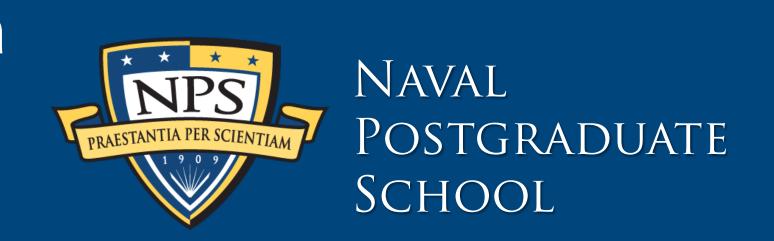
# Additive Manufacturing Laboratories at Sea and their Added-Value to the Navy's Seagoing Warfighter

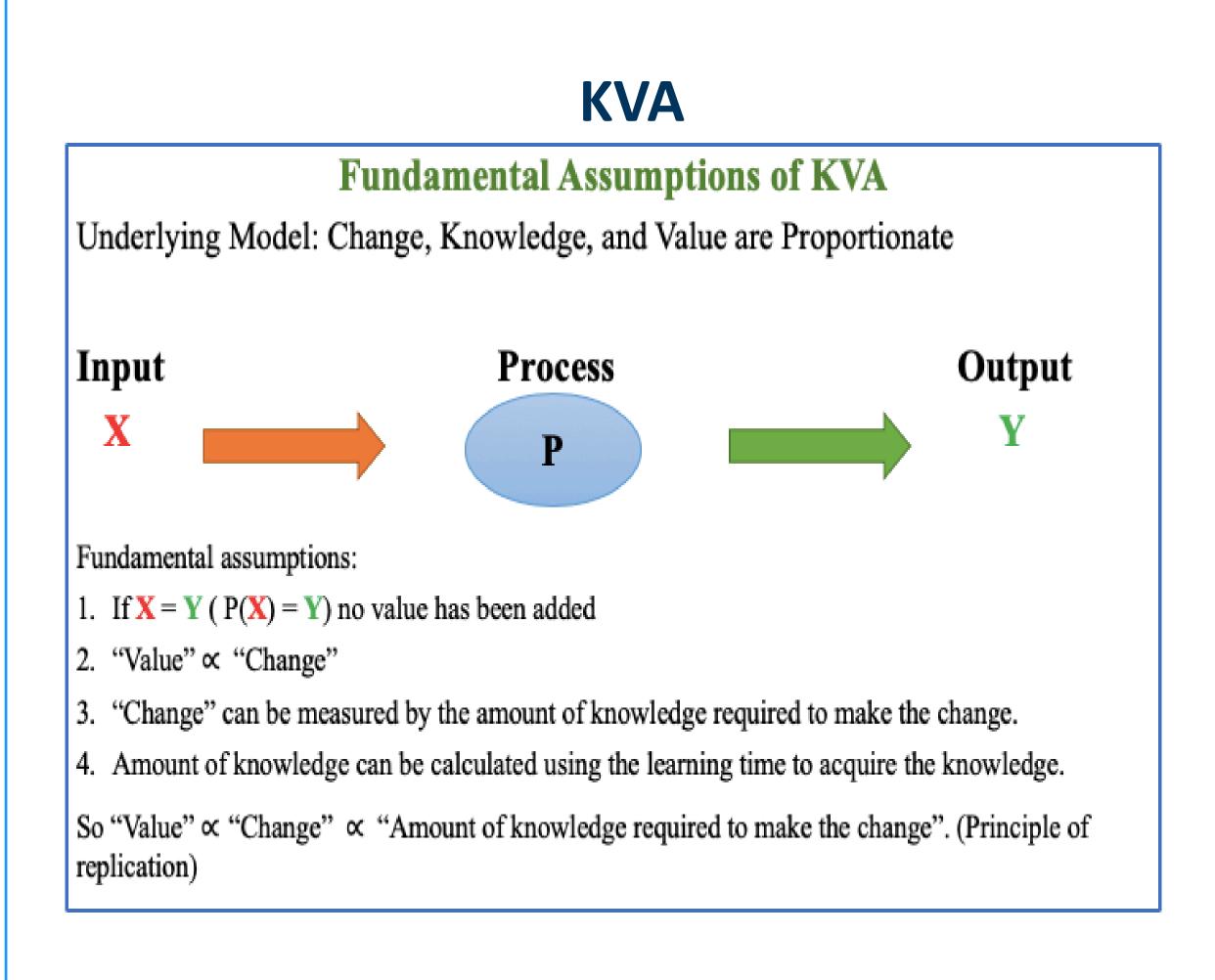


#### **Abstract**

The purpose of this MBA report is to analyze and evaluate the added-value of additive manufacturing laboratories (AMLs) installed on seagoing vessels and to provide lessons learned from the U.S. Navy's first Additive Manufacturing Shop at Sea, onboard USS John C. Stennis (CVN 74), in the manufacturing (printing) of replacement parts on-demand for immediate use. This project seeks to make three contributions. First, a cost-benefit analysis (CBA) utilizing a selected part manufactured through AM procedures to determine value, cost, and time savings that AMLs installed aboard ships would offer. Second, a comprehensive analysis utilizing the Knowledge Added-Value Methodology (KVA) to determine the KVA of the Surface Navy's 3D printing AM program. Third, a compilation of lessons learned to support or reject the installation and viability of these shops and their equipment installed across the fleet, by utilizing data gathered from firsthand accounts and experiences of the sailors who operated the first AML at sea onboard USS John C. Stennis. At the end of the report general recommendation(s) are provided for the future installation of AMLs across the fleet to maximize benefits, cost savings, and value added to the U.S. Navy as well as for future research.

#### Methods

## CBA **COST BENEFIT** 45% **ANALYSIS** Cost Benefit Analysis is a systematic approach to calculate and compare the benefits and costs of a project or a given situation. 25 -Provides a basis for Determines if an investment or decision is feasible comparing investments or decisions **How to Perform Cost Benefit Analysis?** Calculate Calculate Conduct Benefits Costs Brainstorming Compare Costs and **Benefits**



### Results

The findings from the CBA and KVA provide clear evidence that the overall benefits of AM implementation outweigh the cost of investment with a ROK and ROI of 334% and 234% respectively, and a correlation between them of one. Because AM could potentially play a major role in manufacturing timesensitive parts on demand for sustainment and readiness for entire Battle Groups at sea, AML installation on naval vessels clearly provides a value-added capability to the Navy.

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