Theater Support Vessel Procurement:
Industrial Base Assessment of the Potential Economic And Dual Sourcing Impacts

U.S. Department of Commerce
Bureau of Industry and Security
Office of Strategic Industries and Economic Security
Strategic Analysis Division

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Executive Summary

The U.S. Department of Commerce, Bureau of Industry and Security (BIS), conducted this study at the request of the U.S. Army to assess the economic benefits of procuring and building Theater Support Vessels (TSVs) in the United States. The assessment analyzes the potential economic benefits of the TSV project to domestic shipyards, their key suppliers, the workforces involved, and local and regional economies. The assessment also analyzes the strategic benefits of single sourced and dual sourced production.

Aggregate Economic Impacts

Per the Army's parameters, the TSV procurement will initially involve the acquisition of seven high-speed aluminum-hull vessels with delivery through 2008. Each TSV has an approximate procurement cost of $141 million. BIS also analyzed the economic impact should the TSV procurement receive funding for 12 and up to 24 vessels over the life of the program with single and dual-sourced production.[1] The timeline for a single sourced procurement is projected as 2004-2016; dual sourced procurement is projected as 2004-2010.

Our analysis indicated that an initial procurement of seven TSVs between 2004 and 2008 will: (1) add more than $1.3 billion in wealth to the U.S. economy; (2) create 2,849 new domestic jobs: 81 percent at the shipyard and its local economy and 19 percent at the key suppliers; and (3) produce an increase of $310.8 million in earnings of individuals and households. If the procurement reaches 12 – or up to 24 – vessels, the amount of economic benefits increases substantially.

[1] *Single sourced production refers to a single shipyard producing TSVs, dual sourced refers to two shipyards producing TSVs simultaneously.*

Impact of Dual Sourcing

The BIS team also explored the dual sourcing implications of the TSV procurements. On an aggregate basis, our analysis indicates no major economic difference between single and dual sourcing to the overall U.S. economy. However, there are several strategic benefits that are highlighted from the survey results. The main strategic impacts of dual sourcing are: (1) reduced risk to the supply chain and, ultimately, readiness; (2) wider distribution of economic impacts and a faster production timeline; (3) broader dissemination of TSV-related knowledge and its skills base; and (4) enhancement of U.S. shipbuilding industry competitiveness.

Employment Benefits

The TSV-capable shipyards are all located in regions with unemployment rates higher, and wage levels lower, than the national average. Nearly 43 percent of total TSV workers will be highly skilled production workers earning base wages of $14 to $18 per hour. Including benefits, their total compensation would reach between $28 and $36 per hour.[2] Should the full TSV program receive funding, these new jobs would last through 2016 and potentially beyond, with the addition of commercial high-speed aluminum vessel-related business opportunities. Dual sourcing will provide similar employment benefits but split them between the two regions and reduce production time by half (through 2010).

According to the shipyards surveyed, all of the jobs created and supported by TSV production would be filled by U.S. workers, except for a small number of foreign nationals (<1% of the total workforce required) needed for initial design, engineering, and training.

New Market Creation

The TSV project may also create a new market for critical domestic industrial products during a period when the U.S. manufacturing sector is declining. The U.S. balance of trade in key components of the TSV procurement has been increasingly negative since 1992. Indeed, the transfer from abroad of technology used to assist the design and manufacture of TSVs would

[2] *Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOL/BLS Regional Wage and Employment Data 2003*

inject entirely new professional and technical skill sets into the U.S. economy and the defense manufacturing base. Over time, U.S. TSV-capable shipyards could position themselves to enter the $400 million annual, and growing, global market for high-speed aluminum vessels.[3] In a fashion similar to the U.S. Coast Guard's innovative Deepwater program,[4] the TSV procurement could be another vehicle for the U.S. maritime industry to increase sales and enhance its competitiveness in the global marketplace. Dual sourcing would allow two U.S. shipyards to take advantage of this capability.

Impact of Foreign Sourcing on TSV Economic Benefits

Most of the TSV's content will be U.S.-made, ensuring that the greatest possible benefits are captured by the domestic economy. Although the situation varied according to shipyard, it was apparent that some important TSV sub-systems and components may be most easily procured from overseas suppliers – in particular, propulsion systems, aluminum, and some electronics. If this foreign sourcing did occur, the economic benefits would still be substantially positive to the U.S. economy, but the benefits would be an average of one-fourth smaller.

Should these subsystems be imported, the initial overall TSV benefits to U.S. economic growth, employment, and income will be reduced as follows for the first seven TSVs: (1) overall economic impact to the shipyard and supplier economies would be reduced by 26 percent, or $346 million, from 2004-2008; (2) overall earnings would be reduced by 24 percent, or $76 million, from 2004-2008; and (3) overall job growth would be reduced by 19 percent, or more than 530 jobs, from 2004-2008. If the total procurement reaches 24 vessels, the reduction in U.S. growth, employment, and income from imported components would be even greater.

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[3] *Source: Australian Trade Commission 2003*

[4] *U.S. Coast Guard Deepwater Program website: http://www.uscg.mil/deepwater*

I. Introduction and Methodology

The U.S. Department of Commerce, Bureau of Industry and Security (BIS), conducted this study at the request of the U.S. Army to assess the economic benefits of procuring and building Theater Support Vessels (TSVs) in the United States. This BIS assessment analyzes the economic benefits of the TSV project to potential shipyards, their suppliers, and the workforces involved, as well as to local/regional economies. The assessment also analyzes the strategic benefits of single sourced and dual sourced production.

BIS performs industrial base assessments to study the capabilities of the commercial industrial base to support the national defense. As part of these assessments, BIS collects basic economic and industrial information from industry. These assessments are conducted under the authority of Section 705 of the Defense Production Act (50 U.S.C. § 2155), as amended, and Section 401 of Executive Order 12656, as amended.

Per the Army's parameters, the TSV procurement will initially involve the acquisition of seven high-speed aluminum-hull vessels with delivery through 2008. Each TSV has an approximate procurement cost of $141 million.[5] This assessment also projects the impacts of potential long-term procurements of 12 and 24 vessels. Currently, all of the shipyards that BIS surveyed have adequate facilities (land and buildings) to manufacture the TSV. Several shipyards would add production/assembly facilities if needed. On average, each shipyard could build a TSV in 24 months. Each shipyard stated that it had the capacity to build two vessels simultaneously following the initial ramp-up.

Report Methodology

This report's findings are based on site surveys of several U.S. shipyards capable of building the TSV. The BIS survey sought to identify the major inputs required to produce each vessel as well as the proportion of total vessel costs represented by each type of input. Major inputs include

[5] *According to shipyards surveyed, profit margin is projected at 10 percent – or approximately $14.1 million per TSV. This margin is already included in the RIMS II model because it is part of the initial input.*

materials and labor.

The survey results were then fed into the Regional Input-Output Modeling System (RIMS) developed by the Bureau of Economic Analysis of the U.S. Department of Commerce. The RIMS model creates three different ways to look at the potential effects of the TSV procurement: it contains multipliers that permit the calculation of the changes in economic growth, private and household earnings, and employment. The RIMS model is an economic analysis tool that allows for these changes to be calculated and compared from one region of the United States to another. RIMS analysis utilizes different categories of raw materials, parts, components, and subsystems – as well as labor – in manufacturing and other types of production activity to present economic impact data.

The RIMS model is widely used in the U.S. government to assess the economic impact of procurements as well as other related activities. RIMS-based analysis has been used by the U.S. Nuclear Regulatory Commission and the U.S. Department of Housing and Urban Development, and is one of the models used by the Department of Defense to determine the impacts of base closures.

Each shipyard provided a list of the major inputs used in constructing a TSV. This list was then matched to the shipbuilding input categories contained in the RIMS model. A sample of the survey and RIMS analysis explanations are included in the Appendices. To avoid disclosing proprietary information about individual shipyards, the survey responses have been aggregated.

The surveys show that materials will comprise approximately 60 percent of the cost of each TSV. Roughly two-thirds of these material costs are attributable to hull construction and equipment, propulsion systems, and electrical and control equipment. Labor costs will represent 40 percent of the cost of each vessel. Figure I below shows the full average cost breakdown for each key TSV input:

Figure I: Breakdown of TSV Components by Major Category

TSV Component	%
Hull construction and equipment	19%
Propulsion	12%
Electrical and control equipment	12%
Advanced electronic equipment	3%
Internal systems: Environmental, HVAC, Piping	4%
Weapons systems	<1%
Crew boats	<1%
Labor	40%
Other	9%
TOTAL	**100%**

Source: U.S. DOC/BIS TSV Site Survey Data

Hull construction and equipment comprises such materials and items as aluminum, helicopter pads, paint, and coatings. *Propulsion* encompasses such materials and items as engines, maneuvering and mooring machinery, and the fuel system. *Electrical and control equipment* includes lights, a public address system, and basic wiring. *Advanced electronics* include the navigation systems, radar, and a threat detection system. *Internal systems* include environmental systems, HVAC, and piping. *Weapons systems* and *crew boats* are also included, but make up a very small portion of the total cost. *Other* includes non-recurring costs such as insurance, design and testing costs, furnishings, and transportation.

Shipyard Facility Readiness

Facilities are adequate at each shipyard surveyed to build the TSV:

- Shipyard manufacturing facilities are generally underutilized and have excess production capacity;
- New fabrication and modular facilities can be added if needed, and several are already designed to meet potential TSV procurement needs;
- A large, skilled labor pool exists in each shipyard region and can fill the TSV procurement needs; and
- In each shipyard region, federal, state, and shipyard-sponsored training programs and/or assistance are currently in place to upgrade skills or train new workers in specialized job categories.

II. Regional Economic Impact

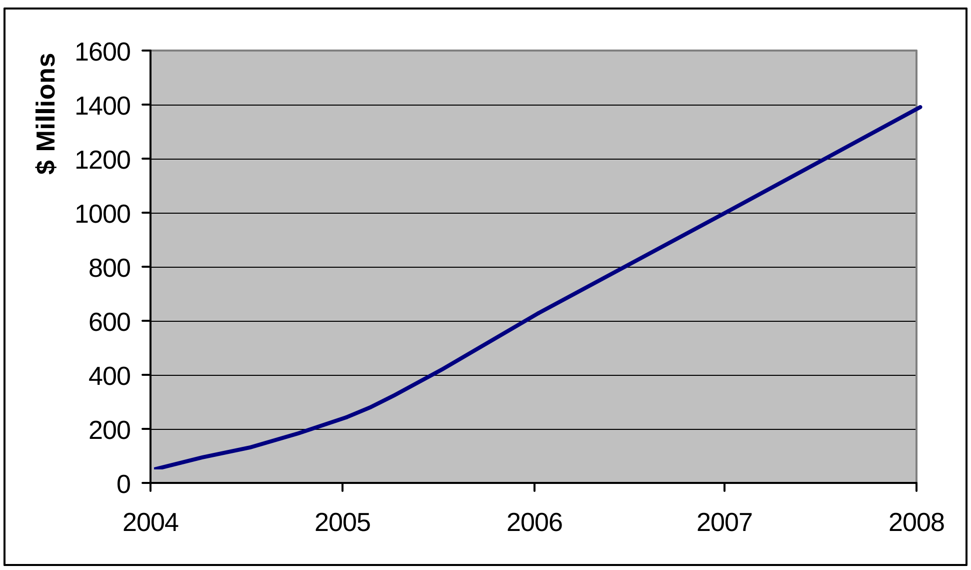
The RIMS model indicates that the cumulative economic impact of building each TSV will be almost $192 million.[6] Therefore, the cumulative increase in economic output generated by the initial procurement of seven TSVs will be more than $1.3 billion. These projections assume that all TSV components and subcomponents will be sourced and manufactured in the United States by U.S. workers.[7]

Figure II: Total Economic Impact for TSV Procurement

Vessels Built	Total Economic Impact
1	$191,525,984
7	$1,340,681,891
12	$2,298,311,814
24	$4,596,623,627

Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/BEA RIMS II Multiplier Data

Figure III: Economic Impact of TSV Procurement on Shipyard and Subsystem Manufacturers (Cumulative: 2004-2008)



Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/BEA RIMS II Multiplier Data

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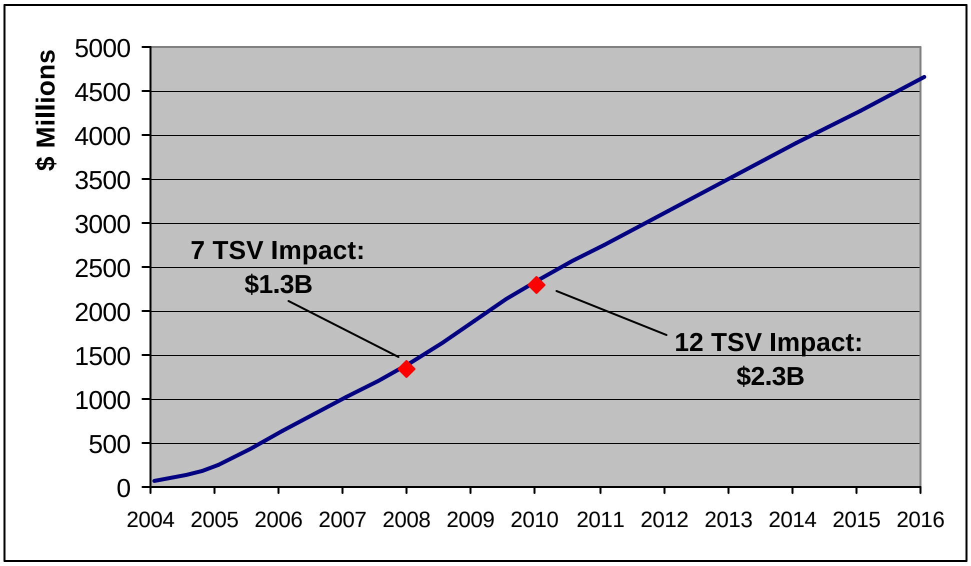
[6] *This economic impact aggregates the following benefits to the economy: employee earnings and enterprise income for the industry, related industries, and local service industries; local and national tax revenue; increased investment and capital spending; and other tangential advancements in technology and competitiveness.*

[7] *Production schedule from the BIS shipyard survey: one ship will be completed in 2005, followed by two ships each year from 2006-2008.*

The overall economic impact of the initial procurement of seven TSVs, as well as a potential procurement of 12 and 24 TSVs over a 13-year period, is shown in Figure IV below. If the 24 proposed TSVs are built, output gains of nearly $4.6 billion will be generated through 2016.

Figure IV: Economic Impact of TSV Procurement on Shipyard and Subsystem Manufacturers (Cumulative: 2004-2016)



Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/BEA RIMS II Multiplier Data

Dual sourcing of the TSV would simply cut the overall production timeline in half, to 2010 with two shipyards realizing the benefits of building 12 TSVs. The overall impact to the U.S. economy would still equal over $4.5 billion.

III. Regional Earnings

A. Overall Earnings

The RIMS model indicates that the impact on regional earnings from building each TSV will be $44.4 million.[8] Therefore, the cumulative impact on regional earnings of building the initial seven TSVs will be $310.8 million over five years. These figures assume the same production schedule as the economic impact figures, as well as virtually 100 percent U.S. manufacturing and sourcing. If all 24 proposed TSVs are built, earnings gains of more than $1 billion will be generated through 2016. Specific earnings increases for each TSV procurement scenario are presented below.

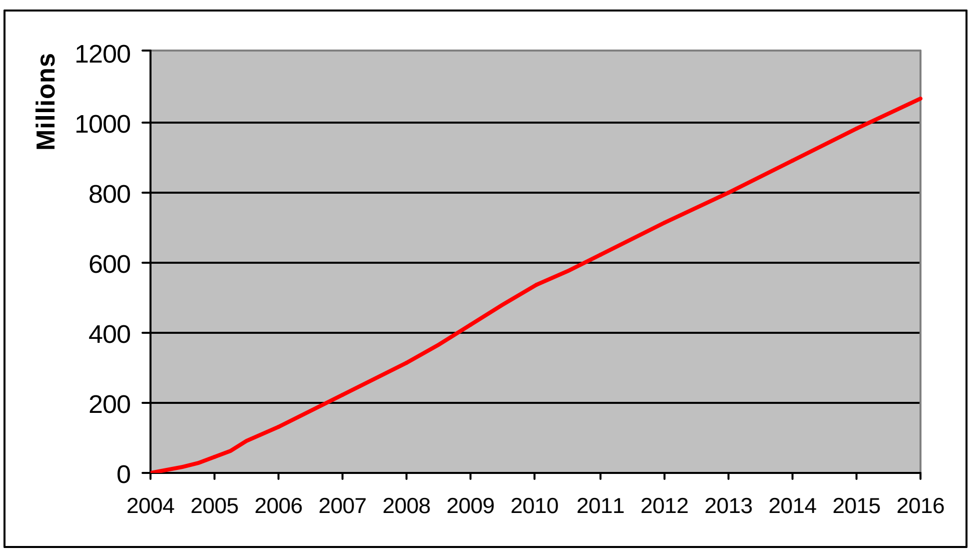
Figure V: Total Economic and Earnings Impacts for the TSV Procurement

Vessels Built	Total Economic Impact	Total Earnings Impact
1	$191,525,984	$44,402,351
7	$1,340,681,891	$310,816,456
12	$2,298,311,814	$532,828,210
24	$4,596,623,627	$1,065,656,420

Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/BEA RIMS II Multiplier Data

As shown, these earnings would grow steadily over the 13-year life of the program:

Figure VI: Earnings Impact of TSV Procurement on Shipyard and Subsystem Manufacturers (Cumulative: 2004-2016)



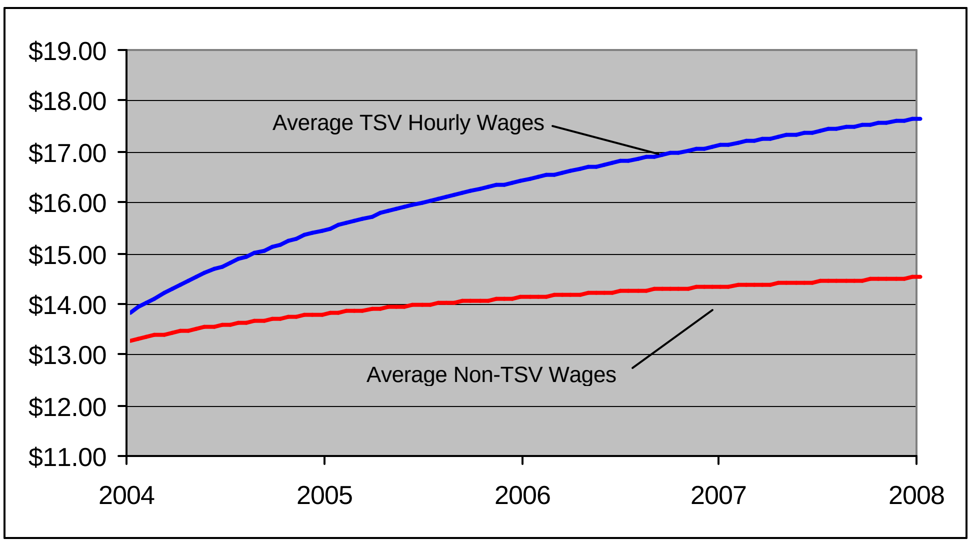
Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/BEA RIMS II Multiplier Data

[8] *Earnings are earnings of individuals. Earnings include aggregate wages of those workers involved directly in the TSV production and local workers benefiting from increased spending and commercial activity.*

B. Wages

The jobs created by the TSV program would pay considerably better wages than the typical shipyard job in the regions surveyed. During the 2004-2008 phase of TSV procurement, the average non-salaried TSV job would pay $16 per hour. During this same period, the average non-salaried, non-TSV shipbuilding job would pay $13.17 per hour – nearly 18 percent lower. The average TSV and non-TSV wages represented below in Figure VII have been adjusted for inflation. An annual inflation rate of 2.34 percent (the average annual inflation rate from 1997-2003) was applied to these wage rates. Inflation rate data were obtained from the U.S. Department of Labor, Bureau of Labor Statistics.

Figure VII: Average Hourly Wage Trends: TSV Level and Non-TSV Level 2004-2008 (Adjusted for Inflation)



Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOL/BLS Regional Wage Data

An examination of TSV employment requirements reveals why the program would pay such high wages on average. Nearly 43 percent of total TSV workers will be highly skilled production workers earning base wages of $14 to $18 per hour. Including benefits, their total compensation would reach between $28 and $36 per hour. Another 13.8 percent of total TSV workers will be salaried engineers and designers whose wages and benefits would be even higher.

A detailed breakout of TSV employment categories and their associated wage and benefit levels is presented below in Figure VIII. Salaried employees, such as engineers and designers, have been separated in order to show the impact on hourly wage positions at TSV shipyards.

Figure VIII: Employment Wage and Type Breakout for TSV Procurement

Type	Base Wage	Wage w/Benefits[9]	% of Total Workforce
*Engineer	$25 to 30	$50 to 60	4.5%
*Designer	$20 to 25	$40 to 50	9.3%
Draftsman	$10 to 14	$20 to 28	13.8%
Welder	$14 to 18	$28 to 36	7.4%
Fitter	$14 to 18	$28 to 36	14.9%
Helper	$10 to 14	$20 to 28	13.0%
Pipefitter	$14 to 18	$28 to 36	5.6%
Painter/Blaster	$14 to 18	$28 to 36	4.5%
Electrician	$14 to 18	$28 to 36	7.4%
Machinist	$14 to 18	$28 to 36	3.0%
Pipewelder	$14 to 18	$28 to 36	3.0%
**Other	$10 to 15	$20 to 30	13.8%
Average Hourly Wage	**$10 to 18**	**$20 to 36**	**86.2%**
Average Salaried	**$20 to 30**	**$40 to 60**	**13.8%**

** - Salaried Workers ** - 'Other' includes clerical, marketing, supervisory, quality assurance, program management and other peripheral positions*
Source: U.S. DOC/BIS TSV Site Survey Data

In addition, the high-wage manufacturing jobs created by the TSV program would utilize skills valuable for many types of high-value and defense-related production. Aluminum welding is the most prevalent skill example because the TSV potentially could be built almost exclusively of aluminum. According to the shipyards surveyed, most of the welding done by their current workforces is steel-based whereas aluminum welding requires completely different skill sets and is more difficult because of the specific properties of the metal.

Benefits from TSV-related construction would extend to other professional jobs such as high-speed ship design and aluminum vessel engineering. These new skill sets would help to expand the nation's manufacturing and defense industrial base as well as make U.S. shipyards more competitive in emerging markets such as high-speed ferry and transport vessel design and construction. Dual sourcing would multiply the effects of these benefits.

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[9] *According to each shipyard's human resources personnel, the average total wage with benefits was roughly double the hourly wage.*

IV. Regional Employment Effects

The impact on regional employment levels from building the first TSV (from 2004 to 2005) will be to create more than 1,400 jobs. When a second production line is operational, the cumulative impact on regional employment of building the initial seven vessels will be more than 2,800 jobs. These figures assume the same production schedule as the output and earnings impact figures, as well as virtually 100 percent U.S. sourcing and manufacturing.

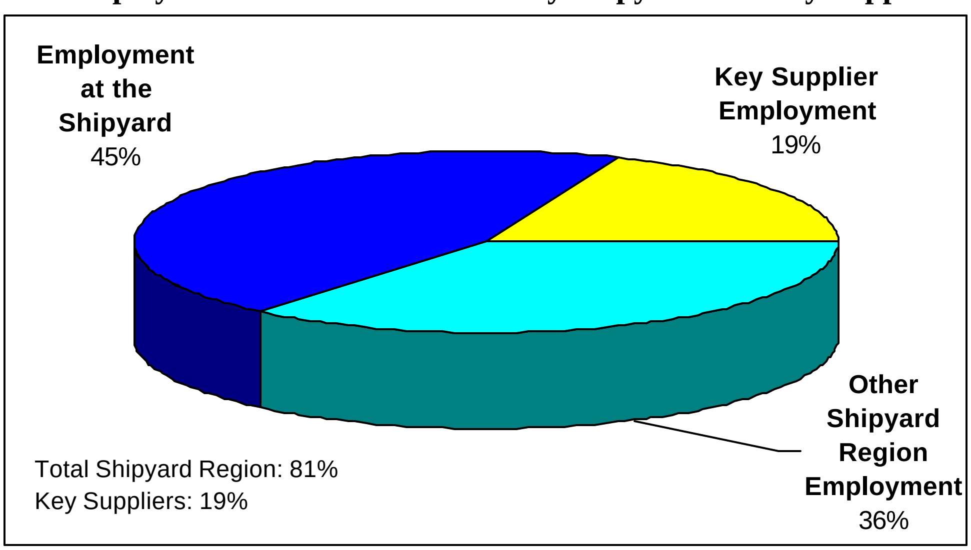
Figure IX: Total Economic, Earnings, and Employment Impacts

Vessels Built	Total Economic Impact	Total Earnings Impact	Total Employment Growth
1	$191,525,984	$44,402,351	1,424
7	$1,340,681,891	$310,816,456	2,849
12	$2,298,311,814	$532,828,210	Stabilizes at 2,849
24	$4,596,623,627	$1,065,656,420	Stabilizes at 2,849

Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/BEA RIMS II Multiplier Data

The employment effects will be felt mainly in the shipyard regions, both at the shipyards themselves and in the local economy. Job growth will also occur in other U.S. regions where the key suppliers are based. A percentage breakdown of the job growth for each region involved in the TSV procurement is shown in Figure X below:

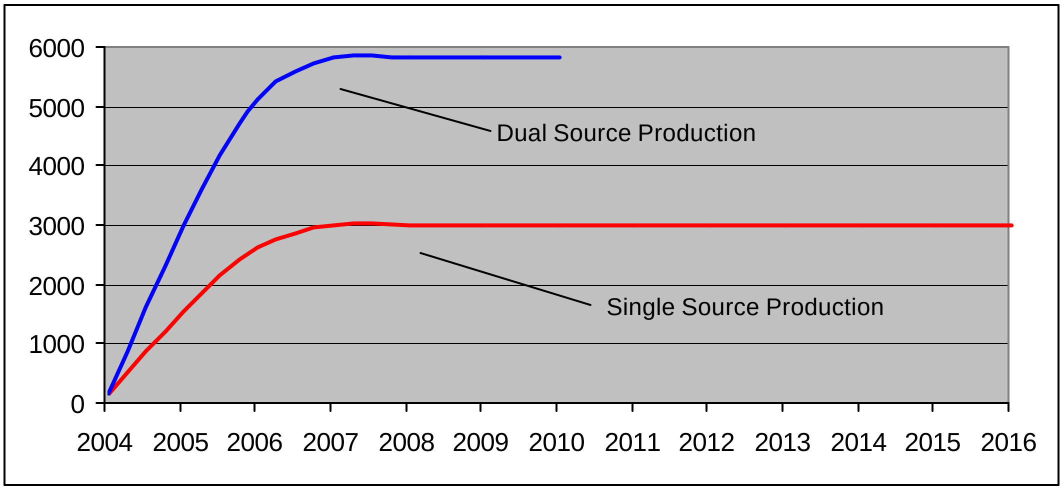
Figure X: Employment Growth Breakdown by Shipyard and Key Supplier Region



Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/BEA RIMS II Multiplier Data

For the purposes of this study, BIS is assuming that the remaining ships would be built two at a time. Should all 24 TSVs be built, the cumulative employment effects will remain at the 2,800+ level through 2016. It is possible that a longer procurement could create new domestic and international markets and/or a greater number of jobs, but this is not assumed for the purposes of this study. The job growth trend for TSV production is presented below in Figure XI:

Figure XI: Shipyard and Subsystem Manufacturers Job Growth from TSV Procurement (Dual and Single Source Production Effects)



Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/BEA RIMS II Multiplier Data

Dual sourcing would create over 2,800 jobs *at each shipyard*, bringing the overall employment level to over 5,600 jobs related to the TSV procurement. However, these jobs would be sustained for the time period through 2010, not 2016.

All the shipyards surveyed by BIS had adequate facilities to build the TSV procurement. Several commented that new sites could also be built if necessary. All shipyards surveyed were operating at least slightly under capacity. As conveyed by the unemployment numbers, there remains a large and skilled labor pool in each shipyard region that could be put to more efficient use with a TSV procurement.

V. Dual Sourcing Impact

The BIS team also explored the dual sourcing implications of the TSV procurements. On an aggregate basis, our analysis indicates no major economic difference between single and dual sourcing to the overall U.S. economy. However, there are several strategic benefits that are highlighted from the survey results. The main strategic impacts of dual sourcing are:

- Reduced risk to the supply chain and, ultimately, readiness;
- Wider distribution of economic impacts and a faster production timeline;
- Broader dissemination of TSV-related knowledge and the TSV skills base; and
- Promotion of U.S. shipbuilding industry competitiveness.

A. Risk Reduction

By increasing the production from one shipyard to two, risks are reduced due to threats from natural disasters, such as a hurricane, or terrorist attacks. This reduces the likelihood of a slowdown or a complete shutdown of TSV production for a period of time.

B. Economic Impact

Producing the TSV in two different shipyard regions will also change the dissemination of economic and employment impacts. For the purposes of this example, we assume that a full production of 24 vessels would be built using dual sourcing. The impacts would be as follows:

- TSV production timeline would be halved, from 2004-2016 to 2004-2010;
- Two shipyard regions would benefit from 12 TSV productions at each shipyard: $2.3 billion in overall impact, $533 million in earnings, and 2,849 jobs; and
- Each shipyard would increase employment by 2,849, but these jobs would be sustained for half the time (until 2010, not 2016) compared to single sourcing.

The lasting economic effects of a full production at one shipyard, and its economy of scale, would not be the same with dual sourcing, but the overall impact on the U.S. economy would remain the same. In the long run, however, the combined strategic and economic benefits of dual sourcing outweigh several specific economic benefits of single sourcing.

C. Knowledge, Technology and Skill Base Expansion

Dual sourcing also would ensure that capability and knowledge concerning TSV construction would not be restricted to one company or region of the United States. Examples of skill sets created from TSV construction include aluminum welding, assembly, and piloting of the vessel. Technology transfers could include water jet propulsion, lighter pumps, and high speed vessel design and technology. Dual sourcing will also create larger demand for training new skilled workers to upgrade and maintain the continuity of skills and knowledge in the current labor force.

D. Increased Competitiveness

Dual sourcing will also provide a more robust and competitive shipbuilding industry. By supporting more than one shipyard in the TSV procurement, technique and know-how will be increased in more than one region. Development of a more technically adept shipbuilding base will make current and future acquisitions more competitive for the Army and the taxpayer. In addition, by having more than one company work on the same program, competition between them is likely to improve the overall product for the Army. Furthermore, this improves the shipbuilders' ability to compete in the emerging commercial high-speed vessel and transport markets, valued at over $400 million annually.[10]

[10] *Source: Australian Trade Commission 2003*

VI. Impact of Foreign Sourcing on TSV Economic Benefits

The following analysis is based on the assumption that there is no substantial difference in quality or cost between U.S. and foreign components. According to the shipyards surveyed, several key TSV components and systems could likely be sourced from foreign suppliers, although the list varied from shipyard to shipyard. These potentially include:

- Engines
- Reduction gears
- Shafts
- Water jets
- Ramps
- Ride control systems
- Aluminum plate

In addition, according to the shipyards surveyed, the design and technical support would be performed in the United States by Australian, British, Swedish, Canadian, and/or Italian nationals.[11] Again, specific needs vary by shipyard. Foreign trainers would also be brought in to teach welding and vessel piloting techniques. For all the shipyards BIS surveyed, foreign nationals would make up a very small percentage of the employed personnel, and they would only be used during the initial stages of TSV production.

At the same time, BIS and a number of shipyards have identified potential U.S. suppliers for many of these inputs. Using foreign inputs and labor rather than domestic inputs and labor would significantly reduce the beneficial impact of the TSV procurement on U.S. output, earnings, and employment levels.

The reduction of these domestic gains can be seen by examining the impact of outsourcing the aforementioned subsystems to foreign suppliers. For the 2004-2008 construction period, these subsystems would total $346.4 million of the seven TSVs' $994.2 million of total content, or approximately 26 percent of the total content value. These subsystems would also represent 24 percent of the total $310.8 million in total earnings generated by this phase of the TSV program,

[11] *Source: U.S. DOC/BIS TSV Site Survey Data*

as well as 19 percent of the 2,849 jobs created during this period. All these figures exclude the design and technical support costs of the TSVs.

If this work is sourced abroad, significantly less output will be added to the U.S. and regional economies, considerably lower earnings will be generated, and noticeably fewer jobs will be created by the initial TSV procurement. Specifically:

- Domestic output gains will be reduced from $1.3 billion to $994.2 million, a 25.8 percent drop;
- Domestic earnings gains will be reduced from $310.8 million to $234.9 million, a 24.4 percent drop; and
- The number of new jobs created will be reduced from 2,849 to 2,316, an 18.8 percent drop.

Figure IX[12]: Total Economic, Earnings, and Employment Impacts

Vessels Built	Total Economic Impact	Total Earnings Impact	Total Employment Growth
1	$191,525,984	$44,402,351	1,424
7	$1,340,681,891	$310,816,456	2,849
12	$2,298,311,814	$532,828,210	Stabilizes at 2,849
24	$4,596,623,627	$1,065,656,420	Stabilizes at 2,849

Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/BEA RIMS II Multiplier Data

Figure XII: Total Economic, Earnings, and Employment Impacts – Without Key Domestically Produced Subsystems

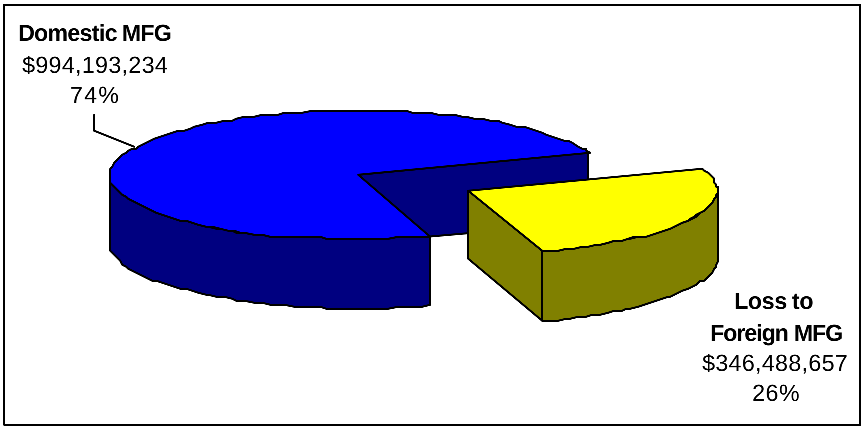
Vessels Built	Total Economic Impact	Total Earnings Impact	Total Employment Growth
1	$142,027,605	$33,559,021	1,158
7	$994,193,234	$234,913,149	2,316
12	$1,704,331,259	$402,708,256	Stabilizes at 2,316
24	$3,408,662,518	$805,416,511	Stabilizes at 2,316

Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/BEA RIMS II Multiplier Data

[12] *Figure IX is first found on page 9 of this report.*

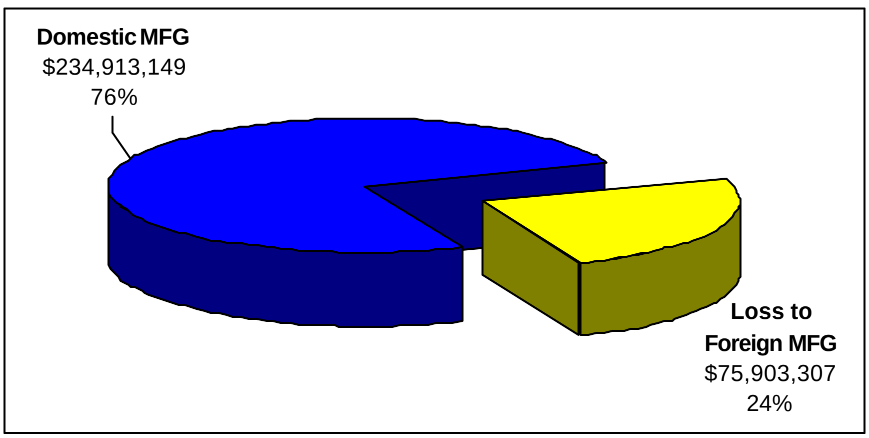
The impacts of foreign sourcing of key components and subsystems can also be viewed below:

Figure XIII: Domestic vs. Foreign Sourcing: Economic Impact (2004-2008)



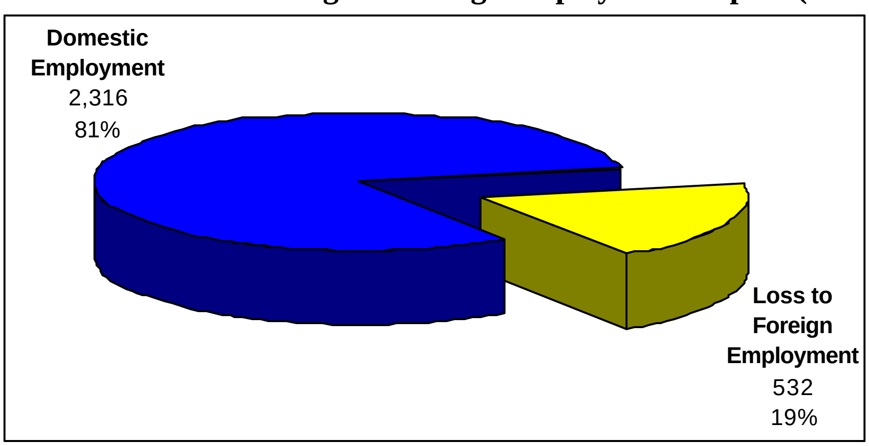
Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/BEA RIMS II Multiplier Data

Figure XIV: Domestic vs. Foreign Sourcing: Earnings Impact (2004-2008)



Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/BEA RIMS II Multiplier Data

Figure XV: Domestic vs. Foreign Sourcing: Employment Impact (2004-2008)



Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/BEA RIMS II Multiplier Data

VII. Trade and Competitiveness Impact

A. TSV-Related Industry

Most of the leading components and subsystems comprising each TSV are produced by sectors of American manufacturing that have faced major global competitiveness challenges since the early 1990s. A detailed breakout of TSV content reveals the following to be each vessel's principal components and subsystems measured by share of total costs:

Figure XVI: Breakout of Key TSV Components and Subsystems

Component/Subsystem	% of Total Cost
Relays and industrial controls	7.83%
Fabricated structural metal	7.64%
Internal combustion engines	4.33%
Mechanical power transmission equipment	3.52%
Blowers and fans	2.97%
Pipes, valves and pipe fittings	2.42%
Electric motors and generators	2.34%
Electrical equipment for internal combustion engines	1.71%

Source: U.S. DOC/BIS TSV Site Survey Data

Together, these components and subsystems comprise nearly one-third of each vessel's total cost. U.S. trade figures, however, indicate that each of these sectors faces competitive challenges, save for internal combustion engines.

These breakouts provided by the shipyards can be roughly matched with Census Bureau data to show recent output trends in these sectors. Because the shipyard data are categorized by Standard Industrial Classification (SIC) codes, and the Census data by the newer North American Industrial Classification System (NAICS) codes, the following figures are important not for identifying precise levels and other figures, but for identifying general magnitudes and trends.[13]

According to the Census data, between 1997 and 2001 (the last year for which detailed output

[13] *The NAICS system was introduced in 1997. The SIC system was phased out in 2001.*

data on U.S. manufacturing are publicly available), domestic production in seven of the TSV component NAICS categories declined from $48.51 billion to $44.2 billion: a drop of 8.9 percent. By comparison, U.S. Gross Domestic Product (GDP) grew by 21.2 percent during that period (in current dollars) and manufacturing output grew by 3.15 percent.

Individual industry data are shown in Figure XVII below:

Figure XVII: Percent Change of TSV Component - by NAICS Category (1997-2001)

TSV Matching NAICS Category	% Change: 1997-2001
Miscellaneous fabricated metal products	-4.70%
Electric motors and generators	-16.30%
Industrial valves	3.61%
Relays and industrial controls	-14.74%
Other metal valves and pipe fittings	-13.00%
Mechanical power transmission equipment	-6.62%
Industrial fans and commercial blowers	-1.48%

Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/Census, NAICS Data 1997-2001

Domestic exports for these industries increased 8.62 percent from 1997 to 2002. But imports for consumption rose more than four times faster during this period – by over 34 percent. Individual industry figures are shown in the tables below:

Figure XVIII: Percent Change of Exports for Key Components Used in TSV Construction (1997-2002)

Export Category	% Change: 1997-2002
Miscellaneous fabricated metal products	23.20%
Electric motors and generators	-3.60%
Industrial valves	12.90%
Relays and industrial controls	11.30%
Other metal valves and pipe fittings	-7.80%
Mechanical power transmission equipment	-1.60%
Industrial fans and commercial blowers	-5.20%

Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/Census Data 1997-2002

Figure XIX: Percent Change of Imports for Key Components Used in TSV Construction (1997-2002)

Import Category	% Change: 1997-2002
Miscellaneous fabricated metal products	30.10%
Electric motors and generators	50.70%
Industrial valves	31.50%
Relays and industrial controls	27.30%
Other metal valves and pipe fittings	31.70%
Mechanical power transmission equipment	15.00%
Industrial fans and commercial blowers	33.10%

Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/Census Data 1997-2002

In 1997, these sectors ran a cumulative trade deficit of $3.04 billion. By 2002, this deficit had more than doubled, to $6.09 billion. Trade balance figures for each sector are shown below:

Figure XX: Trade Balance Data for Key Components Used in TSV Construction (In $ millions - 1997 and 2002)

Component Category	Trade Balance: 1997	Trade Balance: 2002
Miscellaneous fabricated metal products	-$1,104	-$1,644
Electric motors and generators	-$567	-$2,469
Industrial valves	-$641	-$1,279
Relays and industrial controls	-$592	-$1,103
Other metal valves and pipe fittings	$195	-$58
Mechanical power transmission equipment	-$147	-$276
Industrial fans and commercial blowers	-$179	$345

Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/Census Data 1997-2002

At least as important, the domestic market share for each of these domestic industries fell between 1997 and 2001 (the last year for which data are available to support such calculations). Domestic market share figures can be even more revealing than trade balance figures, since they compare imports with domestic shipments or products, not simply with the much smaller export totals. Moreover, the U.S. market is not only the world's largest market for these products, it is the market that U.S. producers presumably know best.

The changes in domestic market share for U.S. producers of the seven TSV-related industries are presented below. They show that domestic producers of these products have all lost share in the U.S. market since 1997:

Figure XXI: Domestic Market Share Data for Key Components Used in TSV Construction (1997 and 2002)

Import Category	1997 Domestic Producers' Market Share	2002 Domestic Producers' Market Share
Miscellaneous fabricated metal products	63.2%	54.2%
Electric motors and generators	71.6%	55.0%
Industrial valves	65.6%	59.8%
Relays and industrial controls	75.9%	66.4%
Other metal valves and pipe fittings	75.3%	64.6%
Mechanical power transmission equipment	75.1%	72.0%
Industrial fans and commercial blowers	79.2%	73.3%

Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/Census Data 1997-2002

More precise and longer-term trade figures for these components and subsystems makers can be obtained from the U.S. government's Standard Industrial Classification figures. These data tell a story closely resembling that told by the NAICS data.

Between 1992 and 2001, domestic exports for the eight industries matching up precisely with the TSV content information rose from $11.34 billion to $19.35 billion – an increase of 70.6 percent. Imports of the same goods during this period, however, grew more than twice as fast – from $11.21 billion to $27.4 billion, or 144.4 percent. Export and import figures for the eight individual industries are presented in the table below:

Figure XXII: Percent Change of Exports for Key Components Used in TSV Construction (1992-2001)

Export Category	% Change: 1992-2001
Internal combustion engines	74.8%
Valves and pipe fittings	107.8%
Electric motors and generators	70.5%
Relays and industrial controls	82.3%
Electrical equipment for internal combustion engines	4.5%
Fans and blowers	88.4%
Mechanical power transmission equipment	96.7%
Fabricated structural metal products	92.6%

Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/Census Data 1997-2002

Figure XXIII: Percent Change of Imports for Key Components Used in TSV Construction (1992-2001)

Import Category	% Change: 1992-2001
Internal combustion engines	110.6%
Valves and pipe fittings	120.0%
Electric motors and generators	150.9%
Relays and industrial controls	200.6%
Electrical equipment for internal combustion engines	135.5%
Fans and blowers	147.9%
Mechanical power transmission equipment	112.6%
*Fabricated structural metal products	2038.0%

** - Fabricated structural metal products percentage increase is very high because its overall market presence is relatively small and changes therefore are magnified*
Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/Census Data 1997-2002

Consequently, sectors whose cumulative trade was in rough balance in 1992 (though much of this was due to a surplus in internal combustion engines) ran a combined $8.05 billion deficit in 2001. Trade balance figures for each sector are shown below:

Figure XXIV: Trade Balance Data for Key Components Used in TSV Construction (In $ millions - 1997 and 2002)

Component Category	Trade Balance: 1997	Trade Balance: 2002
Internal combustion engines	$1,628	$2,255
Valves and pipe fittings	-$285	-$849
Electric motors and generators	-$177	-$2,028
Relays and industrial controls	-$24	-$1,679
Electrical equipment for internal combustion eng.	-$907	-$4,505
Mechanical power transmission equipment	$25	-$92
Fabricated structural metal products	$37	-$384

Source: U.S. DOC/BIS TSV Site Survey Data and U.S. DOC/Census Data 1997-2002

B. Increasing Trade and Competitiveness in the Global Marketplace

In May 2001, BIS released the report "National Security Assessment of the U.S. Shipbuilding and Repair Industry." The report concluded that shipbuilding and repair is important to the national security of the United States and contained these findings:

- It is essential that the capability and infrastructure needed to build these ships is resident in the United States because it provides added assurance that they can be built, repaired, and maintained during times of conflict.

- Shipbuilding and repair is an important component not only of the nation's defense but also of America's transportation infrastructure.

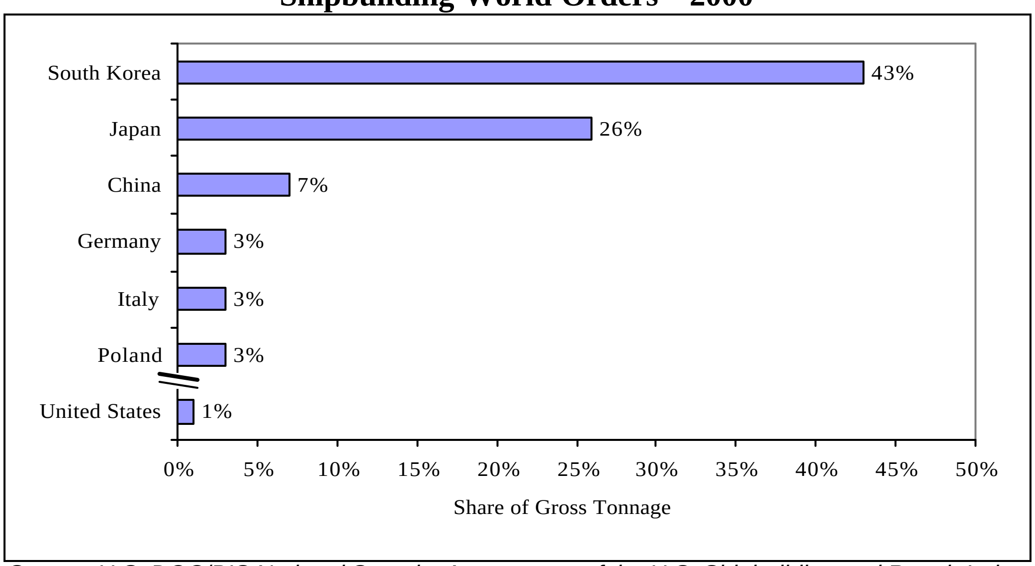
- Many shipyards have difficulty attracting and retaining an adequate supply of qualified production workers. Shipyard productivity increases could potentially allow for higher pay scales, which could help alleviate this concern.

- Extensive modernization of the commercial shipbuilding industry could improve productivity and thereby reduce the costs for purchasers of American-made vessels.

- The U.S. commercial shipbuilding industry is generally not internationally competitive. Various sources report several reasons for this lack of competitiveness, including foreign government subsidies and other unfair trade practices, exchange rates, and lagging U.S. productivity.

- The United States ranks tenth in the world with about a one percent share in the construction of new commercial vessels over 1,000 gross tons (as of 2001). By this measure, the leading commercial shipbuilding nations are South Korea (43 percent of the market); Japan (26 percent); China (7 percent); and Germany, Italy, and Poland (each with 3 percent).

Shipbuilding World Orders – 2000



Source: U.S. DOC/BIS National Security Assessment of the U.S. Shipbuilding and Repair Industry 2001

One way to meet the crucial needs of enhancing U.S. shipbuilding productivity, maintaining stable workforces, and solidifying the maritime industrial base supply chain is through increased exports of unique U.S. maritime assets.

The 2001 report highlighted the U.S. Coast Guard's innovative Deepwater program as an initiative that could enhance the U.S. maritime industrial base. The Deepwater program is a $17 billion acquisition of cutters, smaller ships, helicopters, airplanes and unmanned vehicles that constitute a suite of assets for deployment in a wide variety of maritime missions. Deepwater's unique and cutting-edge assets and sub-systems provide an excellent export opportunity for the U.S. maritime industrial base. A study conducted for the U.S. Coast Guard by AMI International, a Seattle-based maritime consulting firm, projects a worldwide market of $21 to $47 billion for Deepwater-type assets over the next 10 to 15 years.

Similar to Deepwater, the unique TSV program could also help enhance the U.S. maritime industrial base by creating new opportunities for export. As a possible military export, the TSV is attractive because it has many potential features for additional asset integration (e.g., helicopters, unmanned vehicles, etc.). The TSV also has commercial export potential within the current $400 million annual, and growing, global market for high-speed ferries and transport platforms.

APPENDICES

A. **BIS Shipyard Site Survey**

B. **Regional Input-Output Modeling System (RIMS II) – Handbook Introduction and Explanation**

C. **BIS: List of Publications**

APPENDIX A

BIS Shipyard Site Survey

Shipyard Site Visit Questionnaire: Theater Support Vessel Production Requirements

June/July 2003

The U.S. Army Tank-automotive & Armaments Command (TACOM) recently tasked the U.S. Department of Commerce's Bureau of Industry and Security, (BIS) with developing an assessment of the economic benefits of potentially procuring Theater Support Vessels (TSVs).

For the purposes of this assessment, the U.S. Army TACOM TSV procurement will initially involve the acquisition of seven high-speed aluminum-hull vessels with staggered delivery through 2009. Each TSV has an approximate procurement cost of $100 million. TACOM would ultimately procure a total of 24 vessels over the life of the program.

BIS will use the answers provided to the attached questionnaire, and other information gathered on our site visit, to assess the economic benefits of the TSV project to your shipyard, your suppliers, the workforces involved as well as local/regional economies.

BIS is working in conjunction with experts at the Maritime Administration (MARAD) of the U.S. Department of Transportation, the Bureau of Economic Analysis (BEA) of the U.S. Department of Commerce and The University Group, Inc.

The BIS site visit is not meant to indicate that your shipyard has been awarded, or favored to be awarded, the TSV procurement contract. However, for purposes of our economic assessment, we would appreciate if the site visit questionnaire is filled out as if you have been awarded the TSV procurement contract. We would also appreciate that you complete this questionnaire prior to the site visit and be prepared to discuss the results during our visit.

Please note that the information submitted in response to the attached questionnaire is deemed business confidential and exempt from public disclosure in accordance with section 705 of the Defense Production Act of 1950, as amended.

Please also note that the questions submitted in the attached survey are designed to measure approximate amounts so as not to unduly burden your company. Please estimate accordingly.

The attached questionnaire is focused on four main points:

- What are the key materials, components, subsystems and labor you will use to construct each TSV?

- Who will be your key suppliers for materials, components and subsystems?

- What are the costs and amounts involved?

- Will you use foreign sources for any of this production? If so who are they and what will they provide?

Please add any additional information or comments that will assist us in completing our assessment.

If you have any questions or comments, please contact either:

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Geoffrey Gauthier
Trade and Industry Analyst
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ggauthie@bis.doc.gov

Attachment

I. Overall Breakdown of TSV Production

1) Are your current facilities adequate or will you need to build new, and/or modernize, facilities to construct the TSV?

____
____
____
____
____
____

2) What is the percentage breakout of key shipyard costs per each TSV? Please add or modify categories if necessary (percentages should total 100%):

Hull construction and equipment (e.g., hull, ramp, helo pad, coatings):	____%
Propulsion, maneuvering and mooring machinery (e.g., engines, fuel system):	______
Electrical and control equipment (e.g. lights, public address system):	______
Advanced electronic equipment (e.g., navigation system, radar, threat detection):	______
Fire Safety equipment:	______
Boilers, pressure vessels, fired equipment (e.g., heating system, hydraulics):	______
Piping Systems components (e.g., water, HVAC):	______
Weapons systems:	______
Environmental systems (e.g., waste, pollution, climate control):	______
Crew boats (work and rescue):	______
Labor:	______
Other:	______
TOTAL:	**100%**

3) What percentage of production per TSV do you expect to be done in your shipyard versus outsourcing?

Your shipyard production: ______% + Outsourced production: ______% = **100%**

II. Key Components, Materials and Subsystems

Please fill in the table below to answer the following questions. As noted previously, please estimate. All costs and quantities should be for each TSV, *NOT* for a whole production program:

#	Key Comp/Mat'l/Subsys	Potential Supplier (Name)	Supplier Location	Quantity (specify – tons, etc.)	Total Cost ($)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

III. Labor and Wages

Please approximate where necessary:

1) What category of workers will your shipyard employ to build each TSV? (e.g. welders, engineers)

2) How many of each category will be employed?

3) How much will each category of worker be paid?

4) What is the shipyard's total labor cost per employee type for each TSV?

Employee Category	How many?	Wage/hr	Total Cost ($)
TOTALS			

5) Are trained workers available or will you need to train new people? (Please specify what employee category needed)
____
____
____

6) How many foreign nationals do you expect to employ, and in what capacity? ______________________________
____

IV. Foreign Source/Partner

BIS must also determine your potential foreign partners and the technologies you will be sharing. Please explain below:

Potential Foreign Source/Partner	Foreign Source/Partner Location	Key Comp/Mat'l/Subsys Supplied	US Source Available? Y/N

Foreign Source/Partner Comments:

V. Other Commercial/Military Markets

1) What commercial markets might exist for TSV-type vessels both inside and outside the U.S.?

2) What other militaries in the world might also be interested in TSV-type vessels?

VI. Additional Comments

APPENDIX B

Regional Input-Output Modeling System

(RIMS II)

Handbook Introduction and Explanation

Regional Multipliers from the Regional Input-Output Modeling System (RIMS II): A Brief Description

Overview

Effective planning for public- and private-sector projects and programs at the State and local levels requires a systematic analysis of the economic impacts of these projects and programs on affected regions. In turn, systematic analysis of economic impacts must account for the inter-industry relationships within regions because these relationships largely determine how regional economies are likely to respond to project and program changes. Thus, regional input-output (I-O) multipliers, which account for inter-industry relationships within regions, are useful tools for conducting regional economic impact analysis.

In the 1970's, the Bureau of Economic Analysis (BEA) developed a method for estimating regional I-O multipliers known as RIMS (Regional Industrial Multiplier System), which was based on the work of Garnick and Drake. /1/ In the 1980's, BEA completed an enhancement of RIMS, known as RIMS II (Regional Input-Output Modeling System), and published a handbook for RIMS II users. /2/ In 1992, BEA published a second edition of the handbook in which the multipliers were based on more recent data and improved methodology. In 1997, BEA published a third edition of the handbook that provides more detail on the use of the multipliers and the data sources and methods for estimating them.

RIMS II is based on an accounting framework called an I-O table. For each industry, an I-O table shows the industrial distribution of inputs purchased and outputs sold. A typical I-O table in RIMS II is derived mainly from two data sources: BEA's national I-O table (pdf) (html), which shows the input and output structure of nearly 500 U.S. industries, and BEA's regional economic accounts, which are used to adjust the national I-O table to show a region's industrial structure and trading patterns. /3/

Using RIMS II for impact analysis has several advantages. RIMS II multipliers can be estimated for any region composed of one or more counties and for any industry, or group of industries, in the national I-O table. The accessibility of the main data sources for RIMS II keeps the cost of estimating regional multipliers relatively low. Empirical tests show that estimates based on relatively expensive surveys and RIMS II-based estimates are similar in magnitude. /4/

To effectively use the multipliers for impact analysis, users must provide geographically and industrially detailed information on the initial changes in output, earnings, or employment that are associated with the project or program under study. The multipliers can then be used to estimate the total impact of the project or program on regional output, earnings, and employment.

RIMS II is widely used in both the public and private sector. In the public sector, for example, the Department of Defense uses RIMS II to estimate the regional impacts of military base closings. State transportation departments use RIMS II to estimate the regional impacts of airport construction and expansion. In the private-sector, analysts and consultants use RIMS II to estimate the regional impacts of a variety of projects, such as the development of shopping malls and sports stadiums.

RIMS II Methodology

RIMS II uses BEA's 1999 annual I-O table for the nation, which shows the input and output structure for approximately 500 industries. Since a particular region may not contain all the industries found at the national level, some direct input requirements cannot be supplied by that region's industries. Input requirements that are not produced in a study region are identified using BEA's regional economic accounts. Currently, data for 2000 are used.

The RIMS II method for estimating regional I-O multipliers can be viewed as a three-step process. In the first step, the producer portion of the national I-O table is made region-specific by using four-digit SIC location quotients (LQ's). The LQ's estimate the extent to which input requirements are supplied by firms within the region. RIMS II uses LQ's based on two types of data: BEA's personal income data (by place of residence) are used to calculate LQ's in the service industries; and BEA's wage-and-salary data (by place of work) are used to calculate LQ's in the nonservice industries.

In the second step, the household row and the household column from the national I-O table are made region-specific. The household row coefficients, which are derived from the value-added row of the national I-O table, are adjusted to reflect regional earnings leakages resulting from individuals working in the region but residing outside the region. The household column coefficients, which are based on the personal consumption expenditure column of the national I-O table, are adjusted to account for regional consumption leakages stemming from personal taxes and savings.

In the last step, the Leontief inversion approach is used to estimate multipliers. This inversion approach produces output, earnings, and employment multipliers, which can be used to trace the impacts of changes in final demand on directly and indirectly affected industries.

Accuracy of RIMS II

Empirical tests indicate that RIMS II yields multipliers that are not substantially different in magnitude from those generated by regional I-O models based on relatively expensive surveys. For example, a comparison of 224 industry-specific multipliers from survey-based tables for Texas, Washington, and West Virginia indicates that the RIMS II average multipliers overestimate the average multipliers from the survey-based tables by approximately 5 percent. For the majority of individual industry-specific multipliers, the difference between RIMS II and survey-based multipliers is less than 10 percent. In addition, RIMS II and survey multipliers show statistically similar distributions of affected industries.

Advantages of RIMS II

There are numerous advantages to using RIMS II. First, the accessibility of the main data sources makes it possible to estimate regional multipliers without conducting relatively expensive surveys. Second, the level of industrial detail used in RIMS II helps avoid aggregation errors, which often occur when industries are combined. Third, RIMS II multipliers can be compared across areas because they are based on a consistent set of estimating procedures nationwide. Fourth, RIMS II multipliers are updated to reflect the most recent local-area wage-and-salary and personal income data.

Applications of RIMS II

RIMS II multipliers can be used in a wide variety of impact studies. For example, the U.S. Nuclear Regulatory Commission has used RIMS II multipliers in environmental impact statements required for licensing nuclear electricity-generating facilities. The U.S. Department of Housing and Urban Development has used RIMS II multipliers to estimate the impacts of various types of urban redevelopment expenditures. In addition, BEA has provided RIMS II multipliers to numerous individuals and groups outside the Federal Government. RIMS II multipliers have been used to estimate the regional economic and industrial impacts of the following: opening or closing military bases, hypothetical nuclear reactor accidents, tourist expenditures, new energy facilities, energy conservation, offshore drilling, opening or closing manufacturing plants, shopping malls, new sports stadiums, and new airport or port facilities.

1. See Daniel H. Garnick, "Differential Regional Multiplier Models," Journal of Regional Science 10 (February 1970): 35-47; and Ronald L. Drake, "A Short-Cut to Estimates of Regional Input-Output Multipliers," International Regional Science Review 1 (Fall 1976): 1-17.

2. See U.S. Department of Commerce, Bureau of Economic Analysis, Regional Input-Output Modeling System (RIMS II): Estimation, Evaluation, and Application of a

Disaggregated Regional Impact Model (Washington, DC: U.S. Government Printing Office, 1981). Available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161; order no. PB-82-168-865.

3. See U.S. Department of Commerce, Bureau of Economic Analysis, The Detailed Input-Output Structure of the U.S. Economy, Volume II (Washington, DC: U.S. Government Printing Office, November 1994); and U.S. Department of Commerce, Bureau of Economic Analysis, State Personal Income, 1929-93 (Washington, DC: U.S. Government Printing Office, June 1995).

4. See U.S. Department of Commerce, Regional Input-Output Modeling System (RIMS II), chapter 5. Also see Sharon M. Brucker, Steven E. Hastings, and William R. Latham III, "The Variation of Estimated Impacts from Five Regional Input-Output Models," International Regional Science Review 13 (1990): 119-39.

APPENDIX C

BIS List of Publications

OFFICE OF STRATEGIC INDUSTRIES AND ECONOMIC SECURITY
STRATEGIC ANALYSIS DIVISION

PUBLICATIONS LIST

December 12, 2003

he U.S. Department of Commerce's Strategic Analysis Division is the focal point within the Department for conducting assessments of defense-elated industries and technologies. The studies are based on detailed industry-specific surveys used to collect information from U.S. companie and are conducted on behalf of the U.S. Congress, the military services, industry associations, or other interested parties.

PUBLICATION TITLE	****Italics*** indicate forthcoming studies
8th and 9th Offsets in Defense Trade - Conducted under §309 of the Defense Production Act of 1950 – Fall 2003	
National Security Assessment of the U.S. Shipbuilders' Supplier Base – Fall 2003	
National Security Assessment of the Munitions Power Sources Industry – Fall 2003	
National Security Assessment of the Air Delivery (Parachute) Industry – Fall 2003	
Industry Attitudes on Collaborating with DOD in R&D – Air Force – Fall 2003	
Economic Impact Assessment of the Army Theater Support Vessel Procurement – Fall 2003	
A Survey of the Use of Biotechnology in U.S. Industry – October 2003	
U.S. Textile and Apparel Industries: An Industrial Base Assessment – October 2003	
7th Offsets in Defense Trade - Conducted under §309 of the Defense Production Act of 1950 - July 2003	
Technology Assessment: U.S. Assistive Technology Industry – February 2003	
6th Offsets in Defense Trade - Conducted under §309 of the Defense Production Act of 1950 - February 2003	
Heavy Manufacturing Industries: Economic Impact and Productivity of Welding – Navy – June 2002	
The Effect of Imports of Iron Ore and Semi-Finished Steel on the National Security – October 2001	
National Security Assessment of the U.S. High-Performance Explosives & Components Sector –June 2001	
National Security Assessment of the U.S. Shipbuilding and Repair Industry - May 2001	
Statistical Handbook of the Ball and Roller Bearing Industry (Update) - June 2001	
5th Offsets in Defense Trade - Conducted under §309 of the Defense Production Act of 1950 - May 2001	
National Security Assessment of the Cartridge and Propellant Actuated Device Industry: Update - December 2000	
The Effect on the National Security of Imports of Crude Oil and Refined Petroleum Products - November 1999	
4th Offsets in Defense Trade - Conducted under §309 of the Defense Production Act of 1950 - October 1999	
U.S. Commercial Technology Transfers to The People's Republic of China – January 1999	

Critical Technology Assessment: Optoelectronics - October 1998
3rd Offsets in Defense Trade - Conducted under §309 of the Defense Production Act of 1950 - August 1998
National Security Assessment of the Emergency Aircraft Ejection Seat Sector - November 1997
2nd Offsets in Defense Trade - Conducted under §309 of the Defense Production Act of 1950 – August1997
Critical Technology Assessment of the U.S. Semiconductor Materials Industry - April 1997
1st Offsets in Defense Trade - Conducted under §309 of the Defense Production Act of 1950 - May 1996
National Security Assessment of the Cartridge and Propellant Actuated Device Industry - October 1995
A Study of the International Market for Computer Software with Encryption – NSA -1995
The Effect of Imports of Crude Oil and Petroleum Products on the National Security - December 1994
Critical Technology Assessment of U.S. Artificial Intelligence - August 1994
Critical Technology Assessment of U.S. Superconductivity - April 1994
Critical Technology Assessment of U.S. Optoelectronics - February 1994
Critical Technology Assessment of U.S. Advanced Ceramics - December 1993
Critical Technology Assessment of U.S. Advanced Composites - December 1993
The Effect of Imports of Ceramic Semiconductor Packages on the National Security - August 1993
National Security Assessment of the U.S. Beryllium Industry - July 1993
National Security Assessment of the Antifriction Bearings Industry - February 1993
National Security Assessment of the U.S. Forging Industry – December 1992
The Effect of Imports of Gears and Gearing Products on the National Security - July 1992
Natl. Sec. Assessment of the Dom. and For. Subcontractor Base~3 US Navy Systems - March 1992
Natl. Security Assessment of the U.S. Semiconductor Wafer Processing Equipment Industry - April 1991
National Security Assessment of the U.S. Robotics Industry - March 1991
National Security Assessment of the U.S. Gear Industry - January 1991

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