

How Service Science Management and Engineering (SSME) Can Evolve to an Academic Discipline

Guojun Zhao¹, Harry G. Perros², Zhanhong Xin¹

¹ Beijing University of Posts & Telecommunications,
School of Economics and Management,
Postal Box 164, 100876, Beijing, China
Email: {jgjw@bupt.edu.cn, xinzhanhong@263.net}

² Computer Science Department,
NC State University, Raleigh, NC 27695, USA
Email: hp@csc.ncsu.edu

Abstract

IBM proposed in 2004 the study of services as an academic discipline, referred to as Service Science Management and Engineering (SSME), which is currently the object of study in universities and industry. However, the development of SSME as an academic discipline has been relatively slow. This paper reviews the current status of SSME in the universities and industry in the USA and points to relationships among government, universities, and industry that are necessary for the development of SSME as an academic discipline.

Key words: SSME, academic discipline, education, research

1. Introduction

In the early 1900s, only 3 out of every 10 workers in the United States were employed in the services sector. The remaining workers were active in agriculture and industry. By 1950, employment in services accounted for 50 percent of the workforce. Today, services employ about 8 out of every 10 workers. During the past 90 years, we have witnessed a major evolution in our society from being predominantly manufacturing-based to being predominantly service-based, (Fitzsimmons and Fitzsimmons [1]).

Services are undergoing a transformation from the traditional concept of service transaction to one of an experience. Experience create added value by engaging and connecting with the customer in a personal and memorable way. As businesses explicitly charge for the memorable encounters they stage, we transition from a service economy to the new experience economy.

Along with the transformation of the economy and the society, service is now at the center of economic activity and plays a vital role. Industry, government, and universities are beginning to turn their attention to services, and have begun to promote services as a new scientific discipline.

Industry is aware of the important role of Service Science Management and Engineering (SSME) in the modern economy. Enterprises have been unable to stand alone without offering services. Even for pure manufacturing enterprises, services is a necessary tool for innovation, value-added increase and customer expansion. The need to educate service scientists, managers, and engineers has been clearly identified in government and university sponsored publications. Yet, there has not been any major governmental or academic initiative that will foster the development of SSME as an academic discipline. In this paper, we identify what needs to take place in order for SSME to evolve as an academic discipline. The paper is focused on the USA, though obviously it is applicable to other countries.

2. The beginning of SSME

In May 2004, the IBM Research and Business Consulting Services (BCS) convened academic participants from commercial, operations research, and technical fields to validate the changing of business environment, and study cases to develop SSME, a discipline which could define the skills required by the industrial workforce in the 21st century. The outcome of this meeting was documented in [2] and marked the beginning of SSME. According to IBM, SSME is a new scientific discipline set up for skills which are service-based and required by the development of world economy. SSME is a growing multi-disciplinary research and academic effort that integrates aspects of established fields such as computer science, operations research, engineering, management sciences, business strategy, social and cognitive sciences, and legal sciences.

IBM is one of the largest IT services company, and it was the first to recognize that university graduates need new skills to solve business and technical problems in economic and social services. These new skills include effective solution abilities and draw on the integration of traditional fields. The SSME academic discipline is based on integrating technology, management, social sciences, and other traditional fields and focuses on education and research in services.

3. Current status and issues

There are a lot of research papers, seminars, and courses related to SSME [3]. There are management courses, technical courses, and also courses that combine both management and technology. Usually these courses are offered by Business Schools and technology-related departments, such as a Computer Science and Industrial Engineering. Courses cover various topics, such as: the information and services economy, information and business architecture, service management, quality of service, innovation management, business processes, service management and corporate culture, market research, project management, process analysis and design, supply chain relationships, market analysis, business relationship management, and

product and brand management. North Carolina State University was one of first universities to have an SSME curriculum jointly offered by the Business School, the Computer Science department, and the Electrical and Computer Engineering department [4]. It offers SSME-related courses through the MBA program and also through the Masters degree of Computer Networks that is jointly administered by the departments of Computer Science and the Electrical and Computer Engineering. IBM sponsored the development of the SSME courses at NC State University, as well as at several other universities.

There are SSME related research centers [5,6], and several publications on SSME have come out in succession. There is also an abundance of service-related conferences. The academic atmosphere around SSME is in general very encouraging, and services companies seem to engage in applying aspects of SSME. However, it appears that there is no demand for services engineers or MBAs with a service concentration in the industry. It would seem that the inroads made by SSME have not percolated into the industry's organizational culture as far as hiring is concerned. As a result, the hiring of graduates is still done along the traditional delineation of skills and education. The lack of service-related jobs make students choose to specialize in more traditional subjects, such as computer science, as opposed to computer services. Likewise, MBA students focus on traditional lines of specialization rather than service-related concentrations.

Below, we examine some of the issues related to SSME within universities, industry, and government.

3.1 Universities

There have been several reports and articles in newspapers pointing out to the effects on job losses due to outsourcing to countries with cheaper labor. Many of these publications indicate the need for educating students in SSME, see [7]. Despite the many SSME-related courses, the academic discipline of SSME is still at infancy. Education in engineering has not as yet embodied the concept of SSME. Currently,

Computer Science students, and in general engineering students, do not perceive the need to learn about the management aspects of SSME and develop a broad vision of services and the service industry. No matter how the society transforms in the future, technology will be always essential, and the perception is that there will always be a demand for engineering graduates even within the current landscape of globalization and outsourcing. On the other hand, management students lack the necessary technical skills to create and deliver services. To acquire the relevant knowledge is typically hard for management students, unless they have a technical background. Similar thoughts apply to students of social sciences. These issues have to be overcome in order to effectively establish an SSME academic discipline. The demand for services workers in the industry will create a demand for SSME courses and help mature the SSME academic discipline. However, as mentioned above, this has not as yet happened.

3.2 Industry

In today's economy, an enterprise is inextricably linked with services and innovation [8]. IBM and other companies have established a strong connection with academia and have also attempted to encourage government involvement. The emphasis of the industry-academia cooperation seems to be focused on solving specific technical and management problems within different economic sectors, such as IT, networking, and health. Whereas this is an important interaction, there should also be an emphasis on developing a systematic approach to applying SSME and also on solving problems that inherently requires multiple disciplines such as, computer science, cognitive psychology and business models and processes. For, such multi-disciplinary projects will encourage researchers from various fields to cooperate, and hopefully, contribute to the creation of a holistic approach to the application, development of novel curricula, and creating new research areas of SSME.

3.3. Government

Tracking the roadmap of promoting SSME, it does not appear that there is a prominent active governmental role. This lack of involvement does not help the promotion of SSME. Policymakers must recognize that the margin of advantage will flow from the fusion of cutting-edge capabilities with entrepreneurial, creative and interdisciplinary talent. In [7] the Council of Competitiveness provides an analysis of the future trends underpinning future skills, challenges, and opportunities. Four potential areas are identified that can help create a competitive advantage: integrative scientists and engineers, entrepreneurial scientists and engineers, business-savvy service scientists and engineers, computational scientists and engineers. The report suggests that there is a need for a national skills agenda in order for the USA to compete globally and ensure a rising standard for its citizens. Such an agenda requires a cooperation among universities, industry, and government in order to be implemented.

4. The role of government, industry and universities in the developing of an SSME academic discipline

The functions and positions at all levels of society both conform to the trend of development of major changes in accordance with economic and social transformation. The clear boundaries of industrial society are increasingly blurred, and the trend of intersections is getting stronger.

The relationship of government, industry, and universities in this new era of knowledge-based economy can be described by the triple helix model proposed by Etzkowitz [9]. The triple helix is a model for innovation which is spiral rather than the traditional linear one. It describes the multiple reciprocal relationships between different innovation institutions (public, private and academic) in different periods of knowledge commercialization. It has been proposed in order to strengthen the cooperation of universities, industry, and governments for implementing the strategy of national innovation and promote the overall development of synergies, see [10].

The triple helix theory suggests that academia, industry, and government should be linked together according to the requirements of economic development to form three strengths that affect each other, merge together, and finally spiral upwards together. The theory is a combination of different systems between government, industry, and academia, and there are different operating mechanisms, goals, and values between the three parts. The challenge for governments is how to match, supervise and harmonize the three forces effectively. In this section, we examine the role of the government, industry, and academia, in the development of an SSME academic discipline.

4.1 University - The main actor for innovation, knowledge diffusion and production of graduates

As society changes to experience economy, services are correspondingly upgraded and expanded because of people seeking a better quality of life. Thus, it is expected that interdisciplinary trends and scope will be intensified. SSME, being inter-disciplinary by nature, could play a pivotal role. Universities are in a position to transfer SSME knowledge to students, industry, and government in order to promote the formation, evolution, and application of SSME. The universities will also promote the formation of convergence space (strategy) and innovative space (application).

Faculty: The quantity and quality of the faculty in universities is particularly important in the promotion of SSME. To pursue the interdisciplinary scientific characteristics of SSME, faculty members from different disciplines, such as technology, management, and psychology, should collaborate. However, incentives have to be put in place in order to enable such collaborations, such as multi-disciplinary grants, release from other teaching duties, and peer acceptance of SSME as a valid academic area particularly for tenure and promotion.

The establishment of research centers for SSME can act as a catalyst. For instance, on January 2008 IBM Germany and the Institute of the University of Karlsruhe signed an agreement to establish a research consortium for SSME [11].

With the establishment of the Karlsruhe Services Research Institute the two sides of this cooperation indicated the increasing need for academic personnel in order to train people with special service skills. IBM and the Institute of the University of Karlsruhe plan to have a more intensive research in this field. Obviously, more such research centers are needed.

A multi-disciplinary academic curriculum: At present, there is no unified view of SSME, and thus there is a large variation among SSME curricula, within a university and among universities. Most active SSME curricula appear to be in Business Colleges with very little interaction with Engineering and/or Social Sciences.

In addition, it is not clear whether it would be possible to create a “renaissance” SSME student, that is, a student educated in all related aspects of SSME, that is, technology, management, and social studies. Such a broad education may not be unrealistic given adequate economic incentives. However, due to the necessary specialization of SSME to various economic sectors and within a sector to various job descriptions, it is more likely that the multi-disciplinary curriculum for SSME will be differentiated at least between technical and management students, with a common underlying general theory for SSME. At a minimum, technical students should take some compulsory management courses, and management students, there should be some compulsory technical courses.

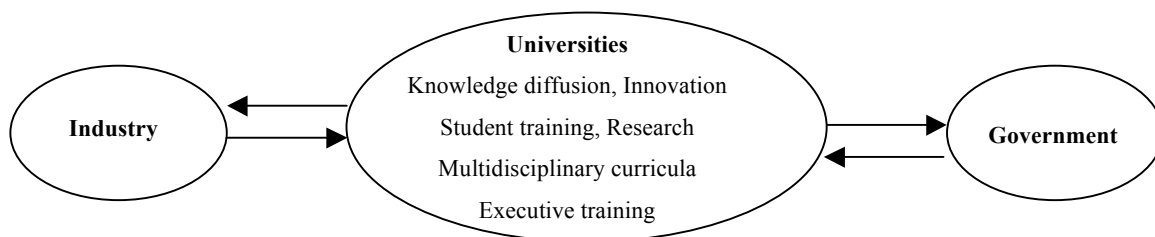


Figure 1: The role of the universities

Service workers are often referred to as T-models, where the vertical line represents technical knowledge, and the horizontal line represents business knowledge.

The length of the horizontal line compared to the length of the vertical line depends on the individual's level in the management structure of the company. Higher levels typically are associated with T-models with very short vertical line and very long horizontal line. Entry-level engineering students will have a long vertical line and a short horizontal line, whereas MBA graduates (without a technical background) will be the opposite. For the education of middle-level service managers, we can envision a future graduate program that is a combination of an MBA with a Master's degree in Computer Science or related fields. Interdisciplinary education, research and collaboration help students expand their world view, and create opportunities for students to be entrepreneurial and work with practicing professionals [7]. The role of university in SSME promotion is depicted in Figure 1.

4.2 Industry - the entity of demand, practice, and innovation

The industry represents the entity of demand, practice, and innovation of SSME. Industry creates the demand for SSME graduates and defines new problems and challenges for research and teaching in SSME. SSME is not just for service companies. Manufacturing and product companies should embrace SSME and develop new approaches to service innovation as well [12].

Universities have an established relation with industry. Typically, industry has an influence on defining new courses and curricula, and also sponsors research in universities. On the other hand, universities provide the industry with graduates and support in research and development. This relation already involves services--related activities. The role of the industry in the promotion of SSME is very important and it is shown pictorially in Figure 2.

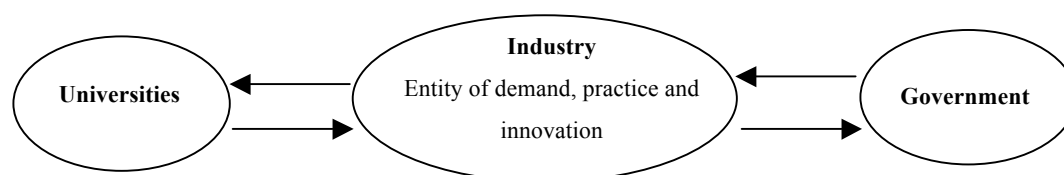


Figure 2: The role of industry

4.3 Government - the medium of guidance, service and support

Governments in the new economic era have integrated many roles, such as, supervision, services, and coordination. It is a known fact that human capital is becoming the dominant competitive differentiator, irrespective of country, company and people. SSME provides the necessary discipline to ensure that workers have the capability to compete in the global economy of the 21st century.

The successful development and promotion of SSME requires government coordination and guidance. Possible governmental actions include: policies and incentives for the industry and universities, the establishment of a national SSME center, and funding for research on SSME. In addition, a government is typically in the business of providing services. Consequently, it in itself can benefit from SSME by applying it to its own service units. The role of government is shown pictorially in Figure 3.

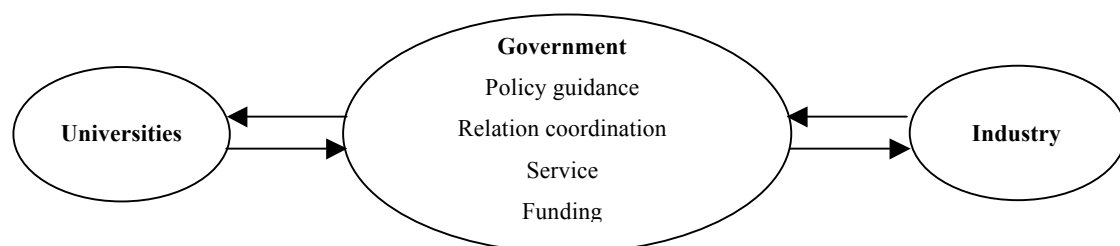


Figure 3: The role of government

5. Conclusions

There exist complex relations between universities, government, and industry that have to be explored for the promotion of SSME. They rely on each other, involve each other, and support each other. The key to the success of SSME is the coordination of relations within universities, governments, and industry. Here, the government is the medium for guidance and coordination, the university is the headquarters of development, and industry is the base station for application. Unlike the industry chain, which has a linear relationship, the three parts have their own development path and process, while at the same time they interact and influence each

other, as depicted by the triple helix model. The relation of government, universities, and industry is shown pictorially in Figure 4.

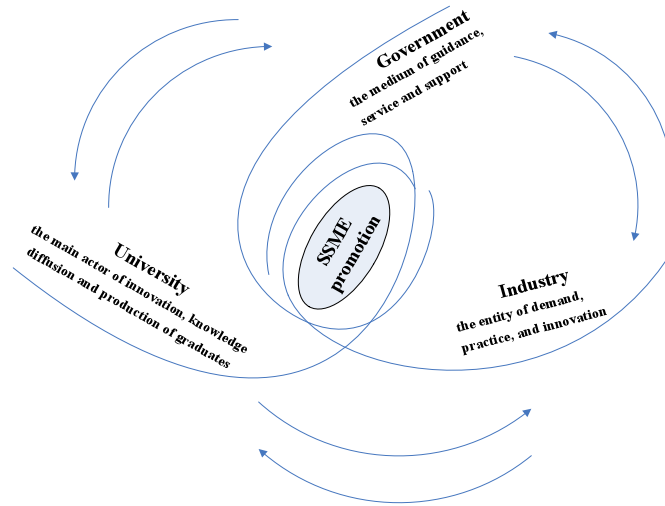


Figure 4: relation between governments, universities, and industry

The development of SSME as an academic discipline requires a coordinated effort between government, universities, and industry. The following are some near-term actions. The industry has to start recruiting service engineering and MBAs with a service concentration. It should also sponsor multi-disciplinary SSME projects in universities that will give an opportunity to the faculty to explore the multi-disciplinary aspects of SSME. The universities need to do a better job in educating the students about the need to understand services within the context of globalization and also develop SSME curricula. Finally, governmental incentives and funding can provide a powerful impetus for accelerating the promotion of SSME as an academic discipline.

References

1. Fitzsimmons J.A. and Fitzsimmons M.J., *Service Management*, Fifth Edition, McGraw Hill, 2003.
2. "IBM research services science: a new academic discipline?"
www.almaden.ibm.com/asr/SSME/facsummit.pdf

3. <http://www-304.ibm.com/jct09002c/university/scholars/skills/ssme/index.html>
4. Services Science, Management and Engineering, North Carolina State University, <http://www.ssme.ncsu.edu/program.php>.
5. Center for Services Leadership, W. P. Carey School of Business, Arizona State University, <http://wpcarey.asu.edu/csl/>.
6. Center for Excellence in Service, Robert H. Smith School of Business, University of Maryland, <http://www.rhsmith.umd.edu/ces/aboutoverview.html>.
7. “Thrive: The skills imperative”, Council on Competitiveness, <http://www.compete.org/publications/detail/472/thrive/>
8. “Service Science: The next frontier in service innovation”, <http://www-304.ibm.com/jct09002c/university/scholars/skills/ssme/spohrer07int.pdf>. 2007.
9. Etzkowitz H., *The triple helix: University-industry-government innovation in action*, Routledge, 2008.
10. <http://www.triplehelix5.com/>
11. The Karlsruhe Service Research Institute: http://www.kit.edu/fzk/idcplg?IdcService=KIT&node=4211&document=ID_060907&lang=en
12. Service Science: The next frontier in service innovation, <http://www-304.ibm.com/jct09002c/university/scholars/skills/ssme/spohrer07int.pdf>