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**NAVAL
POSTGRADUATE
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MONTEREY, CALIFORNIA

MBA PROFESSIONAL REPORT

**Developing a Supply Chain Management Certification for the
Department of Defense**

**By: Timothy R. Griffin
Scott A. Trinrud
December 2007**

**Advisors: Bryan Hudgens,
Ira Lewis**

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**DEVELOPING A SUPPLY CHAIN MANAGEMENT CERTIFICATION FOR
THE DEPARTMENT OF DEFENSE**

Timothy R. Griffin, Lieutenant Commander, United States Navy
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Submitted in partial fulfillment of the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

**NAVAL POSTGRADUATE SCHOOL
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SUPPLY CHAIN MANAGEMENT CERTIFICATION

ABSTRACT

The purpose of this project is to develop a Supply Chain Management (SCM) certification within the Department of Defense (DoD). The report provides background information on certification and SCM. This report defines SCM and describes some potential benefits of SCM for the DoD. The report discusses what the DoD will gain from a formal SCM certification program that could be outsourced to civilian universities or provided by organizations within the Defense Acquisition University (DAU) consortium. Lastly, the report will provide an initial proposal of what the curriculum could look like based on an analysis of current graduate level SCM curricula at leading U.S. universities.

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I. INTRODUCTION

Supply Chain Management (SCM) has gained considerable attention in both the Department of Defense (DoD) and private industry. Globalization has changed the rules by which businesses operate and the intense competition it creates has forced many organizations to either increase efficiency or exit the marketplace. Firms must reduce costs wherever possible and many of these firms have discovered their supply chains can be a source of considerable savings,¹ and in many cases a source of competitive advantage.²

When a firm's supply chain is a source of competitive advantage the firm must leverage and integrate the expertise of all units in the chain, e.g., suppliers, distributors, buyers, production, marketing, to sustain that advantage. The real "gold" can be found when firms in the supply chain integrate their business processes.³ Firms have the potential to create an even larger competitive advantage if they integrate more processes across the supply chain network.

The DoD is in many ways similar to certain aspects of private industry. There is more competition for funding as well as new challenges to properly supply the forward-deployed warfighters. Many of the SCM principles applied in private industry are being implemented within the DoD. Much of the DoD implementation processes are ad hoc because there is no official DoD SCM implementation framework. A formal education program may be an important step in improving SCM capability within the DoD.

The purpose of the report is to develop a proposed certification in supply chain management for the Department of Defense. To do so, the report will first provide some background information on certification and SCM. The report will explain SCM and some of the benefits SCM provides. The report will discuss what the DoD may gain

¹ Gerard P. Cachon, "The Allocation of Inventory Risk in a Supply Chain: Push, Pull, and Advance-Purchase Discount Contracts," *Management Science* 50 (2004): 222-238.

² Ellen Christiaanse and Kuldeep Kumar, "ICT-Enabled Coordination of Dynamic Supply Webs," *International Journal of Distribution & Logistics Management* 30 (2000): 268-286.

³ Michael Hammer, "The Superefficient Company," *Harvard Business Review* 79, no. 8 (1995): 82-91.

from a formal SCM certification program, such as standardized curriculum that could be outsourced to civilian institutions or provided by organizations within the Defense Acquisition University (DAU) consortium. Lastly, the report will provide an initial proposal of what the SCM certification curriculum could look like based on an analysis of current graduate level SCM curriculum at leading SCM universities throughout the United States.

The project identifies key concepts, journals, articles, theories, education program rankings, SCM education program structures, and a proposed SCM certification program for the DAU that will be useful to the DoD. Included are five major themes:

- (1) History of DoD Acquisition Reform
- (2) Definition of SCM and SCM-related terminology
- (3) State of SCM in the Commercial sector and the DoD
- (4) State of SCM education curriculums within the DoD, civilian universities and industry
- (5) Proposed SCM certification framework for the DoD

Sources for this project included articles and papers from scholarly journals, recognized professional publications, books, and material from various DoD publications and web sites. The study explores DoD Acquisition Reform, and both general and specialized supply chain management and logistical principles via published works. This study also uses various definitions of SCM from industry, DoD publications and civilian institutions, and it documents current SCM strategies used by industry and DoD agencies. Finally, we reviewed numerous SCM curricula in order to gain a broader perspective of current SCM educational structures from which we developed a proposed certification framework for the DoD.

The next sections of the report review some background information. The report begins by providing some background on DoD acquisition reform and certification. This is followed by defining key terminology, including SCM and logistics. The report also outlines some current SCM practices within industry and the DoD.

II. BACKGROUND

A. ACQUISITION REFORM

There have been multiple attempts to reform and improve the DoD's acquisition system over the past forty years. Efforts have ranged from discussion on the process challenges of procuring major weapon systems to reform suggestions from presidential blue ribbon commissions⁴ pertaining to workforce reform. Table 1 provides a quick history of acquisition reform projects through 1993; there have been a similar number of large-scale reviews since that time as well.⁵

A key report was the President's Blue Ribbon Commission on Defense Management (also known as the 1986 Packard Commission). The Packard Commission report examined the DoD management practices and processes. The report suggested the DoD acquisition workforce was inexperienced and poorly trained. The report offered multiple recommendations from increased training of personnel to simplification and/or reduction of laws and/or instructions providing acquisition guidance.

⁴ President, Commission, "*Report of the President's Blue Ribbon Commission on Defense Management*," Washington, DC: Government Printing Office, 1986.

⁵ U.S. Department of Defense, "Defense Acquisition Performance Assessment Report," (Washington, DC, January 2006), <http://www.acq.osd.mil/dapaproject/> (accessed November 5, 2007).

Table 1. Studies Recommending Acquisition Process Improvements

Common Name	Full Name
The Hoover Commissions (1949 and 1955)	Commission of Organization of the Executive Branch of the Government
The Fitzhugh Commission (1970)	President's Blue Ribbon Defense Panel
The 1972 Commission on Government Procurement	The Commission on Government Procurement
The Carlucci Initiatives (1981)	Acquisition Improvement Task Force
The Grace Commission (1983)	President's Private Sector Survey on Cost Control
The Packard Commission (1986)	President's Blue Ribbon Commission on Defense Management
DMR '89 (Rittenhouse Report)	Defense Management Review 1989
The Section 800 Panel (1993)	Department of Defense Acquisition Law Advisory Panel
Defense Science Board I (1983)	Transition for Development to Production
Defense Science Board II (1986)	Functional Performance Requirements
Defense Science Board IV (1987)	Technology Based Management
Defense Science Board III (1989)	Used of Commercial Components in Military Equipment
Defense Science Board (1991)	Acquisition Streamlining Task Force

Source: Charles L. Beck and Nina Lynn Brokaw and Brian A. Kelmar, "A Model for Leading Change: Making Acquisition Reform Work", DSMC Fellowship Research Report, Defense Systems Management College (1997): 1-3.

The recommendations from the Packard Commission were formalized into the Defense Acquisition Workforce Improvement Act (DAWIA), part of the 1991 fiscal year National Defense Authorization Act.⁶ DAWIA:

Directs the Secretary of Defense to designate in regulations those positions in DoD that are to be considered acquisition positions. Directs the Secretary to ensure that appropriate career paths for civilian and military personnel who wish to pursue careers in acquisition are identified in terms of the education, training, experience, and assignments necessary for the most senior acquisition positions. Directs the Secretary to establish education, training, and experience requirements for each acquisition position based on the level of complexity of duties carried out in the position. Provides qualification requirements for persons wishing to serve as contracting officers in acquisition positions with authority to award or administer contracts above the small purchase threshold. Requires the Office of Personnel Management to approve all such requirements.⁷

The aim of DAWIA is to reform DoD acquisition and develop a professional and educated workforce. Under DAWIA, the responsibility for training the DoD acquisition workforce falls under the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics (USD AT&L). A recent review of DAWIA implementation by the Logistics Management Institute concludes that “virtually all the requirements and authorities in the DAWIA legislation have been implemented throughout OSD, the Services, and the Defense Agencies.”⁸

An assessment of DAWIA implementation was requested by Congress. The study, completed in 1999, examined and measured how well the workforce was being developed. With reform and continued improvement in mind, the Government Accountability Office (GAO) examined several DoD training programs to provide an answer to the request. The GAO report looked at standard training by DAU and training completed at select program offices and service level training offices. The GAO

⁶ *National Defense Authorization Act for Fiscal Year 1991*, Public Law 101-510, (November 5, 1990).

⁷ *Ibid.*

⁸ Albert H. Schroetel and Delores A. Street, “Baseline Study: Implementation of the Defense Acquisition Workforce Improvement Act (DAWIA),” Logistics Management Institute (2001): 1-2.

examined how well the DoD adapted training to meet training requirements outside the scope of the standard training provided by DAU. The GAO report described the training from DAU as:

Training provided by the university is designed primarily to enable people in individual career fields or functions, such as engineering and cost estimating, to meet professional certification requirements. The university incorporates best practices topics into these functionally oriented courses as drop-in modules that provide a survey of the topic, but not in-depth coverage.⁹

The report further examined how the DoD expanded upon the initial, standard training provided by DAU. Training augmentation is needed to meet new requirements. The report identified module drop-ins as the main approach to meet updated requirements. Another example is the DoD's Acquisition Reform Communication Center:

DoD's Acquisition Reform Communication Center and the acquisition reform offices in the services communicate best practice information through videos, periodic satellite broadcasts, roadshows, and Acquisition Reform Week. These methods can reach more people than Defense Acquisition University courses and are designed around practices — versus functions — but are not tailored to specific program offices and are not necessarily delivered at the time those implementing new practices or initiatives need them. For example, roadshows, traveling multiday training workshops provided to staff at a number of locations, typically provide awareness training on the practices.¹⁰

The above-mentioned GAO report focuses on how the DoD supports the acquisition workforce through training and education. The training DAU provides is vertically or functionally aligned in specific areas such as finance, contracting and program management. Additional information is often added in modules. Functional alignment is critical in a dynamic workforce such as the DoD's acquisition workforce.

⁹ U.S. General Accounting Office, "*Best Practices: DOD Training Can Do More to Help Weapon System Programs Implement Best Practices, 1999*," <http://www.gao.gov/new.items/nsiad-99-206.pdf> (accessed May 30, 2007).

¹⁰ U.S. General Accounting Office, "*Best Practices: DOD Training Can Do More to Help Weapon System Programs Implement Best Practices, 1999*," <http://www.gao.gov/new.items/nsiad-99-206.pdf> (accessed May 30, 2007).

However, training redesign was not discussed. A holistic, cradle-to-grave training model for goods and/or services, which the cross-functional nature of SCM may suggest, may be useful in enhancing the capability of the DoD acquisition workforce. The addition of SCM certification coupled with the functional expertise currently available in the DoD may enhance the effectiveness of the DoD acquisition workforce.

B. CERTIFICATION

Certification programs are used in multiple fields and professions. To better understand certification a definition is required. *The American Heritage Dictionary* defines certification as the act of certifying or the state of being certified.¹¹ *The American Heritage Dictionary* further defines certify as to guarantee as meeting a standard¹². Therefore, to be certified is a guarantee of meeting a standard.

This straightforward definition provided by *The American Heritage Dictionary* identifies the importance of certifying or being certified but what exactly does “certify” entail as far as professional certification. This can be confusing because terms such as accreditation, licensing and certification are used interchangeably. To be accurate we need to distinguish between the terms. According to Bratton and Hildebrand they are:¹³

Accreditation—process in which an agency or association grants public recognition to a school, college, or university, or a specialized study program that meets certain predetermined or established qualifications or standards.

Certification—process in which a professional organization or an independent external agency recognized the competence of individual practitioners in a specific discipline.

Licensure—mandatory legal requirement for certain professions or specialties for the purpose of protecting the public from incompetent practitioners.

¹¹ Joseph P. Pickett and others, eds., *The American Heritage Dictionary of the English Language: Fourth Edition* (Boston: Houghton Mifflin, 2000), s.vv. “accreditation,” “certification,” “licensure.”

¹² *Ibid.*

¹³ Barry Bratton and Myrene Hildebrand, “Plain Talk About Professional Certification,” *Instructional Innovator* 25, no. 9 (1980): 22-24, 49.

It is useful to understand the terminology because DAU is accredited, which means DAU instructional programs have been evaluated; but, the completion of the instructional program by individuals creates the certification if recognized by an external body. The external body responsible for the DAU certification is the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics (USD AT&L). The actual accreditation body used by the USD AT&L is the Council of Occupational Education, which is a national institutional accrediting agency.¹⁴

Does certification add value to the acquisition process? We were unable to find any empirical data to support a causal relationship with certification and job performance. However, a study published in the 1997 Professional Examination Service¹⁵ news release shows “certification is at least associated with higher levels of performance.”¹⁶ We reviewed more literature pertaining to why a practitioner should strive for certification and the majority of this literature revolves around individual mobility within the professional community for promotion and/or increased salary. One such study by Steven King investigated why people obtain certification. His results support the individual’s desire for career advancement was more important than becoming better informed or facilitating improvements.¹⁷

After understanding what certification means and why it is important, we need to understand where certifications are used. Certifications are found in library services, coaching, teachers, administrators, and many other professional fields. The key is to be able to adapt certification requirements and models to meet the changing needs of the evolving field.¹⁸

¹⁴ Defense Acquisition University, “Defense Acquisition University Catalog,” Defense Acquisition University Web Site, <http://www.dau.mil/registrar/pdf/Accreditation.pdf>. (accessed August 21, 2007).

¹⁵ Professional Evaluation Service, “The Value of Professional Credentials as Reflected in Practitioner Performance,” *PES News* 17, no. 1 (1997): 13-15.

¹⁶ William E. Kraus, “Need Justification to Get Certified? — Here are Some Reasons,” *Cost Engineering* 40, no.4 (April 1998): 6.

¹⁷ Steven King, “Certification Process: Barriers and Supports,” *Production and Inventory Management Journal* 30, no. 4 (1989): 36.

¹⁸ Rebecca Brumley, “Certifiable Success,” *Library Journal* 132, no. 3 (February 15, 2007): 46.

Certification programs also provide feedback to the organization providing the education to their workforce.¹⁹ For example, if the external agency does not feel practitioners are performing competently they could review the certification requirements. If there is a requirement missing or not sufficiently captured, the external agency could amend the requirements to the university or college and the instructional program could be improved to meet the new standards.

Certification also can lead to retention.²⁰ This is an important consideration when an organization is dealing with an aging or shrinking workforce. Hale suggests retention should be considered when selecting personnel for certification.²¹ Often in dynamic environments, when more is asked of employees, offering additional certifications and commensurate responsibility can retain employees longer. An employee earning a certification “demonstrates a commitment to the profession of choice through ongoing training that reflects achievement and excellence.”²² This commitment often allows companies or organizations to identify strong performers who seek out additional training.²³

The certification model for the DoD applies the DAWIA certification levels. These certification models are maintained in the DAU course catalog. To stay consistent with the DAWIA certification, we will use the certification model employed within the DoD and refer to it as DAU certification for the remainder of the report. Table 2 documents how DAWIA career field certifications have been altered and updated, which suggests certification requirements have been adjusted over time.

¹⁹ Jerry Gilley and Michael Galbraith, “Examining Professional Certification: HRD Practitioners Continue to Wrestle With the Certification Question,” *Training and Development Journal* 40, no. 6 (June 1986): 60-61.

²⁰ Ibid.

²¹ Judith A Hale, “Certification: It’s a Retention Strategy,” *Leadership Excellence* 24, no. 3 (March 2007): 9.

²² Maria J. Aponte, “Vigilantes Inc. Stresses the Need for Professional Certifications,” *Caribbean Business* 35, no. 12 (March 2007): 30.

²³ Daron Acemoglu and Jorn-Steffen Pischke, “Certification of Training and Training Outcomes,” *Working Papers 99-28* (1999) Massachusetts Institute of Technology and Cambridge University.

There are three key requirements to obtain a DAU certification: education, training and experience.²⁴ The specific requirements for each certification vary between the different professional specialties. The program is tiered with three levels.

Level I certification is the beginner or novice level. Fundamental competencies of the discipline are trained during this level. Acquisition 101, Fundamentals of Systems Acquisition Management, is the required Level I course for several career fields.²⁵ The remaining two levels work in the same manner. For Example, Acquisition 201, Intermediate Systems Acquisition, is a core class for Level II certifications in many career fields.²⁶ An individual will move from Level I to Level II to Level III based on their education, training and experience.

²⁴ Defense Acquisition University, "Defense Acquisition University Catalog," Defense Acquisition University Web Site, http://www.dau.mil/catalog/Course_Description_2007/DAU_2007_Catalog.pdf (accessed June 7, 2007).

²⁵ Ibid.

²⁶ Ibid.

Table 2. Career Field Certification

1991	2007
Acquisition Logistics	Auditing
Auditing	Business, Cost Estimating and Financial Management
Business, Cost Estimating and Financial Management	Contracting
Communications-Computer Systems	Facilities Engineering
Contracting	Industrial/Contract Property Management
Industrial Property Management	Information Technology
Manufacturing and Production	Life Cycle Logistics
Program Management	Production, Quality and Manufacturing
Purchasing	Program Management
Quality Assurance	Purchasing
Systems Planning, Research, Development and Engineering (SPRDE)	SPRDE - Science and Technology Manager
Test and Evaluation	SPRDE - Systems Engineering
	Test and Evaluation

Source: 1991 data from Appendix I: The Defense Acquisition University: Training Professionals for the Acquisition Workforce 1992-2003 and the 2007 data from Appendix B of the 1 October 2006 DAU course catalog.

The variation in education is very limited between the three levels. For example, if an individual meets the education standard for Level I, most likely this same education meets the standards for Level III. The professional acquisition workforce primarily deals with the business side of the military. However, the educational standards require a bachelor's degree with credits in appropriate academic disciplines. This is to ensure the practitioner is competent enough to understand and analyze the quantitative side of acquisition. As a practitioner progresses through the various levels of certification extra education such as a graduate degree is desired but not mandatory.

Training varies amongst the different career fields and the different levels of certification. Some certification levels require only one or two courses, while some require three with more being desirable. The unique aspect of the training leg of the certification triad is the policy of equivalency. This means DAU will give a practitioner credit for other training provided by the DoD.²⁷

The final leg of the triad is experience. Experience is obtained through practicing the discipline or by the time a practitioner is in training or in education for a specific discipline. The experience requirement is documented by time in years. Some experience requirements are a combination of two different timeframes. An example is the Level III certification in Program Management. The experience requirement is four years in acquisition, with two years minimum at a program office (or equivalent) and one year in a program management position.²⁸

²⁷ Defense Acquisition University, "Defense Acquisition University Catalog," Defense Acquisition University Web Site, http://www.dau.mil/catalog/Course_Description_2007/DAU_2007_Catalog.pdf (accessed June 7, 2007).

²⁸ Ibid.

III. DEFINITIONS

A. SCM DEFINED

SCM is considered an emerging discipline and numerous definitions exist throughout the DoD and private industry. Over the past fifteen years experts in the fields of logistics, marketing and operations management have attempted to define it. SCM has been called many things²⁹ over the years, including operations management, procurement, logistics, pipeline management, network sourcing, demand management, value stream management, or a combination of these terms.³⁰ It has become a “catch-all” term for many users because they think it sounds more impressive than “logistics,” even though they do not understand the difference between the two.³¹

One basic definition states that SCM is: “The systemic, strategic coordination of the traditional business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole.”³² SCM deals with multiple firms in multiple locations so it considers relationship management and who can manage their relationships with other members of their supply chain best.³³

The Council of Supply Chain Management Professionals (CSCMP), one of the leading organizations for SCM professionals, recognizes that SCM is going through a normal maturation process and formed an international committee that embarked on a yearlong study to reach a consensus on a SCM definition. After polling their 6,422

²⁹ Paul Cousins, Benn Lawson and Brian Squire, “Supply Chain Management: Theory and Practice – The Emergence of an Academic Discipline?” *International Journal of Operations & Production Management* 26, no.7 (2006): 697-702.

³⁰ Douglas Lambert, Sebastian Garcia-Dastugue and Keely Croxton, “An Evaluation of Process-Oriented Supply Chain Management Frameworks,” *Journal of Business Logistics* 26, no. 1 (2005): 25-51.

³¹ John Kerr, “Master Teacher on a Mission: Douglas M. Lambert,” *Supply Chain Management Review* 10, no. 6 (2006): 16.

³² John Mentzer, Soonhong Min and L. Michelle Bobbitt, “Toward a Unified Theory of Logistics,” *International Journal of Physical Distribution & Logistics Management* 34, no. 8 (2004): 606-627.

³³ John Kerr. (2006).

members they reached the following definition: “Supply chain management encompasses the planning and management of all activities involved in sourcing and procurement, conversion, and all logistics management activities. Importantly, it also includes coordination and collaboration with channel partners, which can be suppliers, intermediaries, third party service providers, and customers. In essence, supply chain management integrates supply and demand management within and across companies.”³⁴

Even though the CSCMP created an “official” definition, they feel their definition is only “a starting point for additional discussion by practitioners and academics in the discipline.”³⁵ CSCMP itself is evidence of an evolving definition because the organization was known as the Council for Logistics Management (CLM) until 2005, and during the previous ten years had revised their definition of “logistics” five times.³⁶ The *International Journal of Purchasing and Materials Management* is another example of SCM evolution as this publication became the *Journal of Supply Chain Management* in 1999.³⁷ Both name changes acknowledge the increasing perceived importance of SCM.

The Supply Chain Management Institute, whose mission is to “influence the theory and practice of supply chain management by publishing leading-edge, practical research,” defines SCM as: “The integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders.”³⁸ This group places emphasis on supplier partnerships, the SCM management process, supply chain performance and organizational performance and their definition is similar to the Global Supply Chain Forum (GSCF) who defines SCM as “the integration of key business processes from end

³⁴ Council of Supply Chain Professionals, “Supply Chain Management Definition,” Council of Supply Chain Management Professionals Web Site, <http://www.cscmp.org/> (accessed May 15, 2007).

³⁵ Bryan Gibson, John Mentzer and Robert Cook, “Supply Chain Management: The Pursuit of a Consensus Definition,” *Journal of Business Logistics* 26, no. 2 (2005): 17-25.

³⁶ Ibid.

³⁷ Theodore Stank, Beth Davis and Brian Fugate, “A Strategic Framework for Supply Chain Oriented Logistics,” *Journal of Business Logistics* 26, no. 2 (2005): 27-46.

³⁸ Douglas Lambert, *Supply Chain Management: Processes, Partnerships, Performance* (Jacksonville, FL: The Hartley Press, 2004): 17.

user through original suppliers that provides products, services, and information that add value for customers and other stakeholders.”³⁹

The DoD acknowledges the growth of SCM in the *DoD Supply Chain Implementation Guide*, which states: “Supply chain management is one of the key practices developed in the private sector over the past two decades. This concept, which involves significant process change, holds great promise for improving military logistics support. Making successful use of this concept requires the proper mix of commercial practices, modern technologies, and consideration of DoD’s unique logistics characteristics”.⁴⁰ The *Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms*, defines SCM as: “A cross-functional approach to procuring, producing, and delivering products and services to customers. The broad management scope includes sub-suppliers, suppliers, internal information, and funds flow.”⁴¹

Figure 1 is a basic example of a supply chain and it illustrates that every member of the supply chain is an independent business unit, but each is connected by the flow of three important pieces: information, money and products.⁴² Production inputs flow from suppliers to manufacturers, from manufacturers to distribution centers, and from distribution centers to retailers. In return for products and services, retailers send money and information (i.e., more orders, product feedback, performance feedback, supply chain relationship feedback, etc.) back through the supply chain to the suppliers.

³⁹ Douglas Lambert, Martha Cooper, and Janus Pagh, “Supply Chain Management: Implementation Issues and Research Opportunities,” *The International Journal of Logistics Management* 9, no. 2 (1998): 1-20.

⁴⁰ J. H. Reay, *DoD Supply Chain Management Implementation Guide* (McLean, VA: Logistics Management Institute, 2000).

⁴¹ U.S. Department of Defense, *Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms*, April 12, 2001, As Amended Through March 22, 2007.

⁴² Douglas Lambert et al. (1998).

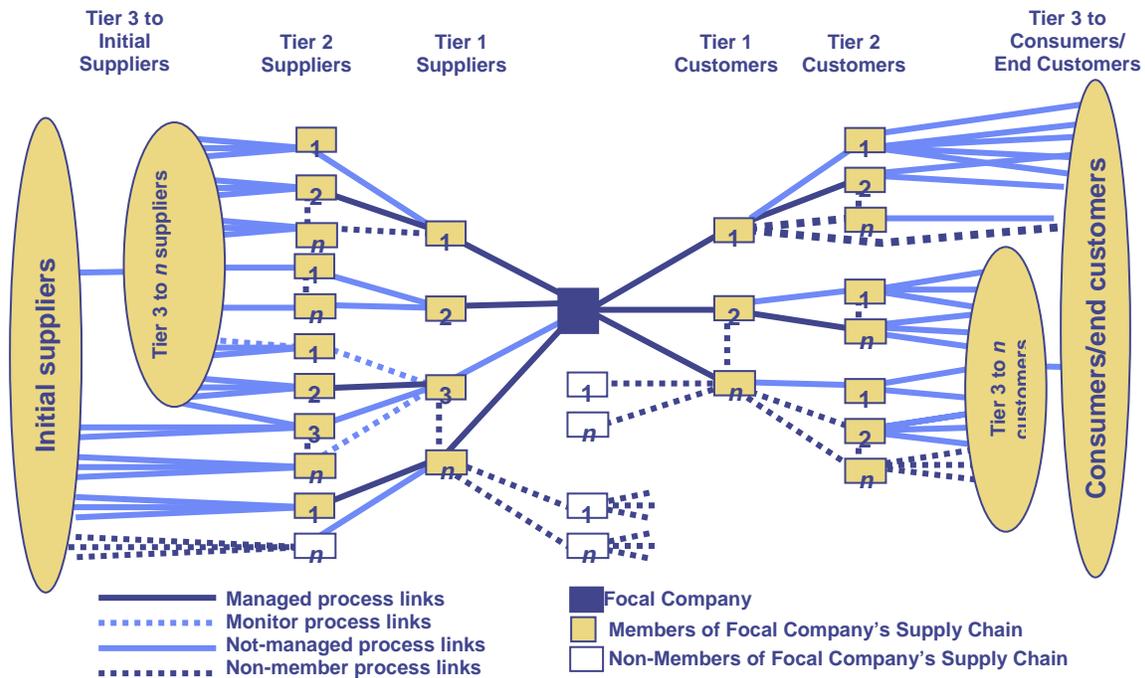


Figure 1. General Supply Chain Model

Source: Douglas Lambert, Martha Cooper, and Janus Pagh, "Supply Chain Management: Implementation Issues and Research Opportunities," *The International Journal of Logistics Management* 9, no. 2 (1998): 1-20.

B. LOGISTICS DEFINED

We provide a definition of logistics because confusion exists between SCM and logistics. Logistics is a subset of SCM and it encompasses all activities and information associated with the movement and storage of goods needs emphasis. Major activities within the logistics function include purchasing, inventory control, warehousing, transportation, packaging, and parts and service support, and each activity can occur

within one firm or they can involve multiple firms.⁴³ Each activity can be a major cost driver for an organization, but they can also be a source of considerable savings and a competitive advantage if managed properly.

CSCMP defines logistics as “the process of planning, implementing, and controlling procedures for the efficient and effective transportation and storage of goods including services, and related information from the point of origin to the point of consumption for the purpose of conforming to customer requirements. This definition includes inbound, outbound, internal, and external movements.”⁴⁴ This is a broad definition but it is limited to the movement and storage of goods, whereas SCM covers a much broader spectrum and it focuses on activities that span vertical stovepipes.

The *Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms* defines logistics as:

The science of planning and carrying out the movement and maintenance of forces. In its most comprehensive sense, those aspects of military operations which deal with: a. design and development, acquisition, storage, movement, distribution, maintenance, evacuation, and disposition of materiel; b. movement, evacuation, and hospitalization of personnel; c. acquisition or construction, maintenance, operation, and disposition of facilities; and d. acquisition or furnishing of services.⁴⁵

Logistics management should also be discussed here because it is that part of SCM that “plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers’ requirements.”⁴⁶ SCM is a very important and challenging task and logistics management is an essential part of it.

⁴³ Ira Lewis and Alexander Talalayevsky, “Logistics and Information Technology: A Coordination Perspective,” *Journal of Business Logistics* 18, no. 1 (1997): 141-157.

⁴⁴ Council of Supply Chain Management Professionals, “Logistics Definition,” Council of Supply Chain Management Professionals Web Site, <http://www.cscmp.org/> (accessed May 1, 2007).

⁴⁵ U.S. Department of Defense, *Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms*, 12 April 2001, As Amended Through 22 March 2007.

⁴⁶ U.S. Department of Defense, *Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms*, April 12, 2001, As Amended Through March 22, 2007.

Logistics management is that part of SCM that manages the flow and storage of goods and services, whereas logistics is focused on the movement and storage of goods.

One major difference between SCM and logistics is a firm should include SCM in its overall strategic planning, and it should consider logistics in its strategic plans for a firm's business unit.⁴⁷ SCM encompasses a broader perspective than logistics and it crosses many vertical stovepipes within and across organizations. Yet logistics is also an inherently cross-functional set of processes, in both the military and commercial sectors. Effective implementation of SCM may provide reduced labor costs, but may also require more leadership and buy-in from higher levels of organizations if it is to be successful.⁴⁸

⁴⁷ Theodore Stank et al. (2005).

⁴⁸ Theodore Stank et al. (2005).

IV. SCM CURRENT STATE

A. COMMERCIAL

SCM is used in manufacturing and service organizations and it is affecting business operations all over the globe. Because of SCM's newfound prominence, extensive research, investigation and academic debate has occurred in the fields of operations management, management science, strategy, economics and organizational behavior.⁴⁹ SCM has an international flavor in part due to globalization, but also because practitioners and academia have realized its importance. The *Journal of Supply Chain Management*, the *Journal of Operations Management* and the *Journal of Business Logistics* routinely feature SCM-related journal submissions from all over the globe.

Since this is a relatively new field, scholars have debated whether SCM is an emerging discipline, or a mature discipline. It has been suggested "the field lacks quality of theoretical development and discussion, and coherence" and it should only be considered an emerging discipline.⁵⁰ Nevertheless, engineering, operations management, purchasing, marketing, and strategic management have all claimed ownership of SCM, even though each function has become its own discipline within SCM.⁵¹

This increased attention has expanded the depth of knowledge and theory in the field, but the quality of SCM research could suffer because SCM is studied across many academic fields. Each field has their own methodologies and ideas and this diversity could lead to gaps in SCM theory, fragmented literature, and a failure to produce consistent findings.⁵² These potential problems might resolve as the field matures and develops a conceptual framework on which its research is based.

⁴⁹ Cousins et al. (2006).

⁵⁰ C. M. Harland, R. C. Lamming, H. Walker, W. E. Phillips, N. D. Caldwell, T. E. Johnsen, L. A. Knight and J. Zheng, "Supply Management: Is it a discipline?" *International Journal of Operations & Production Management* 26, no. 7 (2006): 730-753.

⁵¹ Harland et al. (2006).

⁵² Cousins et al. (2006).

Many organizations have become aware of the impact that SCM can play in their success.⁵³ Effective SCM can provide many benefits to an organization, including: improved requisition response time and delivery performance, reduced inventory management costs, reduced purchasing and material costs, greater productivity at a lower cost, reduced inventory throughout the supply chain, improved forecasting precision, shorter planning cycles, improved quality, enhanced inter-operational communications and cooperation, more reliable financial information, and reduced administrative costs.⁵⁴ Because of these, SCM has encountered tremendous growth internationally but some businesses have a narrow focus and only regard SCM as a subset of logistics, when it is the other way around.⁵⁵

The SCM focus shifted after the introduction of Lean manufacturing techniques, as organizations studied the limitations caused by their supply chain activities and found ways to improve them.⁵⁶ Organizations also began incorporating other tools, such as just-in-time (JIT) delivery and Six Sigma into their operations, and they soon realized these tools could be used to improve virtually any project or process.⁵⁷ Organizations also found ways to eliminate waste and improve the efficiency of their operations by collaborating with other members of their supply chain in joint design and development, which led to the formation of supplier associations.

As mentioned previously, IT has tremendously impacted SCM over the past several years for many reasons.⁵⁸ IT was once too expensive for firms to effectively use in their operations, but IT has become relatively inexpensive when compared to the benefits it provides.⁵⁹ eBusiness has also fueled the IT explosion as many businesses

⁵³ Cousins et al. (2006).

⁵⁴ U.S. Office of the Secretary of Defense Comptroller Web Site, under “Learning Source,” <http://www.defenselink.mil/comptroller/icenter/learn/iscm.htm> (accessed May 25, 2007).

⁵⁵ Mentzer et al. (2004).

⁵⁶ Ibid.

⁵⁷ Hong Mo Yang, Byung Seok Choi, Hyung Jin Park, Min Soo Suh, and Bongsug (Kevin) Chae, “Supply Chain Management Six Sigma: A Management Innovation Methodology at the Samsung Group,” *Supply Chain Management: An International Journal* 18, no. 2 (2007): 88-95.

⁵⁸ Ira Lewis and Alexander Talalayevsky. (1997).

⁵⁹ Stephen Bradley and Pankaj Ghemawat. (2002)

now operate virtual storefronts instead of the brick-and-mortar storefronts they once operated. Companies that work together in a supply chain are more heavily integrated and IT is the catalyst behind this change.

B. MILITARY

SCM is extremely important to the DoD because it is a process used to require, purchase, process, ship, track and deliver parts, supplies and equipment to the operating forces all over the world. *The National Military Strategy* states that the DoD's goal is to deliver "the right parts at the right place at the right time," and SCM is the vehicle the DoD counts on achieve that goal.⁶⁰

The DoD uses over 2,000 different business logistics process throughout the various aspects of SCM, and many users are responsible for the activities necessary to deliver the parts, supplies and equipment to the warfighter.⁶¹ These personnel include the supply, maintenance and logistics personnel at the operating unit, the supply and logistics operators at the wholesale inventory and distribution points, the supply and logistics specialists at the inventory control points that manage DoD material, the contracting specialists that buy parts from commercial partners, the transportation and shipping clerks within DoD that ship the material to the operating units.

SCM overlaps acquisition; it supports acquisition and the major defense systems that result from the defense acquisition system. When many people think of SCM they tend to focus only on the system providing material to the end user, and may forget that many times the parts, supplies and equipment needed by the end user is in support of a major defense system that was procured by the DoD acquisition system. SCM primarily affects the acquisition process after a program has been fielded, and parts support is needed for the system. SCM is then called upon to provide the parts and supplies to

⁶⁰ William M. Solis, "DoD's High-Risk Areas: High Level Commitment and Oversight Needed for DoD Supply Chain Plan to Succeed," United States Government Accountability Office, GAO-06-113T, October 6, 2005.

⁶¹ Ibid.

restore the system. All SCM activities ultimately support the acquisition process because SCM supports all of the systems that result from the process.

The DoD supply chain faces many challenges that the commercial sector does not. The DoD uses over 2,000 different business logistics systems to manage all of the activities in the supply chain, and in many cases there is considerable duplication of effort and little interoperability.⁶² Funding is another challenge SCM faces within the DoD. The DoD has to prioritize its requirements and balance current requirements with future needs, and SCM is forced to compete for resources in an increasingly fiscally constrained environment.⁶³ It is important for the DoD to think long-term, as SCM will not save the DoD money in the short-term because of the tremendous information technology investment that is needed. In the long run, modern SCM systems offers the promise to reduce costs and provide timely and reliable data.⁶⁴

The DoD followed private industry and have shifted their focus from logistics to SCM once they realized their supply chain could also benefit from these efficiencies. This shift in focus is evident in the services' workforce. For example, the Navy Supply Corps has 2,355 officer billets and 745 are SCM billets.⁶⁵ The Navy Supply Corps considers SCM one of its core competencies and it is one of three career paths an officer can pursue.⁶⁶ The Air Force, Army and Marine Corps have similar career paths in logistics and SCM.

Logistics has received unwanted attention in the DoD over the past seventeen years because it has been considered a high-risk area by the Government Accountability Office (GAO).⁶⁷ In 1990, logistics was added to the GAO's list of high-risk areas that needed "urgent attention and fundamental transformation to ensure that they function in

⁶² William Solis. (2005).

⁶³ Ibid.

⁶⁴ Ibid.

⁶⁵ Glenn Robillard, "Supply Community Roadshow 2006-2007," Director of Supply Corps Personnel, April 11, 2007, https://wwwa.nko.navy.mil/portal/page?paf_community_id=comm129 (accessed June 1, 2007).

⁶⁶ Robillard. (2007).

⁶⁷ Ibid.

the most economical, efficient, and effective manner possible.”⁶⁸ GAO placed logistics on the list because of documented problems with excess inventory levels, cost overruns for wholesale inventory parts and supplies, inadequate controls, problems with requirements forecasting, use of the industrial base, distribution problems, and asset visibility.⁶⁹ In 2005, GAO realized that logistics was not the only problem affecting supply support to the warfighter, it was all of the activities involved from procurement to delivery, so logistics was removed from the list and it was replaced with SCM.

Since 1990, the DoD has been working with the Office of Management and Budget (OMB) to develop an action plan to identify SCM vulnerabilities within the DoD that will help prevent fraud, waste and abuse.⁷⁰ This plan, which GAO considered a good first-step, was finalized in 2005 and it focuses on three major areas: improving material requirements forecasts, improving distribution of material, and improving asset visibility.⁷¹ The DoD continues to address each of those areas today, but as GAO said, “successful resolution of DoD’s SCM problems will require continued efforts to complete and successfully implement the plan.”⁷²

A standardized SCM certification program could greatly benefit the DoD and help them tackle many of the issues discussed above. This issue will be discussed in more detail in the following section, but the DoD currently lacks the type and quantity of SCM training and education the services want. All four branches of the armed forces are actively seeking SCM education and training to help them learn how to increase the effectiveness of their supply chains so they can provide better support to the warfighter.

⁶⁸ Robillard. (2007).

⁶⁹ Ibid.

⁷⁰ Ibid.

⁷¹ Ibid.

⁷² Ibid.

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V. ANALYSIS

A. SCM EDUCATION ANALYSIS

It's been very, very clear that demand has been chasing a short supply of supply-chain people. It's one thing to understand one mode. It's another to understand how those modes relate to each other.

— Traffic World⁷³

The above-mentioned quote emphasizes the need to develop SCM expertise. To properly build these experts it is important to develop a strong, robust program that couples experience with training and education. This study suggests ways to implement a strong training program to support the development of supply chain management expertise.

Presently there is no SCM training program within the DoD that leads to formal certification. The closest programs within the DoD are the SCM concentration in the Naval Postgraduate School (NPS) MBA Program, and the Logistics Management Master of Science at the U.S. Air Force Institute of Technology (AFIT). AFIT also offers a number of short courses in logistics and SCM in their School of Systems and Logistics; the U.S. Army Logistics Management College (ALMC) teaches a number of short courses, from a few days up to two weeks, in logistics⁷⁴; and the DAU teaches a number of logistics courses in their Life Cycle Logistics DAWIA certification program. Courses in each of the above programs teach logistics and SCM concepts but they do not provide a graduate degree. Instead, they focus primarily on continuing education, instead of the initial SCM education. Currently, NPS offers the only graduate level SCM education within the DoD.

⁷³ Ann Saccomano, "Hard-Learned Lessons," *Traffic World* 253, (February 1998): 33-34.

⁷⁴ U.S. Air Force Institute of Technology, "Department of Systems and Engineering Management, Master of Science Degree Programs, Curriculum Guide, Class 08M," Wright-Patterson Air Force Base, Ohio, <http://www.afit.edu/en/env/PDF/Guide%2008M.pdf> (accessed August 21, 2007): 11.

The eighteen-month program at NPS is open to all four branches of the DoD, including DoD civilians, and approximately thirty students graduate from the program each year.⁷⁵ NPS has been providing graduate level logistics education for over twenty years but its focus shifted to SCM over the past few years. In addition to the seventeen courses in the MBA core curriculum, SCM students also complete a thesis, or equivalent MBA project, and the following courses, of which all but one are logistics courses:⁷⁶

MN3370 (0-2) Defense Logistics Seminar

GB3420 (4-0) Supply Chain Management

GB4410 (4-0) Logistics Engineering

GB4420 (3-0) Logistics Information Systems

GB4430 (4-0) Defense Transportation System

GB4440 (3-0) Models and Simulation for Managerial Decision Making

GB4450 (4-0) Logistics Strategy*

MN3331 (5-1) Systems Acquisition and Project Management

* Equivalent to DAU course Acquisition Logistics 304 and is certified as DAWIA Level III for Life Cycle Logistics.

Unfortunately, because of its emphasis on graduate education as opposed to training, the SCM course work completed at NPS could be very different from training providers within the DoD. Consider an example of the lack of consistency among DoD education and training opportunities, NPS course GB4450, Logistics Strategy. This course is equivalent to DAU course Acquisition Logistics 304 and it satisfies the educational requirements for DAWAI Level III for Life Cycle Logistics. While this equivalency to the DAU course benefits students, the course itself emphasizes logistics and does not focus on the entire supply chain. As explained earlier, when organizations concentrate on the entire supply chain instead of the fragments within the supply chain,

⁷⁵ Claire Fess, interview by authors, Monterey, CA, August 21, 2007.

⁷⁶ Naval Postgraduate School, Graduate School of Business and Public Policy Web Site, <http://www.nps.navy.mil/gsbpp/curricula/lm.htm> (accessed May 17, 2007).

their profits and efficiencies improve greatly, thus making the companies trailblazers within their competitive industry. The DoD needs to be just as efficient as private industry.

Outside the DoD the situation is different. Ten years ago only a handful of universities offered graduate level educational programs in logistics, and even fewer offered courses in SCM. Many universities taught supply chain concepts in logistics and operations management courses prior to the mid-1990s, but they did not call it SCM because the term was relatively new and still gaining approval and recognition in academia.⁷⁷ In 2007, the *Institute for Supply Management (ISM)* listed 178 colleges and universities in the U.S. that offered educational programs in supply chain management or logistics.⁷⁸ SCM courses are now taught at community colleges.

Increased global competition, unprecedented levels of cost efficiency and the emergence of IT forced the business world and academics not only to recognize SCM's value, but also to study it because the demand for SCM professionals has grown. Today, nearly all of the top MBA programs have augmented their operations management and logistics courses with significant SCM content, and most of the top engineering and MBA programs have redesigned their curricula to include at least one SCM course in their core curriculums.⁷⁹ A number of the top MBA programs also offer a MBA with a SCM concentration.⁸⁰

A number of professional organizations now provide SCM training and education through their certificate programs. The Council for Supply Chain Management, the

⁷⁷ M. Eric Johnson and David Pyke, "A Framework for Teaching Supply Chain Management," *Production and Operations Management* 9, no. 1 (Spring 2000): 2-18.

⁷⁸ Institute for Supply Management, "Institutions Offering Programs and Curriculum in Supply Management," <http://www.ism.ws/membership/content.cfm?ItemNumber=4743&navItemNumber=5574> (accessed May 31, 2007).

⁷⁹ Schools (in alphabetical order) include: Arizona State University, Auburn University, Columbia University, Dartmouth College, Duke University, Georgia Institute of Technology, Harvard University, Indiana University, Iowa State University, Massachusetts Institute of Technology, Michigan State University, New York University, Northwestern University, Ohio State University, Penn State University, Purdue University, Stanford University, Syracuse University, University of Arkansas, University of Chicago, University of Maryland, University of Oklahoma, University of Pennsylvania, University of Tennessee, University of Wisconsin, Vanderbilt University.

⁸⁰ Ibid.

Institute for Supply Management, the Retail Industry Leaders Association, APICS (the Association for Operations Management), and many other professional associations have launched SCM certification programs over the past few years. A number of for-profit organizations are also offering SCM education and training, both in the classroom and on-line. Many companies also provide SCM training and education to their employees. IBM created the Supply Chain Management Career Path that helps employees obtain the necessary skills and experience to expand their career opportunities.⁸¹

Graduate schools have been ranked by leading publications for years but those listings now include the best business schools with a supply chain/logistics specialty. Not surprisingly, many of the top ranked MBA programs throughout the U.S. also have some of the top SCM programs. These universities have recognized that resource management throughout the supply chain has become an essential component of corporate success and these principles must be taught to future business leaders.⁸²

Table 3 shows the results of a survey that appeared in the *Supply Chain Management Review* that listed the top SCM education programs in the U.S. in 2005.⁸³ The authors surveyed 1,000 logistics and supply chain professionals and 175 college and university educators throughout the U.S. They separated the responses from academics and practitioners (since academics focus on research capabilities and academic reputation, while practitioners focus on the SCM talent the universities produce) and provided an overall ranking based on the input received from both groups. This was a longitudinal survey built on the same study that was performed in 1995. Penn State University (PSU) was ranked number one overall in both studies, and the University of Tennessee, Michigan State and Ohio State were also ranked near the top of both lists.

⁸¹ Joseph Carter, David Closs, John Dischinger, William Grenoble and Vickie Maxon, "Executive Education's Role in our Supply Chain Future," *Supply Chain Management Review* 10, no. 6 (2006): 34.

⁸² Stephen Rutner and Stanley Fawcett, "The State of Supply Chain Education," *Supply Chain Management Review* 9, no. 6 (2005): 55-60.

⁸³ Ibid.

Table 3. Ranking of Supply Chain Management Education Programs

	Academics	Practitioners	Overall
1	Penn State	Penn State	Penn State
2	Michigan State	Tennessee	Tennessee
3	Ohio State	Michigan State	Michigan State
4	Tennessee	Ohio State	Ohio State
5	Maryland	Georgia Tech	Georgia Tech
6	Arizona State	Northwestern	Northwestern
7	Iowa State	Wisconsin-Madison	Wisconsin-Madison
8	MIT	MIT	MIT
9	Georgia Tech	Syracuse	Maryland
10	Northwestern	Maryland	Syracuse
11	Arkansas	Arkansas	Arkansas
12	Nevada-Reno	Indiana	Iowa State
13	North Florida	Harvard	Arizona State
14	Auburn	Iowa State	Harvard
15	Syracuse	Georgia Southern	Indiana
16	Georgia Southern	Purdue	Georgia Southern
17	Wisconsin-Madison	Texas A&M	Purdue
18	North Texas	Arizona State	Texas A&M
19	Stanford	Stanford	Stanford
20	Oklahoma	Pennsylvania	Auburn

Source: Stephen Rutner and Stanley Fawcett, “The State of Supply Chain Education,” *Supply Chain Management Review* 9, no. 6 (2005): 55-60.

U.S. News & World Report also publishes a list of the best business schools in the specialty of supply chain/logistics. Their 2008 edition of “America’s Best Graduate Schools” ranked Massachusetts Institute of Technology number one, followed by Michigan State University, Arizona State University, Carnegie Mellon University and The Ohio State University.⁸⁴ PSU was ranked seventh best, even though *Supply Chain*

⁸⁴ Alex Kingsbury, “America’s Best Graduate Schools,” *U.S. News & World Report* 142, no. 12 (April 9, 2007): 70-86.

Management Review considers them the nation's premier supply chain/logistics program. There were considerable differences between the two rankings, but fifteen schools appeared on both lists.⁸⁵

According to a study performed at Dartmouth College, most of the top SCM graduate programs rely on case studies and articles from management journals, versus textbooks, and many programs incorporate SCM educational games such as the "beer game, the poster game, the Siemens Briefcase game, and the Llenroc Plastics game."⁸⁶ This study also presented a framework that identified twelve key components of a SCM course, and those components include:⁸⁷

- location
- transportation and logistics
- inventory and forecasting
- marketing and channel restructuring
- sourcing and supplier management
- information and electronic mediated environments
- product design and new product introduction
- service and after sales support
- reverse logistics and green issues
- outsourcing and strategic alliances
- metrics and incentives
- global issues

In 1996, the Michigan State University (MSU) Eli Broad College of Business took a significant step and created the Department of Marketing and Supply Chain Management, a new department that integrated the marketing, procurement, production and logistics disciplines under one umbrella.⁸⁸ In 2002, the Smeal College of Business at Penn State University followed suit and merged the Department of Business Logistics

⁸⁵ Supply Chain Management Review Staff, "What are the Top Supply Chain Management Programs?" *Supply Chain Management Review Web Site* (October 5, 2006), <http://www.scmr.com/article/CA6378393.html?text=rankings> (accessed May 10, 2007).

⁸⁶ M. Eric Johnson and David Pyke. (2000).

⁸⁷ Ibid.

⁸⁸ David Closs and Theodore Stank, "A Cross-Functional Curriculum for Supply Chain Education at Michigan State University," *Journal of Business Logistics* 20, no. 1 (1999): 59-73.

and the Department of Management Science and Information Systems to form the Department of Supply Chain Management and Information Systems.

According to Dr. John Tyworth, PSU professor of SCM and chair of the new department, “Our goal is to be known as a leader in teaching and research in both business and academic communities. The new department will position Smeal as a major source of talent for corporate recruiters, universities, and graduate schools in supply chain management.”⁸⁹ Many organizations, including IBM, Dell, Wal-Mart, and the DoD, have recognized PSU’s SCM excellence and they have formed long-standing academic partnerships. Linda Dillman, Senior Vice President and Chief Information Officer for Wal-Mart Stores, Inc. stated, “The new Supply Chain and Information Systems Program at Penn State’s Smeal College of Business reflects the important role that information technology plays in supply chain management for a retailer like Wal-Mart.”⁹⁰

In addition to their SCM MBAs, PSU also offers graduate certificates in SCM and Supply Chain Leadership through the PSU Center for Supply Chain Research (CSCR).⁹¹ Both certificate programs require the completion of three courses and there are two options, a corporate option and a military option. The corporate option is intended for anyone who either has taken or plans to take a course in the SCM certificate program. The military option targets military personnel who have attended or plan to attend the PSU SCM Marine Corps Logistics Education Program (MCLEP), MCLP Non-Resident, Marine Corps Logistics Command, Army Material Command, U.S. Army Logistics Innovation Agency, and Army SCM programs and plans to work towards a SCM certificate.⁹²

⁸⁹ Penn State University, “The Nation’s First Supply Chain and Information Systems Business School Program Created at Penn State,” Penn State University News Release, <http://www.smeal.psu.edu/news/releases/nov02/scis.html/?searchterm=supply%20chain%20management> (accessed May 1, 2007).

⁹⁰ Ibid.

⁹¹ Penn State University, “Earn a Certificate in Supply Chain Management or Supply Chain Leadership,” Penn State University, Smeal College of Business, Supply Chain Certificate – Military Options Web Site, <http://www.smeal.psu.edu/psep/milcert.html/?searchterm=supply%20chain%20management> (accessed May 1, 2007).

⁹² Ibid.

Aside from the military option of their supply chain certificate program, PSU and the U.S. Army have formed a number of other partnerships. In 2004, PSU's CSCR and the Army Logistics Transformation Agency (LTA) developed a five-day course titled "Logistics Transformation Management – Developing and Accelerating Logistics Change."⁹³ The course is designed for process- and product-owner representatives in leadership, management or planning positions, and it reviews lessons learned from Operations Enduring Freedom and Iraqi Freedom and incorporates this information into the Army's latest SCM practices, tools and trends.⁹⁴

In addition to their MBA in SCM, the University of Tennessee (UT) also offers a number of graduate-level courses in their SCM certificate programs. UT also has a number of DoD partnerships, including a \$25 million indefinite delivery, indefinite quantity contract that calls upon UT to help the U.S. Air Force with their transformation efforts.⁹⁵ According to Dr. Loren Crabtree, UT Chancellor, the agreement will "allow the college to develop curriculum, teach programs, provide technical assistance or come up with cost-saving ideas and models."⁹⁶ Dan Stewart, Adjunct Professor and Special Assistant to UT Executive Vice President Jack Britt stated,

This contract is important because it recognizes UT's College of Business Administration as a national center of excellence, particularly for the aerospace defense sector. It illustrates how a university can serve government and industry by providing a full spectrum of services from research, education and training, to helping solve some of this country's most complex problems.⁹⁷

⁹³ William Koenig, "LTA and Penn State Offer Logistics Transformation Course," *Army Logistician*, (March-April 2004), http://findarticles.com/p/articles/mi_m0PAI/is_2_36/ai_114487539 (accessed May 5, 2007).

⁹⁴ Koenig. (2004).

⁹⁵ Cindy Raines, "UT Signs \$25 Million Contract With U.S. Air Force," *University of Tennessee College of Business Administration Press Release*, http://bus.utk.edu/cba/News_Articles/air%20force%20grant%20release%20CBA%20_3_.pdf (accessed May 20, 2007).

⁹⁶ Ibid.

⁹⁷ Ibid.

This is not the first partnership between the Air Force and UT. When the Air Force implemented Lean manufacturing throughout its operations they called upon UT for training and assistance and UT provided a six-month “Master Process Manager” course for Air Force military and civilian leaders that “provided them accelerated learning and hands-on experience in running rapid improvement events.”⁹⁸ UT also partnered with the Air Force at Warner Robins Air Logistics Center to reduce the work-in-process on C-5 aircraft from 240 days to 160 days, and they also helped the Air Force reduce the number of C-5s under repair from thirteen to seven.⁹⁹

SCM is a dynamic and rapidly changing field; however, experts suggest that SCM professionals should hone their skills in four key areas: functional, technical, leadership and global management.¹⁰⁰ SCM education is an on-going process that experts suggest should not be filled by one resource; the key is to learn from a variety of resources, including educational institutions, trade journals, peers, professional associations, for-profit organizations and the internet.¹⁰¹ SCM education should focus on the “knowledge and fact base, problem-solving skills, perspective, and judgment to make decisions in a globally integrated supply chain.”¹⁰²

B. RECOMMENDED SCM INSTRUCTIONAL PROGRAM

Based on our research of SCM educational programs and instructional programs, we have created a SCM curriculum proposal for the DoD that would cover many of the major SCM-related themes. The paragraphs that follow outline our proposed SCM curriculum, which is loosely based on the Johnson and Pyke framework developed at Dartmouth University that outlines the twelve key components of a SCM course.¹⁰³

⁹⁸ Cindy Raines. (2007).

⁹⁹ University of Tennessee, “Dr. Srinivasan Shares in Prestigious Business Award: Helps Military Increase Revenues \$49.8 Million Annually,” *University of Tennessee ePerspective* (May 2006), http://bus.utk.edu/cba/News_Articles/srinivasan.htm (accessed May 20, 2007).

¹⁰⁰ Joseph Carter et al. (2006).

¹⁰¹ Frank Quinn, “Education: Keep It Relevant,” *Supply Chain Management Review* 9, no. 6 (September 2005): 5.

¹⁰² Joseph Carter et al. (2006).

¹⁰³ M. Eric Johnson and David Pyke. (2000).

When an individual completes the entire proposed curriculum, an acquisition professional will have had training in each of the twelve suggested areas. Some areas will be covered several times, based on our assessment of the item’s level of importance. The table below traces the characteristic to a recommended course. Recommended courses, and how they are structured within the proposed curriculum, will be discussed in next.

Table 4. SCM Characteristic to Course Cross Reference Matrix

Johnson and Pyke Characteristic	Proposed Course
Location	SCM 101, 104, 201
Transportation and logistics	SCM 104, 201
Inventory and forecasting	SCM 202
Marketing and channel restructuring	SCM 201
Sourcing and supplier management	SCM 204
Information and electronic mediated environments	SCM 203
Product design and new product introduction	SCM 304
Service and after sales support	SCM 202
Reverse logistics and green issues	SCM 301, 303
Outsourcing and strategic alliances	SCM 301
Metrics and incentives	SCM 304
Global issues	SCM 302

Our proposed curriculum is broken down further in a model consistent with DAWIA. The goal of this curriculum is to provide the foundation, in a building block approach, for supply chain managers and the impact supply chain management can have on services or goods throughout the supply chain. The end goal is to provide the warfighter the required good or service as efficiency and expeditiously as possible. The table below provides the construct for the proposed DAWIA SCM certification.

Table 5. Proposed DAWIA SCM Certification Structure and Requirements

Level I

Education

(Desired) Baccalaureate degree in a business, managerial or technical field

Training

SCM 101 SCM Fundamentals
SCM 102 Lean/Six Sigma
SCM 103 Operations Management
SCM 104 Transportation and Logistics

Experience

Requires one year of SCM experience

Level II

Education

(Desired) Baccalaureate degree in a business, managerial or technical field

Training

SCM 201 Intermediate SCM
SCM 202 SCM Planning
SCM 203 Managing SCM Technology
SCM 204 Sourcing and Supplier Management

Experience

Requires three years of SCM experience

Level III

Education

(Required) Baccalaureate degree in a business, managerial or technical field
(Desired) Master's degree in Business Administration to include Supply Chain

Management *or*
(Desired) Master's degree in systems engineering

Training

SCM 301 Supply Chain Strategy
SCM 302 Global Supply Chain Management
SCM 303 SCM Contingency Planning
SCM 304 SCM Quality Engineering

Experience

Requires five years of SCM experience

The paragraphs that follow provide a brief description of each course, a list of objectives for each course, primary student targets for each course, and list of prerequisites is also provided for each course.

Level I

SCM 101

Supply Chain Management (SCM) Fundamentals prepares entry-level acquisition, logistics, transportation and supply professionals to understand and apply the elements of SCM to acquisition principles and processes. SCM 101, 102, 103 and 104 are required for DAWIA certification.

Objectives: Students who successfully complete this course will:

- enhance and apply their knowledge of the business, technical, and managerial aspects of supply chain management;
- understand supply chain designs;
- understand and appreciate critical principles in SCM and how they are important to the supply chain; and
- apply knowledge to day-to-day supply chain operations.

Who Should Attend: SCM 101 is for entry-level military officers, O-1 and above, mid-grade enlisted personnel, E-4 and above, civilians, GS-7 and above, and industry counterparts who are involved in supply chain operations. Students should have one to three years of related experience.

Prerequisites: None.

SCM 102

Lean/Six Sigma prepares entry-level acquisition professionals to understand and apply the elements of Lean/Six Sigma principles and processes to the supply chain. SCM 101, 102, 103 and 104 are required for DAWIA certification.

Objectives: Students who successfully complete this course will:

- enhance and apply their knowledge of the business, technical, and managerial aspects of supply chain management;
- understand and appreciate critical principles or characteristics of Lean/Six Sigma and how they are important to the supply chain;
- understand the fundamentals of quality and quality engineering;
- understand and apply knowledge to identify and/or improve processes within the supply chain; and
- apply knowledge to day-to-day supply chain operations.

Who Should Attend: SCM 102 is for entry-level military officers, O-1 and above, mid-grade enlisted personnel, E-4 and above, civilians, GS-7 and above, and industry counterparts who are involved in supply chain operations. Students should have one to three years of related experience.

Prerequisites: None.

SCM 103

Operations Management prepares entry-level acquisition professionals to understand and apply the elements of Operations Management principles and processes to the supply chain. SCM 101, 102, 103 and 104 are required for DAWIA certification.

Objectives: Students who successfully complete this course will:

- enhance and apply their knowledge of the business, technical, and managerial aspects of supply chain management;
- understand and appreciate critical principles or characteristics of Operations Management and how they are important to the supply chain;
- understand the different effects inventory can have on the supply chain,
- be able to calculate simple formulas to identify bottlenecks within an operation,

- understand operational flows within a supply chain; and
- apply knowledge to day-to-day supply chain operations.

Who Should Attend: SCM 103 is for entry-level military officers, O-1 and above, mid-grade enlisted personnel, E-4 and above, civilians, GS-7 and above, and industry counterparts who are involved in supply chain operations. Students should have one to three years of functionally related experience.

Prerequisites: None.

SCM 104

Transportation and logistics prepares entry-level acquisition professionals to understand and apply the elements of transportation and logistics principles and processes to the supply chain. SCM 101, 102, 103 and 104 are required for DAWIA certification.

Objectives: Students who successfully complete this course will:

- enhance and apply their knowledge of the business, technical, and managerial aspects of supply chain management;
- understand and appreciate critical principles or characteristics of logistics;
- understand the different transportation capabilities within the DoD;
- understand which modes of transportation are the best for supplying goods or services within the DOD; and
- apply knowledge to day-to-day supply chain operations.

Who Should Attend: SCM 103 is for entry-level military officers, O-1 and above, mid-grade enlisted personnel, E-4 and above, civilians, GS-7 and above, and industry counterparts who are involved in supply chain operations. Students should have one to three years of functionally related experience.

Prerequisites: None.

Level II

SCM 201

Intermediate SCM prepares mid-level acquisition professionals to understand and apply the elements of SCM principles and processes to the supply chain. SCM 201, 202, 203 and 204 are required for DAWIA certification.

Objectives: Students who successfully complete this course will:

- enhance and apply their knowledge of the business, technical, and managerial aspects of supply chain management;
- understand and appreciate marketing and channel restructuring principles or characteristics;
- understand inventory turnover and optimization of inventory;
- understand optimization principles in logistics;
- understand control mechanisms in the supply chain; and
- apply knowledge to day-to-day supply chain operations.

Who Should Attend: SCM 201 is for mid-level military officers, O-3 and above, mid-grade enlisted personnel, E-6 and above, civilians, GS-9 and above, and industry counterparts who are involved in supply chain operations. Students should have three to four years of functionally related experience.

Prerequisites: SCM 101, SCM 102, SCM 103, SCM 104.

SCM 202

SCM Planning prepares mid-level acquisition professionals to understand and apply the elements of SCM planning to the supply chain. SCM 201, 202, 203 and 204 are required for DAWIA certification.

Objectives: Students who successfully complete this course will:

- enhance and apply their knowledge of the business, technical, and managerial aspects of supply chain management;
- understand and appreciate inventory and forecasting models;
- understand and appreciate contingency planning requirements within the supply chain;
- understand service and after sales support throughout the supply chain; and
- apply knowledge to day-to-day supply chain operations.

Who Should Attend: SCM 202 is for mid-level military officers, O-3 and above, mid-grade enlisted personnel, E-6 and above, civilians, GS-9 and above, and industry counterparts who are involved in supply chain operations. Students should have three to four years of functionally related experience.

Prerequisites: SCM 101, SCM 102, SCM 103, SCM 104.

SCM 203

Managing SCM Technology prepares mid-level acquisition professionals to understand and apply the elements of SCM technology to the supply chain. SCM 201, 202, 203 and 204 are required for DAWIA certification.

Objectives: Students who successfully complete this course will:

- enhance and apply their knowledge of the business, technical, and managerial aspects of supply chain management;
- understand and appreciate types of supply chain management technologies;
- understand the challenges of integrating technology within the supply chain;
- understand and appreciate information restructuring requirements within the supply chain;
- understand benefits of technology within the supply chain; and
- apply knowledge to day-to-day supply chain operations.

Who Should Attend: SCM 203 is for mid-level military officers, O-3 and above, mid-grade enlisted personnel, E-6 and above, civilians, GS-9 and above, and industry counterparts who are involved in supply chain operations. Students should have three to four years of functionally related experience.

Prerequisites: SCM 101, SCM 102, SCM 103, SCM 104.

SCM 204

Sourcing and Supplier Management prepares mid-level acquisition professionals to understand and apply the elements of SCM technology to the supply chain. SCM 201, 202, 203 and 204 are required for DAWIA certification.

Objectives: Students who successfully complete this course will:

- enhance and apply their knowledge of the business, technical, and managerial aspects of supply chain management;
- understand and appreciate sourcing requirements within the supply chain;
- understand and appreciate supplier management requirements within the supply chain;
- understand and appreciate real time adjustments within the supply chain;
- understand and appreciate supplier relationships within the supply chain; and
- apply knowledge to day-to-day supply chain operations.

Who Should Attend: SCM 204 is for mid-level military officers, O-3 and above, mid-grade enlisted personnel, E-6 and above, civilians, GS-9 and above, and industry counterparts who are involved in supply chain operations. Students should have three to four years of acquisition or functionally related experience.

Prerequisites: SCM 101, SCM 102, SCM 103, SCM 104.

Level III

SCM 301

Supply Chain Strategy prepares senior-level acquisition professionals to understand and apply the elements of supply chain strategy to the supply chain. SCM 301, 302, 303 and 304 are required for DAWIA certification.

Objectives: Students who successfully complete this course will:

- enhance and apply their knowledge of the business, technical, and managerial aspects of supply chain management;
- understand and appreciate reverse logistics and green issues principles or characteristics;
- understand outsourcing and strategic alliances;
- understand outsourcing strategies in logistics;
- understand distribution channels; and
- apply knowledge to day-to-day supply chain operations.

Who Should Attend: SCM 301 is for military officers, O-4 and above, senior enlisted personnel, E-8 and above, civilians, GS-11 and above, and industry counterparts who are

involved in supply chain operations. Students should have five or more years of functionally related experience and a Baccalaureate degree in a business, managerial or technical field.

Prerequisites: SCM 101, SCM 102, SCM 103, SCM 104, SCM 201, SCM 202, SCM 203, SCM 204.

SCM 302

Global Supply Chain Management prepares senior-level acquisition professionals to understand and apply the elements of global supply chain management to the supply chain. SCM 301, 302, 303 and 304 are required for DAWIA certification.

Objectives: Students who successfully complete this course will:

- enhance and apply their knowledge of the business, technical, and managerial aspects of supply chain management;
- understand and appreciate global issues;
- understand global logistic issues;
- understand integrative supply chain issues;
- understand global distribution channels; and
- apply knowledge to day-to-day supply chain operations.

Who Should Attend: SCM 302 is for military officers, O-4 and above, senior enlisted personnel, E-8 and above, civilians, GS-11 and above, and industry counterparts who are involved in supply chain operations. Students should have five or more years of functionally related experience.

Prerequisites: SCM 101, SCM 102, SCM 103, SCM 104, SCM 201, SCM 202, SCM 203, SCM 204.

SCM 303

SCM Contingency Planning prepares senior-level acquisition professionals to understand and apply the elements of SCM contingency planning to the supply chain. SCM 301, 302, 303 and 304 are required for DAWIA certification.

Objectives: Students who successfully complete this course will:

- enhance and apply their knowledge of the business, technical, and managerial aspects of supply chain management;
- understand contingency planning;
- understand current COCOM OPLANS;
- understand reverse logistics and green issues within different global regions; and
- apply knowledge to day-to-day supply chain operations.

Who Should Attend: SCM 303 is for military officers, O-4 and above, senior enlisted personnel, E-8 and above, civilians, GS-11 and above, and industry counterparts who are involved in supply chain operations. Students should have five or more years of functionally related experience.

Prerequisites: SCM 101, SCM 102, SCM 103, SCM 104, SCM 201, SCM 202, SCM 203, SCM 204.

SCM 304

SCM Quality Engineering prepares senior-level acquisition professionals to understand and apply the elements of SCM quality engineering to the supply chain. SCM 301, 302, 303 and 304 are required for DAWIA certification.

Objectives: Students who successfully complete this course will:

- enhance and apply their knowledge of the business, technical, and managerial aspects of supply chain management;
- understand principles of metrics and incentives within the supply chain;
- understand and appreciate quality engineering principles within the supply chain;
- understand product design principles;
- understand implementation challenges with new product design;
- understand and appreciate integration challenges within the supply chain; and
- apply knowledge to day-to-day supply chain operations.

Who Should Attend: SCM 304 is for military officers, O-4 and above, senior enlisted personnel, E-8 and above, civilians, GS-11 and above, and industry counterparts who are involved in supply chain operations. Students should have five or more years of functionally related experience.

Prerequisites: SCM 101, SCM 102, SCM 103, SCM 104, SCM 201, SCM 202, SCM 203, SCM 204.

VI. CONCLUSION

Over the past 25 years, SCM has gained considerable attention in both the DoD and private industry, and that trend is expected to continue in the future because the opportunities and savings in this area can have a profound impact on an organization's effectiveness and its bottom line.

The project provided a brief history of Acquisition Reform within DoD, and it provided the history of DoD's need for a SCM certification program. This project also defined SCM and provided a definition of other pertinent SCM-related terminology that was essential in building an understanding of our project. After the background was provided, we offered an assessment of the state of SCM in the commercial sector and the DoD, and we provided our assessment of the state of SCM education curriculums within the DoD, civilian universities and industry. Lastly, we proposed a SCM certification framework for the DoD that would provide standardized training.

At the beginning of this project, we asserted that the DoD needs to add a certification program for SCM and we developed a SCM training curriculum to support our claim. Our curriculum was modeled after DAU's existing framework and it is based on leading U.S. SCM education curricula that would be most beneficial to the DoD's needs. The proposed curriculum applies a building block approach to grow SCM expertise within the DoD and it adds emphasis on planning, especially the specific planning involved with contingencies. We feel, if nothing else, this proposed curriculum provides a backdrop for further discussion and the development of a DAWIA SCM certification and a training program.

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