

Preface

The Brief comprises of three chapters that describe the application of management theories in Science, Technology, Engineering and Mathematics (STEM) education systems: Two chapters examine STEM education on the K-12 national level (Chaps. 1 and 3), and one chapter focuses on the higher education institutional level (Chap. 2). All chapters are based on comprehensive research works. Thus, it might appeal to all practitioners who care about STEM education: in the schools, the academia, and the government, who hold a wide variety of roles such as teachers, school principals, researchers, graduate students, and policy makers from the government. In all the three chapters, we use Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis as a managerial strategic tool for the examination of factors that focus either on internal circumstance—strengths and weaknesses—or on external ones—opportunities and threats.

Our illustration of SWOT analysis of educational organizations is relevant due to the increased awareness of the similarities existing between educational organizations and other kinds of (both for-profit and nonprofit) organizations. Accordingly, it has been used also as a tool for the analysis of public organizations, such as schools and hospitals. When needed, we elaborate on the SWOT analysis framework throughout the Brief.

Specifically, in Chap. 1, the application of SWOT analysis is illustrated in the case of STEM education on the national level. Chapter 2 demonstrates the application of SWOT analysis in the academia. Chapter 3 uses SWOT analysis for the examination of Research–Practice Partnerships, which bridge the gap between the education system and the academia.

In Chap. 1—*STEM Teachers’ SWOT Analysis of STEM Education: The Bureaucratic–Professional Conflict*—Even-Zahav and Hazzan characterize the way in which STEM teachers perceive (a) their profession, (b) the education system in which they teach, and (c) the way in which the system perceives them and the profession of STEM teaching. Data analysis revealed five conflicts that STEM teachers deal with, which focus on the teachers as professionals in the organization for which they work: (a) the professional opportunities conflict; (b) the profession

perception conflict; (c) the discourse on STEM education conflict; (d) the academic freedom conflict; and (e) the teacher's status conflict.

In Chap. 2—*SWOT Analysis of STEM Education in Academia: The Disciplinary versus Cross Disciplinary Conflict*—Dori, Tal, and Heyd-Metzuyanim show how to turn a SWOT analysis process of an academic department or faculty into a strategic plan in a way that fosters the strengths, eliminates the weaknesses, exhausts opportunities, and deals with outside threats. The case described in this chapter focuses on the Technion's Faculty of Education in Science and Technology. The SWOT characteristics, though specific to this particular Faculty, result from the tensions between disciplinary and interdisciplinary teaching and research. These tensions can be observed in content knowledge, pedagogical principles and approaches, as well as research methods. Besides these tensions, there are also constraints of funding, human resources, and workload of both faculty and students, which are common to all disciplines in higher education. As such, the analysis can serve as a useful managerial tool for coping with challenges that a STEM faculty or a dean face in the process of searching for creative avenues for growth and improvement in their teaching and research.

In Chap. 3—*Research–Practice Partnerships in STEM Education: An Organizational Perspective*—Hazzan, Heyd-Metzuyanim, and Dori examine Research–Practice Partnerships (RPPs) in Israeli STEM education. Based on SWOT analysis, relevant factors were categorized into strengths, weaknesses, opportunities, and threats related to the scene of STEM education in Israel. The SWOT analysis presented in this chapter, which is based on data gathered from representatives of all STEM education sectors, enables to deepen the understanding of how RPPs in STEM education can be enhanced and improved.

As can be seen, all chapters suggest useful guidelines for STEM education organizations, either on the national level or on the higher education institutional level, for policy makers, who wish to improve the competency of their organization, department, or group, in both teaching and research. Such improvement aligns with the new era and directions expected in STEM education.

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