

Advanced Engineering Technology in Industries

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DESCRIPTION

The organization of innovation work is undergoing major changes in technology-based and engineering-intensive industries around the world. Reflecting fluctuating market demands and growing job insecurity, these changes were characterized by three interrelated developments: the externalization of the labor force, the development of new types of employment relationships, and the increased use of technical consultants. These trends make the Technical and Engineering Consulting (TEC) industry play a key role in organizing innovation work and thus in developing and transmitting engineering knowledge. Identifying what underlies the growth of this industry and the performance of TEC companies requires a better understanding of its nature and capabilities. Our paper is based on detailed across multiple organizational levels and includes 50 interviews with top managers, middle managers, consultant managers, individual consultants and customers of leading Nordic TEC companies, as well as field Observational and diary studies are included. This data identifies two key skills relevant to innovation work in technical and engineering consulting rapid transition and knowledge cycles. Interactions between these skills, resulting from interactions between organizational and individual levels, appear to be critical to the successful development, organization and delivery of innovation work and engineering knowledge.

Business and professional services provision is one of the fastest growing sectors in the world, and growth is expected to continue unabated. The sector accounts for 18% of the Gross Domestic Product (GDP) of the United States (USITC, 2016) and nearly 12% of the GDP of the European Union (EC, 2017). The management, science and technology consulting industry projected to grow at the sixth fastest rate of any industry, at least through 2024 (BLS, 2015). The fastest growing segment is engineering services, which includes electrical engineers, software developers, and technical analysts. This segment is expected to grow by 5.3% annually until 2020. The rapid growth of this Technology and Engineering Consultancy (TEC) is largely due to developments related to workforce outsourcing and innovation work specialization. TEC companies have therefore played a leading role in developing, organizing and delivering innovation work and engineering knowledge in several

technology-based industries. They often have a variety of responsibilities, including hiring, career development, strengthening engineering skills, and communicating engineering knowledge. The TEC sector facilitates the provision of qualified resources that are uneconomical or difficult for client companies to develop and mobilize internally for a variety of reasons.

TEC firms of the type described in this document function as knowledge-intensive institutions where technical consultants are tasked with working on innovation and technology projects for client organizations. Although these consultants are employed by her TEC firm, work on complex design and engineering projects is performed at the customer's site, under the supervision of the customer's organization's management, using a variety of resources, technologies and expertise are play an important role. These consultants are therefore the "mobile engineers" and "project-based knowledge workers" suggested in previous study. This is what makes their work different from many other professional services firms. Technology develops solutions in close teamwork with your employees.

In several industries, TEC has become a vital economic player in the transfer of knowledge and the use of experience learned from innovative companies within and outside of our focus industries. Given the rapid shrinkage of traditional functional departments, the TEC industry is now thriving as individuals work on projects, companies, and even industries. TEC firms are therefore playing an increasingly important role as 'capacity containers' that enable dynamic, fast-paced, project-oriented work in a more flexible labor market. This development has fundamental implications for our view of the nature and capabilities of such companies. As Leiponen points out, TEC firms expand their customers search activities by providing both a broad knowledge base and detailed expertise related to a particular technical area, thereby increasing innovation performance.

This white paper is based on an inductive case study of a large Scandinavian TEC company called Advanced Engineering (AE). This study design is appropriate because an in-depth exploration of the nature and capabilities of TEC firms is required to understand the complex organization of technical knowledge,

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the relationships between individuals and organizations, and the interconnected activities that generate capabilities. These issues have received little attention in the scientific literature, largely

due to this complexity and the sheer number of factors involved in such investigations.