J. Eng. Technol. Manage. 29 (2012) 489–507

Contents lists available at SciVerse ScienceDirect

Journal of Engineering and Technology Management

journal homepage: www.elsevier.com/locate/jengtecman

Transforming technology management education: Value creation-learning in the early twenty-first century

Mel Horwitch [a,1], Edward A. Stohr [b,*]

[a] Central European University Business School, Frankel Leo ut 30-34, H-1023 Budapest, Hungary
[b] Wesley J. Howe School of Technology Management, Stevens Institute of Technology, Castle Point on Hudson, Hoboken, NJ 07030, United States

ARTICLE INFO

JEL classification:
M1
M13
M15
M19
Keywords:
Technology management
Education
Vision

ABSTRACT

Management education is often criticized as irrelevant, out of touch, too "trade-school," too interested in training financial services professionals and consultants, and insufficiently focused on innovation, the major driver of the economy. Technology management (TM) education has always focused on practical and relevant issues and innovation has been a major theme. We believe however that rapid changes in the global environment of business demand changes in the underlying assumptions of TM. Starting with a brief overview of the field, this paper examines the major environmental changes that must be addressed by TM and the skills that future graduates will require.

Introduction – purposes

The discipline of Technology Management (TM)[2] is relevant in any organization with a sizeable investment in technology. The focus of this essay is TM education, which is clearly important, especially, but by no means only, in advanced economies where efficiency and low cost can no longer provide sufficient competitive advantage. Instead, the creation of new or improved value is a key, perhaps *the* key, engine for progress and economic health. We see TM as the discipline to which all technology-intensive firms (almost all firms these days) must turn when they seek new talent.

The complexity and breadth of TM are reflected in the diverse ways that TM is defined, as shown in Table 1.

* Corresponding author. Tel.: +1 201 216 8915; fax: +1 201 216 5385.
E-mail addresses: mhorwitch@ceubusiness.org (M. Horwitch), estohr@stevens.edu (E.A. Stohr).
[1] Tel.: +36 1 887 5050.
[2] Also referred to as Management of Technology.

0923-4748/$ – see front matter © 2012 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.jengtecman.2012.07.003

Table 1
Selected definitions of TM.

Management of Technology [thus, TM] links engineering, science and management disciplines to plan develop and implement technological capabilities to shape and accomplish the strategic and operational goals of the organization (National Research Council, 1987).
Management of Technology is the Art and Science of creating value by using technology with other resources of the organization (Thamhain, 2005).
Technology Management is concerned with the effective integration of technological considerations into business decision making (Cambridge, 2010).
Management of technology is the architecture or configuration of management systems, policies and procedures governing the strategic and operational functioning of the enterprise in order to achieve its goals and objectives (Badawy, 1998).

As seen in these definitions, TM's overarching concern is to help management understand, assimilate, integrate and direct technology and technology-facilitated innovation for the benefit of the enterprise and customers. In other words, TM's ultimate objective is to enhance competencies for creating or improving products, processes or services in the marketplace. Key components of TM (such as information management, innovation management, entrepreneurship, new product development, intellectual property, etc.) are increasingly recognized as essential for continued corporate and societal well-being (Atkinson and Correa, 2007).

How technology is managed will determine our future well-being in critical ways. Thus, TM education is critical. But for TM education to play its full and rightful role, there is a need for a re-examination to make sure that our research and educational efforts are *au courant*, relevant and engaged with the important management concerns for today and the next decade or so. In particular, TM education needs to adjust to an increasingly complex interconnected global system, a world-wide scarcity of resources, demographic trends, the advent of new technologies, the rise of increasingly knowledge-intensive innovation, the broadening sources and shifting "geography" of innovation, and the emergence of new types of professionals engaged in TM.

We believe strongly that TM education must use emerging computing and communications technologies – ranging from games and simulations to instant messaging, podcasts, blogs and social networks among others – to deliver its knowledge. Likewise, in a global economy where important problems require interdisciplinary approaches, TM education must embrace program arrangements such as joint and dual degrees that cross traditional academic and international boundaries. However, in this essay, we focus on the content of TM curricula and the desirable attributes of graduates rather than pedagogy or program configuration. This approach helps limit the scope of the essay and emphasizes the subject matter of TM as its distinct competence and competitive advantage viz.-a-viz. other management disciplines.

In this spirit, aiming more to initiate a dialog than to provide definitive answers, this essay hopefully offers a fresh and overarching viewpoint regarding the major parameters that define modern TM education. After presenting a short appraisal of the current state of TM, we proceed to discuss global challenges that lead us to new perspectives and to speculate on the desirable capabilities of future TM graduates.

Background: shifting sources of technology management thinking

It is instructive to reflect on TM's intellectual antecedents, and then to identify ways to go beyond some of the constraints arising out of its lineage.

TM as an academic field is largely now housed in business schools (though several corporations are beginning to contribute significantly and directly to the education of Technology Managers).[3] But TM for many years was closely related to the discipline of Engineering Management, which first became a subject in engineering curricula in the early 20th century. This occurred due to a recognition within engineering that there was a pressing need, in increasingly larger and more complex contexts, to focus

[3] The vigorous effort by IBM to promote and support the development of the "Science of Services" is an example of a company explicitly attempting to influence the direction of TM and aligned fields (IBM, 2008b).