

Abstract 50

THE ROLE OF PROXIMITY IN TECHNOLOGY DYNAMICS OF HIGH-TECH INDUSTRIES: THE CASE OF BIOTECHNOLOGY AND AVIATION INDUSTRIES

Academic paper

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Abstract text:

The paper aims to explore the role of proximity in the formation, growth and dynamics of high-tech industries, based on the cases of biotechnology and aviation industries. The study assumes that certain types of proximities and the related network externalities assist the industry along its life-cycle – from a young to a more mature stage (Figure 1). The three major research problems are being discussed: 1/specific nature and technology dynamics of the two high-tech industries: biotechnology and aviation, 2/ the role of proximities – geographical, social, cognitive/technological, institutional and cultural in stimulating Triple Helix networks, and 3/ the relationship between technology dynamics and types of proximity. The study applies qualitative research and case study methods in the two analysed high-tech industries. The author conducted a qualitative research survey and the direct observation in the selected life sciences/biotechnology ecosystems in the EU and the US, during 2018-2019 (Runiewicz-Wardyn, 2020). The author compared the study findings with the similar surveys conducted in the aviation industry. The broad goal of all surveys was to gain knowledge and insights on how R&D collaboration and innovation processes in the two industries are determined by different types of proximities. The results prove that despite different origins and founding models of the analysed high-tech industry clusters they both display some similar as well as distinct patterns of inter-relationships between different types of proximities, knowledge spillovers and technological dynamics. The presence of high physical/geographical, cognitive and organizational proximities within both industries contribute to more dense social networks and interchange of knowledge. Furthermore, cognitive and organizational proximities are the primary motives for innovation collaborations in the two sectors, while geographical proximity allows biotechnology ecosystem players to have more informal interactions. In fact, geographical proximity matters most when strong social networks already exist. In case of aviation industry geographical proximity may compensate for the weak organisational proximity. Cultural and social proximities increase more effective communication, trust and knowledge sharing in both industries. Thus, brokerage and intermediary managers should focus on narrowing organizational proximity in case of the aviation industry and technological and cognitive proximities in the biotechnology industry. Furthermore, public and other non-profit institutions should be more active in brokering, encouraging and reinforcing the cross-sectoral cooperation at local, regional and global levels. The study findings suggest that more focused policy measures are needed to optimise knowledge exchange and innovativeness within the two types of high-tech industries ecosystems. Any policies should consider a complex set of factors, such as human capital, long-term research strategies, and the innovative profile of research institutions, the technological maturity of industries, the business strategies of firms, the institutional, cultural and social realities of each high-tech cluster ecosystem environment. A policy based on the limitation or replication of the supposedly best practices of other European and US leading clusters should consider the local variation of social and cultural capital and go beyond one-size-fits-all solutions. The study has several limitations resulting from the rather small and unequally distributed (across time and space) sample of the biotechnology and aviation industries cluster case studies. There are at least several directions of the future research that stem from this study: first, further surveys could help to develop a more in-depth and comprehensive view of the role of proximity and relational capital behind the origin, growth and evolution of the specific

high-tech industries ecosystems; second, determine the role of social networks in strengthening the innovation capacity of ecosystem players to respond, deal and transform as conditions in the clusters' ecosystems change; third, determine the role of local, national and global networks and partnerships in maintaining high-tech industries' internal technological dynamics.

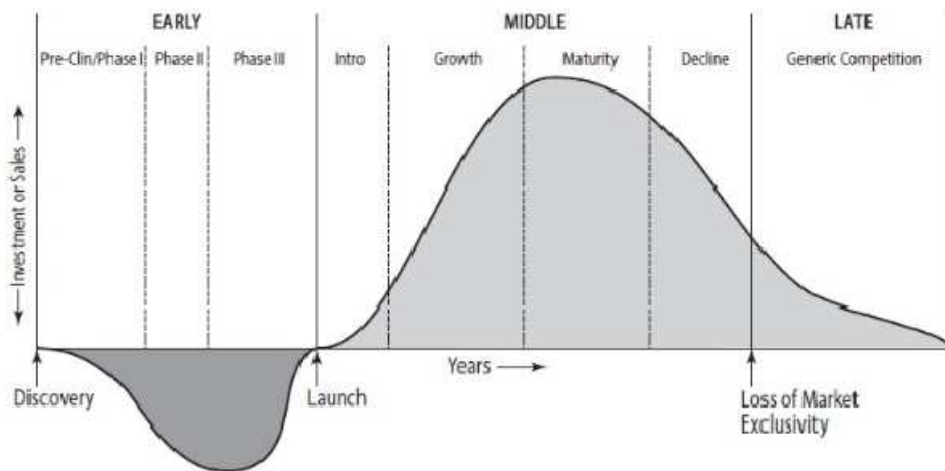
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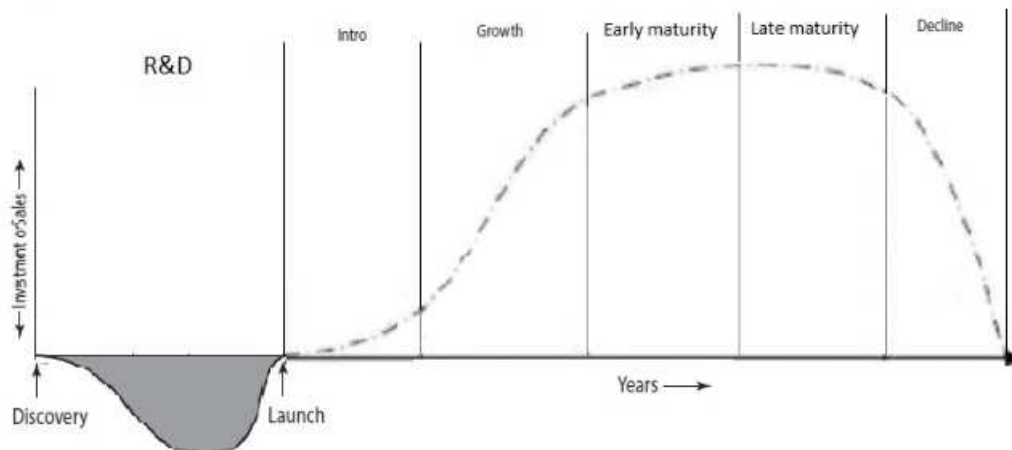
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Figure 1. Product innovation life cycle in the biopharmaceutical (a) and aviation sectors (b)

a)



b)



Source: Runiewicz-Wardyn, 2020; Bernard, 2013.