

# Does technology management research diverge or converge in developing and developed countries?

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## Abstract

The main purpose of this paper is to understand whether the research of developing and developed countries in the technology management (TM) field converge or diverge in terms of topics, approaches, research focus, and methods. International trends are explored based on the comparison of developed and developing countries' academia, conducted through a content analysis of the main TM journals over the period of 1995–2005. The analysis of a random sample of 325 articles indicates a clear differentiation of major topics studied by developing and developed country academics. The paper ends with a call for future studies to focus more on the particularities of developing countries in order to enrich the TM literature by increasing our understanding of TM theory and its applications in developing countries.

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## 1. Introduction

This paper aims to answer the following question: does the research in developing and developed countries converge or diverge in terms of technology management (TM) research agendas, approaches, and methods? In other words, the goal is to generate an overview of TM research that will demonstrate international trends in the field, based on a comparison of the developed and developing countries' academic output. For the purposes of this study, academic output is operationalized as publications in international TM journals.

Management literature, by and large, acknowledges the dominance of US-based theories in management research across the globe (Baruch, 2001; Boyacigiller and Adler, 1991). This general dominance is not verified for different sub-disciplines of management at the empirical level, with few exceptions such as a study carried out for organizational studies (Üsdiken and Pasadeos, 1995). Studies

investigating any US or developed country dominance are also lacking for the TM literature.

Early studies analyzing the TM field were Allen and Varghese (1989) and Adler (1989), which were followed by a long gap until the upsurge in the 2000s (Ball and Rigby, 2005; Beard, 2002; Liao, 2005; Pilkington and Teichert, 2006; Roberts, 2004). As one of the pioneers, Adler's (1989) study consists of a systematic literature review identifying the underlying themes and concepts related to technology strategy. More recent review papers analyzed the historical development in specific TM journals (Allen, 2004; Merino et al., 2006; Linstone, 1999; Pilkington and Teichert, 2006; Teichert and Pilkington, 2006). Even though there is a renewed interest in reviewing the TM field, there are no review papers focusing on developing countries per se.<sup>1</sup> In fact, none of the aforementioned TM review papers consider the particularities of developing countries vis-à-vis developed countries, except for a few remarks. This paper is one of the early attempts to analyze the TM literature in order to understand the similarities and

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<sup>1</sup>Steven et al. (2001) is a notable exception.

differences of research published in major TM journals by authors coming from developing and developed countries. A comparative account of research carried out in developed and developing countries is presented along the following dimensions: (1) the general characteristics of articles, such as author affiliations and methodologies used, and (2) in-depth analysis of the research topics. For this purpose, a content analysis is carried out on 10 major TM journals (Ball and Rigby, 2005; Linton and Thongpapanl, 2004), focusing on the period from 1995 to 2005.

Section 2 of the paper will present an overview of the TM literature, followed by a section on the methodology adopted in the content analysis of the literature. Section 4 presents the results of the content analysis and hence demonstrates the general trends in TM literature, as well as the differences between developing and developed country TM research. The Section 5 ends with concluding remarks, the limitations of this study, and suggestions for future research.

## 2. A review of TM literature

The TM discipline has a history of almost 50 years, as indicated in the special issue of *IEEE Transactions on Engineering Management* in 2004. TM has become an even more self-sustained discipline in the last 20 years with the emergence of specialized professional organizations, such as IAMOT (International Association for Management of Technology) and PICMET (Portland International Center for Management of Engineering and Technology), and the rapid increase in the number of publications and degree programs in the field after the late 1980s (Allen, 2004; Ball and Rigby, 2005; Roberts, 2004). Some studies clearly point to the US government's 1987 publication (National Research Council, 1987) on the importance of TM for competitive advantage as one of the critical milestones in the development of the TM discipline, as it is believed that TM became one of the topics in management schools after this publication (Pilkington and Teichert, 2006). In fact, in January 2007, the education committee of IAMOT, led by Steven Walsh, announced its accreditation/certifications guidelines for graduate degrees in TM (IAMOT, 2007), further establishing TM as a legitimate field for advanced study. In addition, well-established management associations have special divisions devoted to TM, such as the Technology and Innovation Management Division of the Academy of Management.

The analysis of a body of knowledge might take two forms, namely theoretical papers and systematic reviews (Adams et al., 2006). In recent years, there has been wide acceptance of studying management knowledge by means of a systematic review of academic journals using content analysis, citation analysis, and bibliometrics (Adams et al., 2006; Kostoff et al., 2006; Tranfield et al., 2003). Within this approach, some reviews use ad hoc or experience-based classifications (Allen, 2004; Allen and Varghese, 1989; Ball and Rigby, 2005), while others utilize citation

index analysis (Pilkington, 2006; Pilkington and Teichert, 2006; Teichert and Pilkington, 2006) or keyword analysis (Merino et al., 2006). The present work uses a content analysis approach to systematically review the TM literature. A major reason for the selection of a systematic review perspective is the eclectic and diverse intellectual base of TM. TM has an unusually high degree of interaction with other disciplines (Drejer, 1997), which blurs its boundaries with competing fields (Pilkington and Teichert, 2006; Roberts, 2004).

The TM review papers mentioned earlier are, to a large extent, limited to a review of one particular journal. One of the early studies analyzing the TM field is based on the papers published in *R&D Management* (Allen and Varghese, 1989). More recent studies analyze the historical development in *Technovation* (Pilkington and Teichert, 2006), *Research Policy* (Teichert and Pilkington, 2006), and *IEEE Transactions on Engineering Management* (Allen, 2004; Pilkington, 2006). Due to the differences in the techniques used to capture and classify the knowledge generated in the TM field, the review results of extant studies bring forward different sets of results. For example, in the 50th anniversary of the journal *IEEE Transactions on Engineering Management* (IEEE TEM), Allen (2004) categorizes TM topics appearing in IEEE TEM into the following groups: (1) human resources; (2) strategy and policy; (3) product development, project management, and technology problem solving; (4) marketing, organizational and program management; (5) technology transfer and technology communication; (6) university–industry relations; (7) organizational structures and procedures; (8) planning and control, project selection, math modeling; (9) entrepreneurship and new ventures; (10) CAD, CAM, supply chain management. Teichert and Pilkington (2006) use statistical techniques and analyze co-citation patterns at the author level for *Research Policy* and reveal seven major research streams: Technology Strategy, Research Policy for National Systems of Innovation, Application of Theories of the Firm, Econometric Applications and Technometrics, Globalization and International R&D Networks, Reinforcing Evolutionary Dynamics and Lock-in Effects, and Evolutionary Economics of Technological Change.

As noted earlier, there are hardly any review papers specifically focusing on developing countries. The concern of this paper is not merely noting authors coming from developing countries, but also identifying their involvement and contributions to the development of TM. In other words, we try to see if papers coming from developing countries generate a similar body of knowledge compared to their counterparts in developed countries; a question largely left unanswered by previous work. This question brings us to the well-known discussion of convergence or divergence of theories in the management discipline (Alatas, 2003; Baruch, 2001). In the field of TM, available data to pass judgments on the convergence and divergence views are lacking. Is there really convergence of theories

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