



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

MBA PROFESSIONAL REPORT

AN ANALYSIS OF PURCHASING SYSTEMS AT THE SHIP LEVEL IN THE UNITED STATES AND HELLENIC NAVIES

December 2014

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REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE December 2014	3. REPORT TYPE AND DATES COVERED MBA Professional Report	
4. TITLE AND SUBTITLE AN ANALYSIS OF PURCHASING SYSTEMS AT THE SHIP LEVEL IN THE UNITED STATES AND HELLENIC NAVIES			5. FUNDING NUMBERS	
6. AUTHOR(S) Andreas Klados				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government. IRB Protocol number ___N/A___.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			12b. DISTRIBUTION CODE A	
13. ABSTRACT (maximum 200 words) This thesis analyzes the factors that define the outcome of the purchasing function and evaluates the current performance of the Hellenic and U.S. navies on those factors regarding their purchasing activity at the ship level. The literature review identified six critical factors in that function: a) the identification and balance of the organization's goals, b) the mix of control measures, c) the existence of fiscal rules, d) the use of appropriate strategies and integrated sourcing teams, e) the level of centralization, and f) the use of purchase tools. The analysis shows that the U.S. Navy is closer to the practices dictated by the theory than the Hellenic Navy, but both navies can make improvements. The Hellenic Navy needs to emphasize the efficiency-related goals, use performance measurement combined with group incentives, loosen the action controls and allow more discretion to its personnel, enhance personal control measures, address the end-of-year spending, move to a more decentralized structure, apply purchasing commodity strategies, and use the modern purchasing tools. The U.S. Navy should establish performance evaluation combined with group incentives, close gaps with tighter control measures, address the end-of-year spending, use integrated purchasing teams, and improve the use of purchase cards and long-term contracts.				
14. SUBJECT TERMS Hellenic, navy, purchasing, procurement, purchase card, e-procurement, purchase strategy, purchase structure, control measures, principal agent, purchase goals			15. NUMBER OF PAGES 63	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UU	

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**AN ANALYSIS OF PURCHASING SYSTEMS AT THE SHIP LEVEL IN THE
UNITED STATES AND HELLENIC NAVIES**

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Submitted in partial fulfillment of the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

**NAVAL POSTGRADUATE SCHOOL
December 2014**

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ABSTRACT

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The analysis shows that the U.S. Navy is closer to the practices dictated by the theory than the Hellenic Navy, but both navies can make improvements. The Hellenic Navy needs to emphasize the efficiency-related goals, use performance measurement combined with group incentives, loosen the action controls and allow more discretion to its personnel, enhance personal control measures, address the end-of-year spending, move to a more decentralized structure, apply purchasing commodity strategies, and use the modern purchasing tools. The U.S. Navy should establish performance evaluation combined with group incentives, close gaps with tighter control measures, address the end-of-year spending, use integrated purchasing teams, and improve the use of purchase cards and long-term contracts.

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TABLE OF CONTENTS

I.	INTRODUCTION.....	1
II.	LITERATURE REVIEW—CRITICAL PURCHASING FACTORS	5
A.	HUMAN RELATED FACTORS IN PURCHASING	5
1.	Competing Goals and Stakeholders	5
2.	The Principal-Agent Issue and Control Measures to Address It	7
3.	The Implications of Fiscal Rules.....	11
B.	STRUCTURE, STRATEGY, AND TOOLS	12
1.	Purchasing Structure.....	13
2.	Purchasing Strategy.....	14
3.	Purchasing Methods and Tools.....	15
a.	<i>Purchase Cards</i>	15
b.	<i>Electronic Tools</i>	17
c.	<i>Long-Term Agreements and Just-in-Time Purchasing</i>	18
III.	ANALYSIS AND CONTRAST BETWEEN THE HELLENIC AND THE U.S. NAVIES	21
A.	COMPETING GOALS	21
B.	THE PRINCIPAL-AGENT ISSUE AND CONTROL MEASURES.....	22
C.	THE IMPLICATIONS OF FISCAL RULES IN PUBLIC PROCUREMENT.....	25
D.	PURCHASING STRUCTURE.....	26
E.	PURCHASING STRATEGY.....	27
F.	PURCHASE CARDS.....	28
G.	ELECTRONIC TOOLS.....	30
H.	LONG-TERM AGREEMENTS AND JUST-IN-TIME PURCHASING.....	31
IV.	CONCLUSIONS	33
A.	RECOMMENDATIONS.....	33
B.	SUMMARY	36
C.	AREAS FOR FURTHER STUDY	37
	LIST OF REFERENCES.....	39
	INITIAL DISTRIBUTION LIST	45

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LIST OF FIGURES

Figure 1.	The key technologies used to support the procurement process (from Doherty et al., 2013).	18
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LIST OF TABLES

Table 1. Current status of critical purchasing factors in HN and USN ships.32

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LIST OF ACRONYMS AND ABBREVIATIONS

AT&L	acquisition, technology, and logistics
BPA	blanket purchase agreement
BBP	better buying power
DOD	Department of Defense
FC	Fleet Command
FY	Fiscal Year
GAO	Government Accountability Office
GSA	General Service Agreement
GPCP	government-wide purchase card
HN	Hellenic Navy
HNGS	Hellenic Navy General Staff
i-ENCON	Incentivize Energy Conservation
ISM	Institute of Supply Management
JIT	just in time
NAVICP	Naval Inventory Control Point
NAVSUP	Naval Supply Systems Command
O&M	operations and maintenance
OPTAR	operation target
TYCOM	Type Command
USD	Under Secretary of Defense
USN	United States Navy

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ACKNOWLEDGMENTS

I would like to thank my advisors, Dr. Jesse M. Cunha and Professor Matthew J. Jacobs, for their support, patience, guidance, and effort during the research and writing of this MBA project. I am grateful for all their assistance.

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I. INTRODUCTION

This thesis discusses the major factors that affect the outcome of the purchasing activity and analyzes the role of those factors in the current purchasing systems at the ship level in the Hellenic and United States navies. The objective of the thesis is to identify areas for improvement in the existing procedures of each navy.

The Hellenic Navy (HN) is a medium-size military organization with limited geographic dispersion of its activities. The HN active military personnel are approximately 20,000 people. Most HN units and agencies are located in the broad area of Attica. The fleet comprises 39 warships, 8 submarines, and 63 more patrol and fleet support ships. The HN ships participate in national deployments and exercises. They also participate in international maritime groups and exercises since Greece is a member of European and international organizations (Hellenic Navy, 2014; Hellenic Navy, n.d.). HN ships are allowed to proceed in procurement of required non-weapon goods or services when the supply system cannot provide them in a reasonable time. The most common purchased items are cleaning supplies, office supplies, spare parts, paints, chemicals and other consumables (Hellenic Navy General Staff [HNGS], 2009). The maximum euro amount for purchases by a HN ship is 15,000 euros (HNGS, 2014c).

The adverse economic circumstances make it critical that the HN gets the highest possible value for any euro it spends in purchasing, in which ships play a significant role. Greek governmental agencies, including the HN, suffer from significant budget cuts due to the fiscal recession that Greece has been facing since 2010. The achievement of cost savings and higher spending efficiency are critical for all agencies, while the optimal use of any available resources should be the main concern of all personnel involved in budget planning and execution. In 2006, the HN's operational budget was 224 million euros. In 2010, it decreased to 206 million and continued decreasing the next four years. For fiscal year 2014, the operational budget was just 111 million euros (HNGS, 2014a).

The U.S. Navy (USN) is a large organization with more than 325,000 active duty personnel and bases located all over the world. The fleet comprises 289 warships such as

frigates, destroyers, cruisers, amphibious assault ships, and littoral combat ships. It also has nuclear-powered aircraft carriers and submarines. More than 30 percent of USN ships are currently deployed overseas (America's Navy, 2014). All USN ships have contracting authority up to the micro-purchase threshold, which currently is \$3,000, while the Type Commands (TYCOMs) can expand ships' authority to \$25,000 in the U.S., or \$100,000 overseas. USN ships can use their contracting authority "to obtain the material and services necessary for day-to-day operations" (Naval Supply Systems Command [NAVSUP], 1997, p. 9–5). The most common required items include repair parts, office supplies, cleaning supplies, medical supplies, electronics, and safety materials (NAVSUP, 2005; NAVSUP, 1997).

The USN is also looking for better value in purchasing. Even though the U.S. economy is one of the biggest and more stable economies in the world, the risk associated with continuous annual deficits and accumulation of public debt has led to strict budgets for governmental agencies, such as the Department of Defense (DOD) services. Since 2010, the DOD is intensively trying to increase efficiency in defense spending through a group of acquisition initiatives known as Better Buying Power (BBP). These include such measures as reduction of the purchasing cycle, strong internal relationships, and the use of incentives (Under Secretary of Defense [USD] (AT&L), 2013). The operation and maintenance (O&M) budget of the USN, under which falls ships' purchasing activity, has been smoothly increasing during the last few years, however. According to the Under Secretary of Defense (USD) Comptroller website (2014), for the Fiscal Year (FY) 2006, the O&M part of the budget was \$29.5 billion. In FY2010, it increased to \$34.6 billion, while in FY2014 it reached the amount of \$44.3 billion.

Organizations no longer consider purchasing as a clerical activity, but rather as a critical function for the accomplishment of their goals. The term purchasing—or procurement as it is commonly used in the public world—refers to "the management of [a] company's external resources in such a way that the supply of all goods, services, capabilities, and knowledge, which are necessary for running, maintaining, and managing the company's primary and support activities is secured at the most favorable conditions" (Bjornaas & Schmidt, 2013, p. 19). The purchasing process is comprised of the following

subsequent distinct phases: a) the identification and evaluation of the need, b) the search for suppliers, c) the selection, d) the form of agreement, e) the ordering, and f) the review and improvement (Laios & Xideas, 1994; Monczka, Handfield, Giunipero, & Patterson, 2011, pp. 42–46). Since the 1980s, private organizations moved to a new strategic approach when they realized the critical role of strategic purchasing in cost savings, innovation, competitive advantage, speed, and flexibility. The public sector followed the same trend a few years later (Bjornaas & Schmidt, 2013; McPeak, 1995; Monczka et al., 2011, pp. 3–28).

The literature review, which is presented in Chapter II, identifies six human and design-related factors in the purchasing process that affect the quality of the purchasing outcome. Overlapping areas among those factors may exist. The identification and balance of the desired goals is the first of them. The second factor refers to the mix of control measures that organizations use to align the behavior of purchasing personnel with their objectives. The existence of fiscal rules in public procurement is the third factor that influences procurement officials' behavior and affects the purchasing outcome. The fourth factor is the use of appropriate strategies and integrated sourcing teams based on the characteristics of purchased items. The fifth factor is the extent of centralization in the structure of the purchasing system, which should match organizational goals. Finally, the use of purchase tools—such as purchase cards, electronic means, and long-term agreements—is the last important factor in purchasing.

Chapter III provides an analysis of the current purchasing procedures followed at the ship level in the Hellenic and the U.S. navies, regarding the identified critical purchasing factors, and shows that the USN is closer to the practices dictated by the theory than the HN; both navies, however, can achieve improvements.

Chapter IV includes specific recommendations for the two navies, according to which the HN needs to place more emphasis on the efficiency-related goals, use performance measurement combined with group incentives, loosen the action control measures and allow more discretion to its personnel, enhance personal control measures, address the end-of-year spending, move to a more decentralized structure, apply purchasing commodity strategies, and use the modern purchasing tools. The USN should

establish performance evaluation combined with group incentives, close gaps with tighter control measures, address the end-of-year spending, use integrated purchasing teams, and improve the use of purchase cards and long-term contacts.

II. LITERATURE REVIEW—CRITICAL PURCHASING FACTORS

This chapter provides a comprehensive review of articles related to the purchasing and supply chain systems to identify the critical factors that affect the purchasing outcome, particularly in public organizations. First, we will analyze some of the innate characteristics of a public procurement system related to the human factor in purchasing, and discuss methods to leverage existing problems. The three categories discussed in this section are the following: a) the balance of competing goals and stakeholders, b) the principal-agent problem with related managerial issues and control measures, and c) the implication of public fiscal rules. Next, we will discuss the significance of factors related to the design and the execution of the purchasing activity. The three areas of this section include the following: a) the purchasing structure, b) purchasing strategies, and c) the purchasing methods and tools. The product of this chapter is the theoretical framework for comparing and evaluating the purchasing systems at a ship level in the Hellenic and U.S. navies.

A. HUMAN RELATED FACTORS IN PURCHASING

Public organizations often use private companies as benchmarks to improve their performance and decrease their costs; there are some major differences between the public and the commercial sectors, however, since the objectives of the first are more complex and wider (Stentoft & Vagn, 2012). It is only during the last twenty years that the differences between private and public procurement have been recognized. Public procurement can never become as streamlined as private, since public procurement officials have to balance among competing goals and interests, whereas private procurement is driven solely by the profit motive. Their discretion authority is constrained by procurement and fiscal regulations (Laios & Xideas, 1994).

1. Competing Goals and Stakeholders

Competing goals inside public procurement lead to trade-off decisions. Unlike private purchasing, where profit is the ultimate goal and integrity a moderate concern,

public procurement needs to balance a big variety of goals, which are often at odds. The public procurement goals can be divided into three major categories, which I describe in turn (Murray, 2009; Schooner, Gordon, & Clark, 2008; Sundry, 2007).

The first group includes the goals of “end-user satisfaction, cost-savings, best value, efficiency, and risk avoidance” (Schooner et al., 2008, p. 6). The end-user satisfaction is the core element of the group, while all the others can be considered as intermediary goals. The procurement agency is not usually the end user while the end user has low cost and budget concerns. Efficiency is related to speed and limited waste. The risk avoidance goal is mainly expressed by the formality in processes, the preference in sealed bidding, and the absence of subjectivity in supplier selection (Schooner et al., 2008).

The second group includes the goals of “integrity, uniformity, transparency, accountability, and competition” (Schooner et al., 2008, p. 10). Integrity is the core goal of the second group, since all of the rest have a supplementary role. Integrity is a significantly bigger concern in public procurement than in the private world, since the money of the tax payers is at stake and corruption is always a threat. Integrity is mainly secured through uniformity, transparency, and competition. Uniformity is achieved through the standardization of the procurement procedures, while transparency refers to the visibility and availability of procurement data to the public. Accountability necessitates the assignment of responsibility to the procurement officials. Finally, competition leads to lower prices and prevents corruption, but it may also lead to delays and damage efficiency. The integrity-related goals are usually at odds with the efficiency and best-value goals (Schooner et al., 2008).

The third group of goals refers to the targeted procurement that supports socio-economic goals. Procurement as a tool of public policy is more common in the U.S., where regulations direct specific portions of the total procurement budget to small and disadvantaged businesses (FARSite, 2014). In the European Union, however, procurement and social-economic policy are also somehow related. The third category of goals is totally absent from private purchasing and is at odds with most of the goals of the other two categories (Schooner et al., 2008). The obligation to achieve specific socio-

economic goals, such as the award of contracts to small and disadvantaged companies, restricts procurement officials' discretion and imposes more bureaucracy and administrative costs. Thus, it hinders the efficiency and best value goals. Moreover, by implementing different standards among companies, uniformity and competition is not fully implemented.

Another major difference between private and public procurement is the variety of stakeholders. In the business world, the procurement system serves the interests of the company's shareholders. The public procurement system has to serve many different groups of stakeholders, the interests of whom may be conflicted. Inside the government, legislators, politicians, program managers and end users are all stakeholders. The public (both as taxpayers and end users) the oversight organizations, and the media are also stakeholders of the public procurement system. The interest of the end user for immediate satisfaction of a need may be in conflict with the public interest for the most economical and rational choice. The public procurement system has to understand the different goals and balance the interests of its stakeholders (Schooner et al., 2008; Soundry, 2007).

2. The Principal-Agent Issue and Control Measures to Address It

The principal-agent theory is a useful tool in explaining behaviors among different stakeholders in both public and private purchasing. The big variety of shareholders and goals in public organizations, however, makes the principal-agent problem more complicated and critical, and necessitates a deeper analysis to address the implications. The agent is a person who acts on behalf of another person, while the principal is the person for whom the agent acts. In this relationship, the principal provides some authority and discretion to the agent. Problems arise when the interests of the agent are not the same as the interests of the principal. The agent will usually have better knowledge and access to information, which makes it difficult for the principal to evaluate his actions (Jurich, 2012; Mankiw, 2012, p. 468–469; McCue & Prier, 2008; Soundry, 2007).

In public procurement, the principal-agent relationship exists at different levels, such as between the government and the purchasing personnel, between the purchasing

personnel and the end user, and between the purchasing organization and the contractor. The procurement personnel at the unit level may prioritize goals based on their own perceptions and differently than the rest of the stakeholders would expect. Better outcomes in procurement require more effort by the procurement personnel without any additional reward. Subsequently, procurement personnel will usually prefer to perform at the minimum acceptable level to avoid any additional non-compensated effort. That trend can be exhibited as a preference for familiar and established suppliers and limited market research. Moreover, personnel's commitment in the achievement of organizations goals should not be taken for granted, especially when the salaries are low and cultural norms increase the risk of corrupted activity. Finally, procurement personnel at the unit level tend to put more importance on quality than best value, so the agency acquires products of higher quality than it needs at a significant high cost (Marshall, Meurer, & Richard, 1993; Polymenidis, 2003; Soundry, 2007).

Organizations establish control measures to address the principal agent issue and the related managerial problems. The managerial problems can be divided into the following three main categories: a) lack of direction (i.e., the personnel do not understand what the organization needs), b) lack of motivation (i.e., the personnel are not motivated to act according to the organization's interests), and c) personal limitations (i.e., the personnel understand the organization's goals and are willing to work towards them but lack the required capabilities). The control measures to address those problems can be grouped in the following four categories: a) the result controls, b) the action controls, c) the people controls, and d) the cultural controls. Organizations decide what mix of control measures to use and how tight those measures will be. In any case, they need to understand the related direct and indirect costs of any measure (Merchant & Van der Stede, 2012, pp. 3–17).

The result control measures include the linkage of rewards (or punishment) with specific, identified, and measurable parameters that define the accomplishment of the organization's goals. Rewards can be in the form of monetary incentives, but they can also include non-monetary motivations such as recognition, autonomy, promotions, training and opportunities. Material incentives can provide short-term results, while

social incentives tend to last longer. Result controls are indirect measures, since they do not regulate employee actions even though they indirectly affect their behavior. Those measures emphasize the outcome and provide autonomy to employees on the means to achieve the goals. Result controls should only be used when all three of the following conditions are satisfied: a) the organization can define the desired results, b) the results are clearly related to employees' actions, and c) upper-level managers can effectively measure the results. Result controls can be an effective and inexpensive tool in increasing motivation and performance; if not well planned, however, they can lead to undesired behaviors. Moreover, result measures may not work successful with all types of employees, such as risk-averse characters (Haley, Klotzbach, & Fox, 2009; Merchant & Van der Stede, 2012, pp. 29–40).

Result controls have limited implementation in public procurement due to the difficulty in defining and measuring the desired results. The variety of goals and stakeholders makes the establishment of a single measured result difficult and risky. Even though the current compensation policies in public sectors do not include monetary incentives, public organizations can use some of the non-monetary rewards to motivate personnel towards higher effort and better performance (Marshall et al., 1993; Merchant & Van der Stede, 2012, pp. 29–40).

The action controls include a variety of measures that aim to directly regulate personnel actions and behavior. Some examples of these measures are the limitation of decision-making authority, the separation of duties, the supervision and auditing, and the preapproval review. Employees' accountability is also a form of action control measure. Organizations have to be able to define and clearly communicate to their employees the desired actions for which they are being held accountable, however. Action control is the most simple and direct control measure. It leads to standardization of procedures and establishment of best practices. It is usually an expensive measure, however, which can damage creativity and intrinsic motivation (Anechiarico & Jacobs, 1995; Merchant & Van der Stede, 2012, pp. 81–95).

Action controls tend to be the most prevalent form of measurements in public procurement. Those measurements usually include procedures that restrict an agent's

discretion, such as tendering and bidding without communications, but also include auditing, sanctions, and budget restrictions (Jurich, 2012; McCue & Prier, 2008; Soundry, 2007). Public organizations formalize most of their purchasing procedures to reduce variability and control the outcome. The restriction of procurement officials' discretion is more prevalent in the European procurement systems, since communications with bidders are not allowed and award criteria have to be measurable and clearly pre-established (Jurich, 2012; Soundry, 2007). The restriction of the purchaser's discretion and budget authority impedes the goal of efficiency, however (Glock & Hochrein, 2011; Soundry, 2007). Purchasing officials need autonomy and control over the process and the means to be creative. Excess control over their actions decreases motivation. Budget restrictions lead managers to use their creativity in finding additional resources instead of creating more value (Amabile, 1998).

Personal controls intend to increase personnel self-monitoring, while cultural controls are based on mutual monitoring among employees. The selection of personnel, the training, and the design of the work environment are the main personal control measures. The cultural controls can be in the form of codes of conduct, team rewards, personnel transfers, and other tangible or intangible elements that shape the culture in an organization. Personal and cultural controls are helpful, but inadequate, tools in achieving organizational goals; thus, organizations should combine those measures with action or result controls for better outcome (Merchant & Van der Stede, 2012, pp. 81–95). Public organizations often use some forms of personal and cultural controls such as training and personnel transfers to increase personnel capabilities in public procurement and build a culture that serves their goals. Nevertheless, limitations in organizations' ability to select their personnel and reward desired behaviors can be barriers to the development of personal and cultural measures.

A performance measurement system, which links results and behaviors with rewards, is a necessary tool for the successful implementation of any result control measure, but is also helpful with the action, personal, and cultural controls. The measurement system needs to be “objective, precise, easily-understandable, aligned with [the] organization's goals, dynamic, non-manipulable, and cost efficient” (Monczka et

al., 2011, p. 754). Moreover, a measurement system tends to be more successful when the employees affected by it participate in its creation. For each measure, the organization has to set a challenging objective that is neither easy nor impossible to achieve. The objectives can be based on available historical data or achievements of internal departments and other organizations. Finally, a successful measurement system should include regular reviews, reporting of results, and appropriate training for the involved personnel. When organizations use performance measurement systems to punish low performers instead of reward positive behaviors, however, personnel under evaluation may develop undesired behavior and attempt to manipulate the measurement system (Glock & Hochrein, 2011; Institute of Supply Management [ISM], 2014, p. 231; Merchant & Van der Stede, 2012, pp. 29–40; Monczka et al., 2011, p. 763; Murray, 2009).

The balanced scorecard is an effective measurement system that integrates all the appropriate parameters to measure the performance of the purchasing organization. The Institute for Supply Management (ISM) defines a scorecard as “a performance measurement and management document that records the ratings from a performance evaluation process” (ISM, 2014, p. 230). The balanced scorecard includes and balances performance areas—such as financial goals, service quality, and customer satisfaction—and results in an overall evaluation of the contribution of purchasing in achieving organizational goals and strategy (Monczka et al., 2011, p. 761; Polymenidis, 2003).

3. The Implications of Fiscal Rules

The spending patterns caused by the fiscal year concept lead to less efficient procurement. Organizations that operate under budgets that expire at the end of the year tend to save money in the beginning due to the future uncertainty, and then they rush to spend it just before the budget expires, even in lower-quality projects. Moreover, budget managers undertake secondary projects of lower value from the beginning of the year because they know that they will not have sufficient time at the end to spend the entire budget. Even though spending part of the end-year remaining budget in secondary projects can be efficient, spending the entire remaining part is not. Furthermore, the high

volume of purchasing at the end of the year causes less-efficient management of these purchases (Hurley et al., 2014; Liebman & Mahoney, 2013).

The fiscal year concept is a unique characteristic of public procurement that negatively affects procurement behavior and spending efficiency. It is in the culture of defense organizations to feel underfunded. This feeling, combined with the fiscal rules of annual budgets, creates an incentive for spending all the funds before the end of the year. Units perceive the end-year spending as an increase of next year's budget. Moreover, units understand that annual budgets are based on past spending; thus, spending less than budgeted can lead to lower budgets for the next years (Haley et al., 2009; Hurley, Brimberg, & Fisher, 2014).

While organizations may consider the fiscal year concept a necessary tool to maintain order in budgeting, some deviations from it can lead to significant cost savings. Liebman and Mahoney (2013) showed that agencies that are allowed to transfer their budgets to the next year do not exhibit this spike in spending. They also estimated that if agencies are allowed to rollover the remaining amount of their budgets, this would result in a 13 percent increase in efficiency. That means that agencies would spend 87 percent of the budget, and they would get the same value in goods and services. Even if agencies are allowed to transfer part of their budget for a limited period, it would still result in significant gains. Canada, the state of Oklahoma, and the Department of Justice have already allowed a rollover for their budgets (Liebman & Mahoney, 2013).

B. STRUCTURE, STRATEGY, AND TOOLS

Besides the significant effects of the human factor, the purchasing outcome is also highly affected by other critical factors such as the structure of the purchasing system, the purchasing strategies followed, and the purchasing tools employed. The private sector can also be a source of useful ideas in those areas, but the specific characteristics of public organizations require a careful analysis before adopting successful commercial practices.

1. Purchasing Structure

A variable that often appears in the literature to have major influence in the purchasing outcome is the structure of the purchasing organization. Centralized and decentralized organizations are the two extreme structures. In reality, however, most organizations fall somewhere between these two extremes to combine their benefits and avoid their disadvantages. No one structure guarantees the highest efficiency; conversely, different factors and circumstances determine the appropriate structure that best serves an organization. Some of these factors are the following: a) the organization's general strategy and goals, b) the variety of items purchased, c) the total monetary amount spent in purchasing combined with the geographic dispersion, and d) the top management's philosophy (Hudgens, 2008; Monczka et al., 2011, pp. 155–182).

Organizations with a centralized structure make the great majority of purchasing activities and decisions centrally—usually at the headquarter level—while organizations with a decentralized structure make most of the purchasing activities and decisions at the unit level. Center-led is a hybrid structure, which combines centralized and decentralized approaches and provides for central purchasing of common items and unit-level purchasing of unique items. Although there is a trend for the center-led structure, the highly centralized structure is still prevalent in the public sector, especially at the final stages of the purchasing cycle (Glock & Hochrein, 2011; Laios & Xideas, 1994; Monczka et al., 2011, pp. 155–182).

The centralized purchasing structure provides six critical benefits to an organization. First, it unifies and increases purchasing amounts, which constitute a useful tool in price negotiation. Second, it minimizes resources used in purchasing by eliminating repetition of purchasing procedures. Third, it eases the implementation of an organization-wide policy and strategy in purchasing. Fourth, it allows for better usage of supply management systems, such as the warehousing and the inventory management software system. Fifth, it results in a higher level of expertise among the purchasing personnel. Finally, a centralized purchasing structure helps the organization to measure the progress towards established purchasing goals and implement necessary changes (Monczka et al., 2011, pp. 155–182).

On the other hand, the decentralized purchasing structure can also provide several benefits to the organization. First, it shortens the purchasing procedure, thus providing units with necessary items in a more timely way. Second, it allows the decision of which items to purchase to be made by the personnel who know the operational requirements of the unit. Third, it better serves the development of a new product. Finally, it enhances the accountability and commitment of the unit's personnel and increases their morale (Monczka et al., 2011, pp. 155–182).

2. Purchasing Strategy

The purchasing strategies followed by the organization also affect the outcome of the purchasing activity. Organizations should plan and establish appropriate purchasing strategies, which are called commodity or category strategies, based on the characteristics of families of products or services (Monczka et al., 2011, pp. 189–234). The procedure starts with the formulation of an integrated team, which includes end users and experienced personnel. The team conducts market research for potential suppliers. Then, it develops the commodity strategy and moves to the contract award administration. An analysis of past spending provides the necessary information for the development of purchasing strategies. Private corporations have achieved significant cost savings by using commodity sourcing. Some of the best practices in that procedure are the following: a) the standardization of processes and tools, b) the use of integrated teams, and c) the empowerment and support of the teams. Public organizations tend to use teams that include internal customers, but they use fewer sourcing teams than the private sector (Hudgens, 2008; Monczka et al., 2011, pp. 189–234; Rendon, 2005).

Organizations need to analyze the data of their spending to leverage the purchasing power and eliminate maverick spending—purchases from unauthorized suppliers (Monczka et al., 2011, pp. 671–682). Towards this goal, they can use Peter Kraljic's portfolio analysis method to group purchases in four categories and treat them accordingly (Monczka et al., 2011, pp. 189–234). The critical (or strategic) category includes items both valuable and hard to find, for which organizations should establish a partnership with suppliers and look for continuous improvement. The bottleneck category

includes items that are hard to find, but without significant value. For these items, firms should establish agreements with suppliers to ensure availability. The routine category includes items of low value and importance, for which organizations should automate purchasing processes and standardize requirements to decrease transactional cost. Finally, in the leverage category belong items that are of high value but which are common in nature. This category provides an opportunity for cost savings by establishing preferred suppliers and using purchasing tools such as the reverse auction (Monczka et al., 2011, pp. 189–234).

3. Purchasing Methods and Tools

Some of the best practices to decrease spending in purchasing, according to the study of Trent and Kolchin (as cited in Monczka et al., 2011, p. 76), are the use of electronic tools, procurement cards, and long-term purchase agreements. Moreover, organizations can achieve significant cost savings by using online requisitioning systems between end users and purchasing (Monczka et al., 2011, pp. 76–81).

a. Purchase Cards

Purchase cards are mainly used for “small value transaction, non-inventory, non-capital items such as office supplies” (Boulianne, 2005, p. 594), for which there are no established agreements with specific suppliers. The use of the purchase card is a circumvention of the formal purchasing procedures, since the cost to follow these procedures would be inefficient relative to the cost of the items purchased. Purchases of low-value products represent 60 to 80 percent of the total amount of an organization’s purchases, but just 20 percent in total dollar value. Organizations with less bureaucratic environments and decentralized structures provide for higher purchase card usage (Boulianne, 2005).

The process for the use of purchase cards is usually fixed. The purchase cards are issued to the personnel designated by the organization. The cardholder places an order for goods (or services) to the supplier, who provides these products after having received the bank’s authorization. The bank makes a payment to the supplier and sends a card statement to the cardholder, who does the necessary reconciliation of the transactions.

The bank also sends a total statement, which includes all the firm's purchase cards, and the firm proceeds to a payment to the bank.

The use of purchase cards has both tangible and intangible benefits (Boulianne, 2005). Higher responsiveness to a user's needs and lower transaction costs are the two primary benefits of this method (Monczka et al., 2011, p. 77). Different studies and independent organizations' estimates have attempted to quantify the cost savings per transaction. According to some of these studies, the cost savings per transaction ranges from \$25 to \$100 (Gupta & Palmer, 2008). Organizations can also receive significant refunds by the card's issuer, depending on the agreement they have made. Additionally, the purchase card use may benefit the organization by allowing for transferring personnel from routine bureaucratic activities to more creative functions, thus enhancing their morale and productivity (Boulianne, 2005).

Moreover, the use of purchase cards can also become an instrument for quick and easy-to-access managerial reports, which will contribute to the decision-making process. The type of information available from the purchase card's use depends on how the firm and the bank will design the process and what type of information they will ask for suppliers to enter. Suppliers may not agree to a high level of information reporting, however, which would necessitate expensive transaction devices. The exploitation of this benefit may be more feasible for organizations working with a specific group of preferred suppliers (Boulianne, 2005).

Besides its significant benefits, some organizations still hesitate to use purchase cards. Managers are concerned with potential misuse by the cardholders. Organizations are also concerned about the risk of increased spending and budget overruns due to the flexibility that the cards provide in purchasing. These concerns, however, are often based on isolated, exaggerative stories. Actual misuses of the purchasing cards account for only a small percent of purchases, and cause insignificant losses compared with the benefits that the method provides. Organizations should always establish efficient preventive management controls to eliminate the problem, however. In addition, organizations may choose to buy insurance for the cards, covering the cases of unauthorized transactions (Boulianne, 2005).

b. Electronic Tools

The use of electronic tools in procurement—referred to as e-procurement—can provide significant benefit to the organization under the appropriate conditions. If properly implemented, e-procurement increases efficiency and leads to significant cost savings. The cost savings may manifest as lower prices, lower inventories, lower transactional costs, and better decision making due to higher information availability (Croom & Brandon, 2005; Doherty, MacConnell, & Ellis, 2013; Monczka et al., 2011, pp. 76–81). Moreover, e-procurement contributes to strategic sourcing by streamlining the ordering procedure and allowing the purchase personnel to focus on value-creating activities (Gruber & Onur, 2011). Several factors may affect the successful implementation of e-procurement. The best practices include the following: a) the standardization of items purchased, b) the decreased number of vendors, and c) the establishment of contracts and the compliance with them. One of the main barriers is the cultural factor (Croom & Brandon, 2005). Problems may also arise due to security issues, suppliers' unwillingness, and poor regulation (Doherty et al., 2013).

E-procurement is mainly used in the private sector; the significant opportunities for cost savings, however, have also made it attractive for the public sector. Public organizations can use electronic tools at different phases throughout the purchasing process, as illustrated in Figure 1. Nevertheless, the adaption of e-procurement is still limited in many public organizations because of the complexity in the procurement process, the variety of items purchased, the lack of knowledge and infrastructure, and the risk avoidance culture (Doherty et al., 2013; Wirtz, 2010).

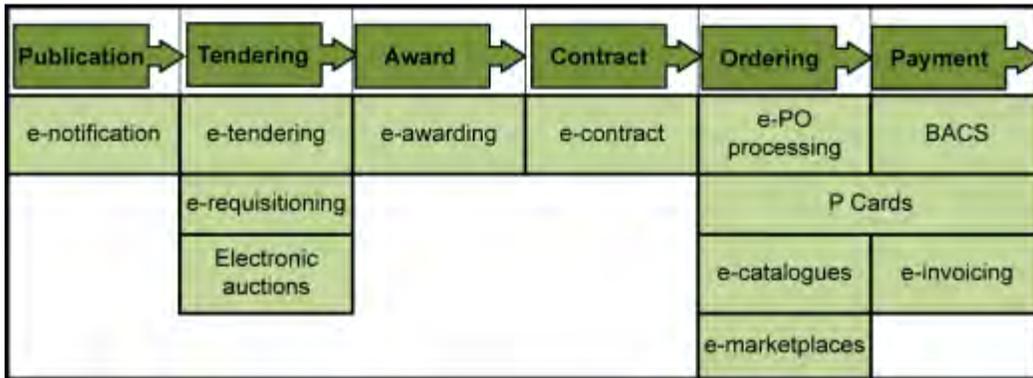


Figure 1. The key technologies used to support the procurement process (from Doherty et al., 2013).

c. Long-Term Agreements and Just-in-Time Purchasing

Long-term agreement is another useful purchasing tool. Long-term contracts decrease administrative costs, allow end users to order and receive the items they need in a shorter time, and lead to fewer inventories. Long-term agreements also lead to a better relationship between buyer and supplier, with all the related benefits for both sides (Monczka et al., 2011, p. 78). The procurement cycle becomes faster when the supplier delivers the ordered item directly to the end user instead of sending it to a central warehouse facility (McPeak, 1995). Of course, the purchaser should be very careful during the supplier-selection procedure to ensure adequate quality and delivery performance (Gunasekaran, 1999). Long-term contracts have to include clauses for price adjustments, performance improvements, penalties, and termination. The duration of a long-term agreement can be up to five years, or four years in the European public sectors (Charalampakis, 2006; Monczka et al., 2011, p. 78).

Long-term agreements constitute the basis for the just-in-time (JIT) purchasing system, which decreases inventory-related costs and achieves continuous quality and design improvement of purchased items. When using JIT purchasing, buying organizations order and receive only the currently needed quantities of items. Many organizations, such as the military, tend to maintain large quantities of inventories due to the culture of risk avoidance, the overstatement of requirements, and the necessity for future forecasts based on past data (McPeak, 1995). Holding inventory entails a variety of

significant costs such as storage cost, handling cost, pilferage cost, obsolescence cost, depreciation cost, and opportunity cost of capital (Jacobs & Chase, 2014, p. 517). Moreover, excess inventory decreases employees' concern for losses. Organizations need to conduct spend analysis to identify what needs would be better served through long-term contracting and JIT purchasing. JIT purchasing is appropriate for repetitively purchased items of low value and high volume. Training, education, and organizational commitment are critical factors towards successful implementation of long-term agreements and JIT purchasing methods (McPeak, 1995).

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III. ANALYSIS AND CONTRAST BETWEEN THE HELLENIC AND THE U.S. NAVIES

This chapter compares and contrasts the status of the purchasing procedures in the Hellenic and U.S. navies regarding the previously discussed critical purchasing factors. It also briefly discusses the reasons that favor the status in each navy. Table 1, at the end of the chapter, summarizes the analysis and comparison findings.

A. COMPETING GOALS

The HN and USN have similar conflicted goals to achieve through the purchasing activity but they do not weight these goals in the same manner.

(1) Hellenic Navy

The HN asks for efficiency and best value in purchasing, but emphasizes more the integrity- and accountability-related goals through the purchasing instructions and directives. Purchasing directives define three main principles to dominate any acquisition procedure, which are the following: a) the principle of publication, b) the principle of transparency, and c) the principle of equal treatment (HNGS, 2009). The emphasis on integrity goals can be attributed to the belief that publication and transparency combined with the competitive procedures will automatically lead to low prices in procurement. Moreover, the goals of efficiency and end-user satisfaction are already tied with the existing culture of maximizing operational readiness, so the HN wants to ensure that integrity-related goals are getting equal consideration. Since the commanding officer is the person responsible for both categories of goals on a HN ship, the balance between those goals would be the most probable outcome (HNGS, 2009; HNGS, 2014c).

The purchasing procedures at the ship level in the HN are not directly related to any specific public policy. The HN instructs its ships to achieve dispersion of purchases among a broad variety of suppliers, however. That fact provides more opportunities for small businesses and suppliers that do not regularly do business with the HN (HNGS, 2009; HNGS, 2014c).

(2) U.S. Navy

The USN instructs its ships, through the purchasing-related directives, to pursue and balance goals from all three categories. Unlike the HN, the USN clearly emphasizes the end-user satisfaction goal and provides specific instructions on how to maximize efficiency. For example, it instructs ships to use oral instead of written solicitations to achieve speed and efficiency. The USN ships are also instructed to secure integrity and maximize competition. While the HN considers competition the ultimate tool that leads to the lowest offered price, the USN just asks for “fair and reasonable price” (NAVSUP, 2005, p. 6–6) and mentions competition as one of the methods to achieve it. When benefits of a competitive procedure are insignificant compared to the additional administrative costs, however, ships can choose procedures that are more efficient. For example, they can make purchases under the micro-purchase threshold—which currently is \$3,000—without the obligation to obtain competitive quotes. Finally, the socio-economic goal category receives more attention in the purchasing activities of the USN ships—compared to the HN—since purchasing has to satisfy specific public policies, such as to provide opportunities to small and disadvantaged business (NAVSUP, 2005).

B. THE PRINCIPAL-AGENT ISSUE AND CONTROL MEASURES

Both navies have standardized procedures and control mechanisms in place to address the principal agent problem and align purchasing personnel’s behavior with organizational goals. The mix of control measures differs between the two organizations, however.

(1) Hellenic Navy

The HN does not currently use result control measures in purchasing at the ship level, but rather addresses the principal-agent problem and tries to align the behaviors of the stakeholders at all levels through tight action control measures. Performance measurement systems and incentives, which constitute the basic elements of any result measure, are not in place. The action controls at the ship level include restriction of authority, pre-action reviews, standardizing of procedures, auditing, separation of duties, oversight, inspections, and personnel accountability measures. For example, the ships

have no authority to commit or obligate funds; thus, before making any further step they have to submit a request for approval of the expenditure to its supervising command. Moreover, HN and Ministry of Justice agencies conduct auditing to all expenditures of the units—no matter the value. The limited discretion authority in spending, and the universal auditing, increase compliance with the regulations but restrict autonomy, damage motivation, and cause high administration costs in purchasing. Purchasing personnel may spend their creativity in searching for funds and overcoming tight controls instead of achieving the actual purchasing goals (Amabile, 1998; HNGS, 2009; HNGS, 2014b; HNGS, 2014c; About Public Accounting, 1995).

The HN supplements the action control measures with personal and cultural measures. The purchasing personnel receive periodic training on the procurement field at specific milestones throughout their career. The HN uses lectures and navy messages to appeal to the professionalism and patriotism of the purchasing personnel and inspire them to make the best use of available funds. Moreover, the HN rotates most of the employees among different ships and agencies and tries to match the right person to the appropriate position (HNGS, 2009; HNGS, 2013b; HNGS, 2014b; HNGS, 2014c).

The HN is currently pilot-testing a new budgetary and purchasing program for its ships, which could create the necessary conditions for the initiation of result control measures. The new system provides higher discretion authority and accountability to the ships during their purchasing activities. It increases the personnel's motivation and sense of responsibility by allowing them to prioritize their needs and pursue specific goals. Rather than controlling all their actions and decisions, it allocates them individual budgets, which they use in a relatively flexible way to achieve their operational goals. The pilot-testing procedure includes periodic reviews and evaluations on the progress and success of the program. Review and evaluation, even though they are not combined with specific incentives, help the HN to identify and eliminate the weaknesses, but also to adopt and spread the best practices of the program. Moreover, the review procedure helps the units to realize what they did right and what they need to improve (HNGS, 2013b; Fleet Command [FC], 2013).

(2) U.S. Navy

The USN primarily addresses the principal-agent problem in purchasing at the ship level with action control measures. Those measures are less tight compared to the HN, while the USN ships have adequate discretion authority during the purchasing procedure. Separation of duties is mandatory for the functions of initiating the need, awarding the purchase, and receiving the material. Ships do not have to submit documentation of all expenditures for auditing, but they file them in the ship to be available for periodic inspections by the TYCOMs and independent agencies. Moreover, the use of purchase cards for payments provides to the USN the ability for real-time oversight of the purchasing activity. Even though procedures are also standardized in the USN, the purchasing personnel have some discretion during the selection of suppliers where price is not the only factor. Quality and past performance are also evaluated by the contracting officer, who decides on the best value (Naval Inventory Control Point [NAVICP], 2005; NAVSUP, 2005; NAVSUP, 1997; NAVSUP, 2012).

The USN is more familiar with the concepts of result controls and incentives, but like the HN, it has not established performance measurement and rewards for ships' purchasing activity. The allocation of individual budgets to the ships and the continuous evaluation of the progress during the execution may operate as a form of result measure that allows for less tight action controls. The individual budgets, which are called operation targets (OPTARs), provide autonomy and discretion to ships to achieve their goals. It is noticeable that unlike the HN pilot-tested program, the value of the items provided by the USN supply system to the ships is also subtracted from the ship's budget (NAVSUP, 1997). The Incentivize Energy Conservation (i-ENCON) program, which could become a useful example for the purchasing system itself, employs material and non-material group incentives to decrease fuel consumption in ships (Haley et al., 2009).

The USN also uses personal and cultural controls to achieve the desired outcome in purchasing. The involved personnel receive appropriate training and must acquire certification before assuming duties as contracting or ordering officers. Part of the training is devoted to instilling conduct standards in them. Moreover, the USN applies meticulous screening to choose the personnel who will be assigned to use the

procurement cards and make payments. Finally, personnel transfers and careful matching between employee and position are also established practices in the USN (NAVSUP, 2005; NAVSUP, 2012).

C. THE IMPLICATIONS OF FISCAL RULES IN PUBLIC PROCUREMENT

As almost every public organization, the HN and USN operate under annual budgets and fiscal year rules, and they both face the related problems.

(1) Hellenic Navy

The trend for spending the entire budget before the fiscal year ends is a fact at the unit level in the HN—for the units that operate under annual budgets—while HN commands further encourage their units towards this goal (FC, 2013). Ships cannot transfer any remaining funds to the next fiscal year. The obvious link between current year spending and future year budgets combined with the lack of incentives for saving and returning funds lead the ships to spend any amount they have available. Furthermore, the uncertainty in future needs of the ships makes them save a significant percentage of their budget for contingencies during the year, which consequently causes a spike in spending at the end of the year (FC, 2013). Even though there is no specific evidence, it can be safely assumed that the above procedure causes a percentage of inefficient spending for the reasons described at the literature review chapter.

(2) U.S. Navy

The USN has not established measures or incentives to address the existing trend for increased purchasing activity at the end of the fiscal year, which tends to cause less-efficient spending. The spending patterns throughout the fiscal year follow the same trend with the HN. The annual budgets for the ships are also based on past years' spending, while any remaining funds will either be spent or lost; thus, ships are incentivized to exhaust their budgets before they expire (Koch, 2009, p. 24; NAVSUP, 2012).

D. PURCHASING STRUCTURE

The organizational structure, regarding the purchasing activities, presents significant differences between the HN and the USN, mainly caused by the differences in size, geographic dispersion, and culture.

(1) Hellenic Navy

The traditional purchasing structure in the HN is highly centralized regarding the authority to commit and spend funds, but decentralized regarding the tasks of market research and supplier selection. In the traditional purchasing and budget system, ships do not have individual budgets to manage, and the prioritization of their needs is centrally controlled at a higher level in the navy. The centralized purchasing structure helps the HN to materialize benefits such as the oversight of purchasing procedure and the measurement of progress on meeting purchasing goals. It impedes the HN in realizing the decentralized structure's advantages, such as personnel involvement and commitment, however. Moreover, the decentralization of specific purchasing tasks hinders the HN in leveraging its buying power and avoiding duplication of effort. Some of the factors described in the literature review chapter that have significantly affected the purchasing structure in the HN and the ships' role in it are the following: a) the existing culture for tight control systems, b) the continuously increasing need for cost savings, c) the limited geographic dispersion of navy units, and d) the similarity of items purchased (HNGS, 1987; HNGS, 2009; HNGS, 2014b; HNGS, 2014c).

The new pilot-tested budget system is an exception to the centralized budget authority and constitutes a significant change in the overall purchasing structure. The HN initiates a new decentralized approach that seems to produce the desired benefits of higher "speed and responsiveness" (Monczka et al., 2011, p. 162), but also broader participation and interest by ships' personnel. Ships' reports, however, indicate that the new approach leads to a loss of some of the centralized structure's benefits, such as the leverage of purchasing power and the minimizing of purchasing effort (HNGS, 2013b; Monczka et al., 2011, p. 161; FC, 2013).

(2) U.S. Navy

The purchasing system in the USN approaches the center-led structure. Ships have the authority to make purchases and obligate funds for their needs that cannot be satisfied by the supply system, while central agencies establish contracting vehicles for the provision of commodity items with repetitive demand. All ships can make contracts and purchases under the micro-purchase threshold, while the TYCOMs can provide them with additional contracting authority. Ships typically forward their requisitions above the micro-purchase threshold to a local contracting department when a contract vehicle is not available, however. The center-led structure provides high efficiency and speed in purchasing to the USN ships by giving them the ability to initiate and complete their purchases without submitting pre-action requisitions and waiting for approvals, as the HN ships do. Moreover, the USN leverages its purchasing power by establishing big contracts for repeatedly required items. The big size and broad geographic dispersion of the organization, as well as the emphasis on the efficiency and the flexible control system, make the use of a center-led approach the appropriate structure for the USN (NAVSUP, 2005; NAVSUP, 1997).

E. PURCHASING STRATEGY

The USN seems to implement the appropriate purchasing strategies for each category of purchased item in a more professional way than the HN, even though it does not make use of integrate sourcing teams on ships.

(1) Hellenic Navy

The HN ships follow different purchasing procedures for different categories of products and employ integrated sourcing teams in their purchasing activity; defects on the implementation of those concepts negatively affect the outcome, however. The procurement committee—which consists of three officers and conducts market research, ordering, acceptance, inspection and payment for all purchases—provides an integrated perspective but only limited experience since its members rotate every two months. The committee operates more as a control measure than a source of expertise. Moreover, ships do not use automated purchasing processes for routine items, such as office supplies

and cleaning items. They also purchase many of the leverage category items, such as common spare parts, from multiple sources instead of preferred suppliers. Thus, the HN misses the opportunity for cost savings. Finally, ships do not conduct any detailed spend analysis—individually or collectively—which would provide a good insight for further improvement of the purchasing process (HNGS, 1987; HNGS, 2009; HNGS, 2013a; HNGS, 2013c; HNGS, 2013d).

(2) U.S. Navy

Even though ships do not use sourcing teams for their purchasing activity, the implementation of the right purchase strategy based on the nature of the items and the demand patterns is exemplary in the USN. The USN implements the appropriate purchasing strategy for each category of items and achieves significant cost savings, but also streamlines the purchasing process of its units. USN ships take advantage of existing—or establish new—agreements with suppliers to order standardized routine and leverage items. Moreover, the USN has established regional purchasing departments, to which ships forward their requirements for purchases of critical items when the cost exceeds the micro-purchase threshold. The USN requires its units to submit all the data from purchases they made throughout the year to analyze them and identify patterns in the demand that would make the establishment of additional agreements useful for the organization. Unlike the HN ships, the USN ships invest in the professionalism and experience of certified contracting officers, instead of short-term integrated committees, to conduct their purchasing activities (NAVSUP, 2005; NAVSUP, 1997).

F. PURCHASE CARDS

The use of purchase card is one the areas where the HN could gain significant knowledge from the USN, which implements that system for a considerable long period.

(1) Hellenic Navy

The HN ships do not use purchase cards for their transactions. The ships maintain cash onboard, which they use for purchases under the threshold of 1,000 euros—they forward expenditures above that threshold for payment through bank transfer. Thus, the

HN bears all the cash-related transactional costs and misses the opportunity to take advantage of tangible and intangible benefits of the purchase card system. The risk avoidance culture in the HN and the limited use of credit cards in the Greek society are the two reasons that may probably impede the use of purchase cards in the HN (HNGS, 2009; “Limited use,” 2014).

(2) U.S. Navy

The USN ships use credit cards in purchasing, and achieve most of the potential benefits of the system. The USN participates in the Government-Wide Purchase Card Program (GPCP) and mandates the use of the purchase card for micro-purchases. Moreover, it encourages the use of cards above the threshold for contract payments under specific conditions. The purchase card system has reduced administrative costs in purchasing and payment procedures. Furthermore, the purchase card system provides for better support to agency missions. The ships can acquire most of their daily-needed supplies in a faster and easier way, while procurement departments can focus their efforts on more critical and unique products. The USN is not yet able to take full advantage of the system, however, since the current procedure does not provide easy-to-use data to the commands for real-time oversight and decision making (Government Accountability Office [GAO], 2002; Koch, 2009; NAVICP, 2005; NAVSUP, 2012).

Isolated cases of improper use of the purchase card do not substantially decrease the value of the system, but need to be addressed. The GAO has reported some incidents of improper use of the purchase card in USN ships, but there is no substantive suggestion that those cases have significantly weakened the benefits of the program. Koch (2009) conducted a spend analysis in three USN destroyers, which showed that card purchases in ships follow specific patterns regarding the products acquired and the vendors selected. Most of the purchases are consumables and office supplies, with only a small percentage related to repair part purchases. Moreover, ships tend to select authorized vendors, who provide approved materials. Both these two facts indicate proper and efficient use of the card by the USN ships. Fraudulent and abusive use, however, even in a small extent, may undermine the credibility and hinder the further growth of the program, and thus need to be efficiently addressed (GAO, 2002; GAO, 2008; Koch, 2009).

G. ELECTRONIC TOOLS

Consistently with the overall culture for technology, the USN makes much broader use of electronic tools in purchasing than the HN. Other factors, such as the existing legal framework and infrastructure, also affect the different extent of e-procurement use in the two navies.

(1) Hellenic Navy

Electronic tools have limited application in the purchasing procedure of HN ships. The publication of purchase requirements above the threshold of 5,000 euros is the only exhibition of e-procurement. Bidders cannot submit their offers online; they must submit it in hardcopy. Ships conduct most of their purchasing communications through conventional and navy channels—such as fax and navy messages. They even submit their requisitions to the Navy Supply System in paper form. The lack of technological infrastructure and regulating framework in the Greek public sector impedes the implementation of e-procurement in the HN. Moreover, government laws and HN regulations require specific payment procedures and invoice forms, which include withholding of third-party fees. Thus, ships tend to avoid electronic ordering, payment, and invoicing since it can cause unintentional deviations from the required form, and can endanger the settlement of the expenditure during the auditing phase. Finally, electronic purchasing is directly related to the use of purchase cards that, as already mentioned above, has not yet been implemented in the HN (About Public Accounting, 1995; Charalampakis, 2006; HNGS, 2009; HNGS, 1987; HNGS, 2006; HNGS, 2014c).

(2) U.S. Navy

USN ships take advantage of electronic tools in purchasing at a significant higher rate than the HN ships. They submit their requisitions to the supply system through online channels and conduct market research by using electronic databases and Internet sources. Moreover, USN ships employ electronic tools for placing orders and making payments—for which they use their purchase cards. They also use electronic methods to submit data from their purchasing and budget execution activity to supervising agencies. Through the extended use of e-procurement by its units, the USN achieves cost savings,

speed, efficiency, transparency, and real-time oversight (NAVSUP, 2005; NAVSUP, 1997).

H. LONG-TERM AGREEMENTS AND JUST-IN-TIME PURCHASING

The use of long-term agreements is another area where the HN does not take full advantage of the potential benefits, whereas the USN has better realized the opportunity for efficient purchasing and cost savings.

(1) Hellenic Navy

Even though HN units are currently forced to use a JIT purchasing approach, since the lack of funds prohibits buying of large inventory quantities, the HN makes limited use of long-term agreements in just some specific purchasing areas, such as the food items. Thus, the ships have to repeat all the steps of the purchasing process every time they need an item or a service. The repetition of the purchasing procedure leads to significant transactional costs, duplication of effort, and higher prices. As in every public organization, close relationships with suppliers and long-term agreements are mainly hindered by the legal environment and the integrity-related goals (HNGS, 2014a; HNGS, 1987; HNGS, 2009).

(2) U.S. Navy

Unlike HN, USN ships have in their availability long-term agreements for most of the items they need in a repetitive base. The General Service Administration (GSA) establishes long-term contracts for many of the commodity items, while regional contracting agencies and the ships can also solicit and award formal contracts or blanket purchase agreements (BPA)—BPA are charging accounts with selected suppliers for the provision of all, or some, of their products under specific terms (NAVSUP, 2005, pp. 7–18). The agreements may include more than one supplier for the same item, and ships can choose among them based on price, quality, and delivery factors. Ships can also conduct additional market research and look for alternative sources outside of the existing agreements; even though that provision may enhance competition, it leaves room for maverick spending by ships. The broad use of long-term agreements helps the USN to

implement JIT purchasing, minimize inventory costs, avoid duplication of effort, accumulate and leverage buying power, and decrease purchasing time (NAVSUP, 2005; NAVSUP, 1997; Stanberry, 2013, pp. 154–155).

Table 1. Current status of critical purchasing factors in HN and USN ships.

	Purchasing factors														
	Competing goals			Control measures				Fiscal rules	Purchasing structure	Purchasing strategies			Purchasing methods/tools		
	Efficiency, customer satisfaction, best value, etc.	Integrity, transparency, competition, etc.	Public policy, socio-economic goals	Result controls	Action controls	Personal controls	Cultural controls	End-of-year inefficient spending	Centralized / Decentralized / Center-led	Commodity sourcing	Integrated teams	Spend analysis	Purchase cards	Electronic tools	Long-term agreements
Hellenic Navy	Little emphasis	High emphasis	Not applied	Not applied	Overly tight	Adequate - Can be enhanced	Adequate	Existing - Not addressed	Mainly centralized	Inadequate implementation	Misconception of their role	Not applied	Not applied	Limited use	Limited use
US Navy	Emphasized and balanced	Emphasized and balanced	Emphasized and balanced	Limited	Adequate	Adequate	Adequate	Existing - Not addressed	Center-led	Exemplary use	Not applied	Applied	Broad use	Broad use	Broad use

IV. CONCLUSIONS

A. RECOMMENDATIONS

The following recommendations are based on the findings from the theoretical analysis and the comparison between the two navies. The recommendations are listed separately for the HN and the USN.

- (1) Hellenic Navy
 1. Put more emphasis on the goals of efficiency, best value, and end-user satisfaction. The goals of integrity, competition, and transparency may be critical for the HN, as for any public organization, but they should be carefully balanced with the other important goals, such as best-value, efficiency, and customer satisfaction. The abolishment of the requirement for at least three written quotes for low-value purchases can be one of the initiatives to enhance efficiency.
 2. Design and establish a performance measurement system for the purchasing activity of ships and combine it with group rewards for high performers. The measurement system should have all the characteristics described in the literature review chapter. The performance evaluation should be conducted by external integrated teams. Rewards can be any material and non-material incentive that is valuable for the personnel of a ship. Moreover, the rewards should be group based rather than individual to enhance team effort and positive cultural norms. The performance measurement system will be the basis for the establishment of effective result controls.
 3. Loosen some of the action control measures and provide more discretion authority to the ships' purchasing personnel. Less tight action controls will allow the purchasing personnel to focus on the actual goals and use their creativity for the benefit of the HN. Moreover, by reducing some of the excessive control measures, the HN will eliminate significant unnecessary administrative costs, such as the time and resources spend in requisition evaluation and expenditures auditing.
 4. Enhance the personal control measures by establishing certification procedures for the purchasing personnel. The purchasing activity on a ship is critical for the mission accomplishment of the ship and the overall function of the HN. Thus, the personnel involved in that process should first be evaluated and certified for their knowledge on the subject.

5. Offset the existing disincentives that lead to inefficient end-of-year spending. The HN can address that trend by disconnecting future budgets from past spending and providing incentives for units that return unused funds at the end of the year. The evaluation of ships performance in budget execution and the rewarding of the desired behavior can be included in the integrated purchasing performance measurement system. Instead of encouraging its units to exhaust their budgets, the HN should collect any remaining amounts and use them in centrally-managed, high-value projects. Moreover, the HN should consider the probability of allowing partial transfer of remaining funds for a limited period in the next fiscal year.
6. Move to a center-led purchasing structure. In that structure, ships and regional contracting offices will have budget and purchase authority for unique requirements, while purchasing of commodity items will be managed centrally. Data from ships' individual purchases, however, should be reported, gathered, and analyzed for decision making. The pilot-tested program is a useful system towards this goal; thus, it should be expanded and improved through continuous observation.
7. Conduct spend analysis on the past year purchases of ships, and categorize the purchased items in four groups according to the portfolio analysis. The spend analysis would allow the implementation of the appropriate purchasing strategy based on the characteristics of each category. For example, it would lead to the establishment of vehicle contracts and automate ordering procedures for the identified routine and leverage items.
8. Conduct a cost benefit analysis for the implementation of a purchase card program. Both tangible and intangible benefits of the program should be taken into account. If decided, the implementation of the purchase card system should be carefully planned to take advantage of all opportunities and avoid pitfalls. The experience from the implementation by the USN ships should guide the process.
9. Increase the use of electronic tools in ships' purchasing procedures by providing infrastructure, appropriate regulatory framework, and training to the involved personnel. The computerization of communications between the ship and the supply system of the navy should be the first step in that process.
10. Establish long-term agreements for items with repetitive demand. Ships will be able to place orders for just the amount they need without having to repeat all purchasing steps. The established agreements should include clauses for price adjustments and performance improvements. The selection of suppliers should be very careful since close, long-term relationships have to be developed.

- (2) U.S. Navy
1. Design and establish a performance measurement system for the purchasing activity of ships and combine it with group rewards for high performers. The developed measurement system should have all the characteristics described in the literature review chapter. The performance evaluation should be conducted by external integrated teams. Rewards can be any material and non-material incentive, which is valuable for the personnel of a ship. Moreover, the rewards should be group based rather than individual to enhance team effort and positive cultural norms. The performance measurement system will be the basis for the establishment of effective result controls.
 2. Monitor the level of misuse of the purchasing card system and, if necessary, address it with increased the action and the personal control measures. For example, universal auditing of all purchase card expenditures and assignment of cardholder duties solely on contracting and certified officers could be two of those measures.
 3. Offset the existing disincentives that lead to inefficient end-of-year spending. The USN can address that trend by disconnecting future budgets from past spending and providing incentives for units that return unused funds at the end of the year. The evaluation of ships performance in budget execution and the rewarding of the desired behavior can be included in the integrated purchasing performance measurement system. Instead of encouraging its units to exhaust their budgets, the USN should collect any remaining amounts and use them in centrally-managed, high-value projects. Moreover, the USN should consider the probability of allowing partial transfer of remaining funds for a limited period in the next fiscal year.
 4. Establish integrated sourcing teams comprised of ship's personnel to assist the contracting officer in the purchasing process. The major departments of the ship, such as the engineering directory, should be represented in that team to provide an end-user perspective during the purchasing phases.
 5. Upgrade the purchase card system to provide easy-to-use data for central oversight and decision making. The USN should standardize the process and the data that suppliers insert during transactions to make it possible for commands to gather and analyze information for ships purchasing activity. With this information, the USN would be able to eliminate misuse of the system and conduct quick and accurate price analysis of ships' spending.
 6. Eliminate maverick spending by prohibiting the purchase of any item from unauthorized suppliers when a long-term agreement for that item is in place. The benefits from the use of long-term agreements are undermined

by ships' ability to conduct additional market research. The goal for maximizing competition should not cancel other purchasing best practices.

B. SUMMARY

Purchasing is no longer considered a clerical function, but rather a most critical factor in the accomplishment of organizational goals in both the private and public sectors. This thesis analyzed the factors that define the outcome of the purchasing function at the unit level, particularly in public organizations. The main objective is to evaluate the current performance of the Hellenic and U.S. navies on those factors regarding their purchasing activity at the ship level and identify ways for improvement.

The literature review identified six critical factors in that function. Overlapping areas among those factors may exist. The first factor is the identification and balance of organizational goals. The second factor refers to the mix of control measures, which the organization uses to align the behavior of purchasing personnel with the desired objectives. The existence of fiscal rules in public procurement is the third factor that influences procurement officials' behavior and affects the purchasing outcome. The fourth factor is the use of appropriate strategies and integrated sourcing teams based on the characteristics of purchased items. The fifth factor is the level of centralization in the structure of the purchasing system, which should match the organization's goals. Finally, the use of purchase tools—such as purchase cards, electronic means, and long-term agreements—is the last important factor for the purchasing outcome.

The analysis of the current purchasing procedures followed at the ship level in the Hellenic and the U.S. navies, regarding the identified critical purchasing factors, shows that the USN is closer to the practices dictated by the theory than the HN, but both navies can make improvements. The HN needs to emphasize more the efficiency-related goals, use performance measurement combined with group incentives, loosen the action controls and allow more discretion to its personnel, enhance personal control measures, address the end-of-year spending, move to a more decentralized structure, apply purchasing commodity strategies, and use the modern purchasing tools. The USN should establish performance evaluation combined with group incentives, close gaps with tighter

control measures, address the end-of-year spending, use integrated purchasing teams, and improve the use of purchase cards and long-term contracts.

C. AREAS FOR FURTHER STUDY

This thesis identified areas for improvement of the current purchasing systems in the Hellenic and U.S. navies based on the best practices indicated from the theoretical analysis and the comparison between the two navies. Some of the suggestions for improvement require further detailed study before their implementation. The areas for additional research include the following:

- Design and implementation of the optimal performance measurement system and the balanced scorecard for the purchasing activity at the ship level, which will better serve and balance organizational goals.
- Estimation of the extent of the inefficient end-of-year spending in the Hellenic and U.S. navies and analysis of incentives and mechanisms to address it.
- Spend analysis of the purchasing activity of the HN and categorization of all purchases based on the portfolio analysis or other relevant theories.
- Cost-benefit analysis for the implementation of a purchase card system in the HN.
- Cost-benefit analysis of the implementation of e-procurement in the HN.

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