Chapter 19

International R&D Collaboration in High Tech: The Challenges of Jet Fighter Development Partnerships in Emerging Economies

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ABSTRACT

This chapter seeks the answers to the following research question: Which are the challenges related to high tech R&D collaboration involving firms both from established and emerging economies? To answer this question, the Turkish jet fighter program is used as a case study. The study shows the chances to succeed are highly uncertain in this sector dominated by USA. Although Turkey acquired some level of R&D capability in previous defense R&D programs, the complexity of jet fighter development poses new challenges. Previous experiences indicate that technical capabilities are not sufficient, equally important is the formation of management capabilities. During the pre-development (concept) phase, Turkey chose to collaborate with Swedish Saab. The chapter discusses several challenges in this type of collaboration for a full-scale jet fighter development program. These challenges concern intra- as well as inter-organizational management, the organization of the technical development projects, and the design of appropriate industry governance structures.

INTRODUCTION

“Combat aircraft, and in particular, high-performance fighters – are among the most expensive, complex and challenging weapon systems to develop” (Lorell, 1995:53). Sophisticated knowledge is required in a broad spectrum of areas: advanced materials and fabrication methods, design technologies, measurement devices, flight control, sensor and detection technologies, aerodynamics, and most importantly, systems
International R&D Collaboration in High Tech integration (Lorell, 1995; Liu, 2014). These daunting requirements have made jet fighter development a flagship case for the management of high technology and high complexity. For most of the post-war period, US firms have been dominant both in terms of technologies and market power (Vucetic, 2013). However, new candidate countries have announced plans to build indigenous capabilities in jet fighter development, motivated by ambitions to expand and strengthen their high-tech industries; to increase their national independence, security and ability to tailor the development to their needs; to enter a profitable and oligopolistic global market, and to reap the benefits of technology spill-overs from the jet fighter firms acting as “technical universities” (Eliasson, 2010; Cho, 2000).

Since the 1970s, rapidly growing economies from Asia and Latin America have built large-scale industrial capabilities and moved from low-cost manufacturing to product adaptation and research and development. In various industries, from steel and electronics to software and telecommunications, several of these economies now successfully compete with established OECD countries (Amann and Cantwell, 2012). Their successes have been analysed as the outcome of internal capability building combined with external knowledge acquisition, mainly by means of production contracts with international industry leaders (OEM-contracts), joint ventures and license agreements (Hobday, 1995; Mathews, 2002).

Several of these countries, e.g. China, India, Korea and Turkey, also aspire to enter the exclusive club of advanced jet fighter developers. The development of next generation combat aircraft, however, requires a different class of knowledge-intensive development efforts and innovation capability where established methods of knowledge transfer and learning, such as reverse engineering, contract manufacturing, joint ventures and product licenses are far from enough to build sufficient capabilities. To succeed, the candidate nations need to engage in intensive forms of knowledge collaboration with external partners (Liu, 2014). Moreover, jet fighter development is a lengthy and uncertain process, involving high risks of delays, cost overruns and technical problems (Vucetic, 2013). These aspects make jet fighter development different from partnerships between established and emerging economy firms in civilian industries and imply a need for more complex forms of collaboration, involving joint knowledge development as well as knowledge transfer and management capability building. The study of the challenges and dilemmas involved in such complex international partnerships is the object of this paper.

The remainder of the paper is structured as follows. Next, the research questions and the studied case are presented. The following section provides an overview of the jet fighter industry, the US leader and the new contenders. The subsequent section is devoted to the empirical case, the Turkish jet fighter program and its international partner, Saab from Sweden, and the Turkish defense industry. Four challenges related to this partnership are analyzed. The concluding section briefly relates these challenges to extant literature on international knowledge acquisition in emerging economies, ending with a note of the limitations of the current study.

MAIN FOCUS OF THE CHAPTER

The focus of this chapter is twofold, which is reflected in the following research questions:

1. Which are the main factors leading up to the formation of new types of international partnerships in jet fighter development?
2. Which are the specific challenges related to such partnerships involving firms both from established and emerging economies?