

# Future Directions Of Management Science And Operations Management In Business School Curricula

Jack A. Fuller, (Email: [jfuller@wvu.edu](mailto:jfuller@wvu.edu)), West Virginia University  
James W. Denton, West Virginia University

## ABSTRACT

*The fields of Management Science (MS) and Operations Management (OM) have co-existed in business school curricula for over a half century. This paper examines five trends that point toward a bright future for Operations Management in the business curriculum. These trends include an increasing emphasis on global competition, the growth of the supply chain as a competitive weapon, more participation from the Operations function in formulating business strategies, the continued dominance of the service sector over the manufacturing sector in developed economies, and increasing demand for general management skills over technical skills for business school graduates. The de-emphasis on technical skills and the fact that MS techniques have been subsumed into other functional areas indicates that the future of Management Science in the business curriculum may not be as bright.*

## INTRODUCTION

The fields of Management Science (MS) and Operations Management (OM) have co-existed in business school curricula for over a half century. This paper begins with a review of the historical development of the MS and OM curricula. Then, five trends are identified that distinctly favor Operations Management in the business curriculum over Management Science.

## OVERVIEW OF OPERATIONS RESEARCH AND MANAGEMENT SCIENCE HISTORY

Operations Research, often referred to as “Management Science” in a business school setting, or as “Operational Research” in Great Britain, is concerned with the development and use of mathematical methods and algorithms to aid in decision-making. These methods are used in optimization, stochastic processes, simulation, game theory, and network analysis. Common applications of MS techniques include managing communication networks, supply chain management, pricing and revenue management, logistics, scheduling, and other areas.

The foundations of OR / MS can be traced to military planning. The first applications of OR appeared in Great Britain, where scientists used these new techniques to develop effective air defense procedures for their new radar technology. In the United States, initial applications of OR focused on tactics used in the search for submarines, plans for escorting convoys, procedures for finding the optimal settings for depth charges used against submarines, and the development of other measures and countermeasures used in World War II (Miser, 2000).

Academic interest in OR was set in motion with the first OR course, offered by MIT in 1948, and the initiation of an Operations Research program at the Naval Postgraduate School in 1951 (Gass, 2002). Case Institute of Technology awarded the first Ph.D. degree in operations research in 1957 (Horner, 2002). In 1952, the Operations Research Society of America (ORSA) was founded. This society provided an outlet for academic researchers in the field by sponsoring journals and conferences where their ideas could be shared. A year later, some of these researchers grew frustrated with the emphasis on military applications and esoteric mathematics and the lack of practical business applications in ORSA. They founded the Institute of Management Sciences (TIMS) to provide an

outlet for research on problems more likely to be encountered in day-to-day business and management activities (Vazsonyi, 2002).

The 1990's saw an end to the growth of OR practitioners, at least in terms of memberships in their professional societies. In some cases, the practice of Operations Research has been adopted by other functional specialties in organizations (financial analysts, materials planners, etc.) such that OR has lost much of its identity. In addition, many business schools have de-emphasized OR and MS in the graduate and undergraduate programs, partly in reaction to the demands of the customers, the students, who are more interested in other aspects of business administration – financial applications or “softer” applications in corporate strategy or human resources (Horner, 2002). This, in part, led to the merger of ORSA and TIMS into a new organization, the Institute for Operations Research and the Management Sciences (INFORMS) in 1995.

The de-emphasis of OR/MS in the MBA curriculum can be traced to 1991 when the Association to Advance Collegiate Schools of Business (AACSB), the primary accrediting authority for business schools, removed OR/MS from its requirements for business programs. Instead of requiring business schools to provide students with a common “body of knowledge”, business schools were given the freedom to create curricula consistent with their own defined missions. As a result, the role of OR/MS in business curricula declined significantly (Albritton, 2003).

## **OVERVIEW OF OPERATIONS MANAGEMENT HISTORY**

Operations Management is concerned with the productive management of resources used in creating and delivering a product or a service. The operations function of an organization is a transformation process that converts inputs into outputs. The inputs usually consist of raw materials, labor, energy, etc., and the outputs are the products and services that are sold to customers. As a result of this transformation, value is created. The operations function comprises many tasks including selecting processes, designing jobs, locating facilities, arranging layouts, managing inventory, and scheduling production.

The history of operations management can be traced to Frederick Taylor, the founder of the scientific management movement in 1911. Other important early contributors were Henry Gantt (developer of the Gantt chart used in scheduling and project management), Frank and Lillian Gilbreth (who developed the science of time and motion studies), and Walter Shewhart (who invented the control chart used in statistical process control).

Operations is only one functional area of an organization, along with Marketing, Finance, Engineering, etc. To be successful, operations managers must interface with their peers in these other functional areas. Therefore, in addition to the knowledge of mathematical tools, operations managers must also understand human relations, business strategy concepts, accounting principles, managerial finance, marketing concepts, and the use of information technology.

Courses in OM typically view operating systems as processes categorized as job shop, batch flow, or assembly line. The performance of these processes can be analyzed by comparing factors such as cost, capacity, lead time, quality, flexibility, and productivity. Since the operations function does not have any control over the pricing of products and services, its contribution to the overall profitability of an organization comes from an emphasis on minimizing costs. In addition, the control of quality, the ability to handle a wide variety of product options, and filling orders on-time are important objectives of the operations function (Hill, 2000).

## **CURRENT TRENDS IN OM AND MS CURRICULA**

Several current trends in business have affected the content of MS and OM courses offered in business schools today. (In the balance of this paper, Management Science will be used for discussion purposes rather than Operations Research since MS is the more commonly offered topic in business school curricula.) Among these are increasing global competition, the growth of the supply chain as a competitive weapon, the realization that operations should play a greater role in the strategic thinking of organizations, and the transformation in developed countries from a manufacturing-based economy to a service-based economy. At the same time, the hiring preferences of

businesses have shifted from a desire for technical skills to a desire for more general business skills. Universities and educational organizations have reacted by deemphasizing narrow mathematical skills, and instead have concentrated on general management and interpersonal skills. Each of these factors will be discussed in more detail below:

### **GLOBALIZATION**

As the global environment becomes more competitive, OM courses have placed more emphasis on teaching about world-class production systems. Lean production, six-sigma quality management, benchmarking, and just-in-time inventory techniques are some of the subjects that relate to world class manufacturing and competitiveness (Chase, 1998). The growth of global markets and the resulting increase in competition have highlighted the need for an emphasis on OM in business school curricula. In order to be competitive, businesses must meet the challenges present in a global market by offering products and services that offer good value to their customers. Good value is a combination of low cost, high quality, and rapid availability.

### **SUPPLY CHAIN**

Many changes in OM curricula have resulted from the realization that manufacturing is just one link in the chain of activities that must occur to convert raw materials into a product in the hands of a satisfied customer. Therefore, the supply chain is becoming a bigger part of the typical business curriculum. Forecasting, inventory models, scheduling, purchasing, and quality control all play a part in the management of the supply chain (Chase, 1998).

### **STRATEGIC EMPHASIS**

The area of operations strategy has a strong interface with marketing, and is concerned with broad issues of product positioning, matching product and process, the adoption of technology, and new product development. The emphasis is on competitive advantage in a market and how operations can be used to achieve and maintain that competitive advantage. Historically in industry, strategic decisions have been largely based on corporate marketing goals, and the role of operations has been to simply react to those decisions without the opportunity to provide inputs to the process of formulating that strategy. The result is that manufacturing is often ill prepared to carry out corporate strategies that have been prepared without taking the views and opinions of operations personnel into consideration. One reason that operations personnel have not been consulted by the formulators of corporate strategy is that operations managers have historically been focused on the technical details of their jobs rather than long-range goals.

Educators have not done enough to prepare future operations managers to fill a strategic role in their organizations. This can be accomplished by shifting the teaching emphasis from tactical techniques to strategic thinking. Students in operations management should be prepared to answer two questions. First, how can the manufacturing process contribute to a competitive advantage for the business in its market? This is not easy to do, but it can often be accomplished through the clever application of technology in the manufacturing process. The second question is more pertinent to manufacturing managers. How can the manufacturing process support marketing's strategy for how it intends to win orders? These order-winning strategies often involve cost, quality, flexibility, or speed of delivery. Operations managers can contribute significantly to all of these factors (Hill, 2000).

### **GROWTH OF THE SERVICE SECTOR**

The growth of the importance of the service sector, at the expense of the manufacturing sector, has resulted in a change in emphasis away from production-oriented topics to service-oriented topics. The intangible nature of services requires that service operations be managed significantly differently than manufacturing operations. Therefore, assembly-line balancing and shop floor control have less prominence in the curriculum, while queuing models and service delivery systems have correspondingly more prominence. Since services are consumed when they are delivered, they cannot be inventoried, and it is therefore not possible to decouple a service operation from its delivery by using inventory as a buffer. The direct involvement of the customer in a service operation means that

different objectives must be satisfied in a service operation, and that different skills are required of service operation managers.

### **CHANGING EMPLOYER REQUIREMENTS**

Practitioners in industry, who hire most of the business school graduates, have expressed a desire for business education to concentrate less on specific methods and techniques, and concentrate more on general management skills and the “big picture”. For example, a group of industry experts asked to rank courses that are commonly offered in the OM curricula of business schools placed the greatest importance on operations strategy and analysis. Less importance was placed on specific technique-oriented courses such as forecasting, work measurement, and simulation (Taj, 1996).

More recent surveys have confirmed the finding that employers value general skills significantly more highly than technical skills. A survey of the employers of Chicago-area business graduates showed that verbal communication, problem-solving, listening, team-building, and written communication were the most important general skills and abilities sought in potential new employees. Among technical skills, word processing, spreadsheets, and database skills were more highly valued than the more specific skills of forecasting, resource planning, and quantitative analysis (Gabric, 2001).

### **CONCLUSIONS**

Forces in the world of business have always driven the curricula in business schools. These forces are currently emphasizing the importance of operations management, and de-emphasizing the importance of management science. Businesses are currently reacting to the pressures of global markets, realizing efficiencies available through the clever management of their supply chains, and allowing operations to play a greater role in the development of their business strategies. In addition, the content of OM courses has changed from concentrating on manufacturing to also include the management of services, reflecting the increased importance of the service sector in developed economies. Employers have affected business curricula by demanding increased attention to general management skills at the expense of specific technical skills. The result is that OM is becoming a rich and vibrant area in more business schools, while MS has often been subsumed into various functional areas, including operations, marketing, and finance.

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