

Automation as a Manpower Reduction Strategy in US Navy Ships

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Since the early 2000's, the US Navy has endeavored to decrease the Total Ownership Cost (TOC) of their ships through a decrease in Operating and Support costs. This led to a large-scale effort by ship program managers to decrease crew size on current and prospective ships. Also during this time period, the rapid-onset improvement of technology led to the increase and complexity of automated systems and equipment installed on ships. These combining trends have caused ships to evolve from a fully manually operated system into a socio-technical system. But does increasing automation to support minimally manned ships lead to the expected performance? To answer this question, a thorough understanding of how the Navy currently determines its manpower requirements was obtained. The purpose was to discover the driving factors that influence manpower requirements, which are mission, installed systems, maintenance and training. Next, the process that the Navy uses to develop and manage technology was explored. The purpose was to discern the driving factors that influence technology selection, which are capability, maturity and cost. Since the Defense Acquisition System (DAS) is the framework that intersects manpower requirements, technology selection and ship design, a brief overview of DAS is given. Using key acquisition documents from DDG-51, LCS, and DDG-1000 programs, the selection, classification and implementation of automated technology on these platforms were explored. This data was then combined with the baseline manpower model to highlight key manpower and automation strategies for each platform and then study the resulting performance. From these case studies, it was determined that automation as a manpower reduction strategy gives mixed cost and readiness performance results. Although automation leads to lower manpower costs, increases in maintenance, training and shore support also occur. Some of these costs were offset through the use of human system integration early in the ship design, however, the maintenance and training costs of high-degree-automation systems was higher than estimated.

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