6 Consolidation, interpretation and outlook

Firstly, this part of the thesis summarises the conclusions, results and findings gained in the previous chapters through theoretical discussion and empirical analysis. Secondly, the major results and contributions of this thesis should be interpreted from the perspectives of academic innovation research, innovation management, and innovation policy, the three basic motivations mentioned at the beginning of the thesis. Finally, the thesis closes with a brief outlook of further fields requiring research.

6.1 Summary

During the last decades, research and development (R&D) activities have become substantial pillars of innovation research in the quest to explain the innovation ability and competitiveness of sectors and enterprises. Today, the majority of scholarly research and policy documents on innovation still focuses almost entirely on R&D, ignoring other methods that firms use to innovate. As a consequence, firms that do not perform formal R&D were largely neglected by academic research and the policy community because R&D-focused approaches often overlook the fact that a major part of firms’ innovation does not necessarily originate from institutionalised R&D activities.

For this reason, this thesis explicitly focused on the group of non-R&D-performing manufacturing firms as an evolutionary subset of enterprises which systematically lack the resource of R&D expenditure (chapter 1). Based on a comprehensive overview of existing empirical literature, the starting point of this thesis was the observation that the few empirical studies dealing with innovation strategies of non-R&D-performing manufacturing firms provide a fragmented, incomplete, and sometimes even inconsistent picture. While there is some consensus about the particular relevance of practical, experience-based knowledge, their strong process orientation, or their relatively high labour intensity, there is disagreement, for instance, about whether non-R&D-performers are driven rather by technical or non-technical process innovation, or if they have a higher or lower propensity to participate in innovation cooperations. This is due to the fact, for instance, that these studies use different definitions of what should be considered non-R&D-intensive or “low-tech” firms. But most importantly, the vast majority of existing studies assume that non-R&D-intensive firms represent a more or less homogeneous group of firms either because they are affiliated to a certain category of "low-tech" industries or they all lack the same innovation resource of R&D.
Consolidation, interpretation and outlook

The central question of this thesis is whether non-R&D-performing manufacturing firms demonstrate characteristic, heterogeneous innovation patterns or not. In order to address this research question theoretically and empirically, the research question was divided into a structural aspect dealing with the question if and why inter-firm heterogeneity of non-R&D-performing firms can be expected, and a substantive aspect addressing which innovation dimensions this heterogeneity could manifest itself in.

To provide a basic understanding of the theoretical roots and relevance of the prevailing R&D focus in innovation research, chapter 2 elaborated on economic growth theory as well as the firm level effects of R&D activities on innovativeness and economic performance. It was shown that R&D still represents one of the most important determinants to explain why some firms persistently gain higher competitiveness and better economic performance than others. Recent OECD data proved, however, that despite their frequently inferior performance compared to R&D-intensive sectors, there is no justification to assume a declining economic relevance of non-R&D-intensive sectors in Germany by absolute numbers. On the contrary, the data indicates that their economic importance may further increase during the next years. But by discussing the underlying linear model of innovation as well as dealing with the definition and measurement of R&D, the chapter builds a conceptual bridge between macro-economic growth theory and firm level R&D. Thus it provides the starting point for the developing a theoretical framework to explore the innovation behaviour of firms without formal R&D which was the subgoal of chapter 3.

Based on evolutionary innovation theory, chapter 3 first provided theoretical arguments as to why inter-firm heterogeneity regarding their innovation strategies can be still expected, even within low-tech industries, respectively the evolutionary subset of non-R&D-intensive firms. Unlike other contributions, the arguments do not primarily refer to ex post manifestations of heterogeneity, like firm-specific behaviour as a result of evolutionary processes. Instead, the arguments were developed based on the interplay between the evolutionary mechanisms of variation and selection to explain why inter-firm heterogeneity is a structural characteristic of economic evolution. Three major reasons were

\[ \text{[238] So far, no statistical data particularly dealing with non-R&D-performing firms exists. Hence, this analysis has to take non-R&D-intensive sectors as a proxy to approach their economic relevance.} \]

\[ \text{[239] See, for example: Gehrke/Legler (2010), Som et al. (2010).} \]