2 The Role of Consumers in Innovation Economics

This chapter describes the theoretical foundation of the simulation model carried out in the later chapters of this dissertation. We aim to show how demand side aspects have been included in the economic literature on innovation in the past and how they are included today. Additionally, this chapter also describes the fundamental aspects of the so called evolutionary economics approach which will be used as a framework for the model carried out in the later chapters of this dissertation.

We start in section 2.1 with a detailed description of how the demand side has been included in the literature on innovation. In more detail, this section discusses three well-known classes or generations of innovation models, each of which, representing fundamentally different perspectives on innovation. In section 2.2 the main characteristics of the evolutionary economics theory are discussed. This discussion also serves as a basic framework for the simulation model elaborated in the later chapter of this dissertation. Finally, section 2.3 outlines today’s view on the role of the demand side for innovation, describing related concepts and models from literature.

2.1 The Neglected Demand Side

The following section discusses the relevance of the demand side for the study of innovation by giving insight to three fundamental different perspectives on innovation. While the importance of the demand side has long been acknowledged in various economic fields, its particular role for innovation has long been under great debate. We start in subsection 2.1.1 with some early contributions stressing the concept of the linear innovation model. Based on this, subsection 2.1.2 describes the so called demand-pull model. Finally, subsection 2.1.3 explains the basic ideas behind multidimensional innovation models.

2.1.1 The Linear Innovation Model

As the basis for the later analysis, let us start with a brief look into the history of economists’ thoughts on innovation and the demand side. It would be too easy to state that the demand as an important factor is something completely new for the analysis of innovation or in economic science in general. On the contrary, one is tempted to say that the demand side has always been part of the story, the question is in which way it has been considered.

Let us start with a fascinating contribution by Adam Smith who in his famous book: *An Inquiry into the Nature and Causes of the Wealth of Nations* describes the important role of the division of labour for economic growth (Smith 1776).
Although Smith recognizes science and research as a main driver of growth (Knell 2012), he also sees the market size as a crucial because limiting factor:

“As it is the power of exchanging that gives occasion to the division of labour, so the extent of this division must always be limited by the extent of that power, or, in other words, by the extent of the market.” (Smith 1776, p. 31)

He continues and describes for example the particular role of geographical structures and the distribution of population as crucial factors for the division of labour. Smith notices that in the rural and scattered areas of Scotland “every farmer must be a butcher, baker, and brewer, for his own family” in which case there is no place for division of labour (Smith 1776, p. 32). Smith hereby clearly stresses the role of demand as a necessary condition for technological developments which becomes also clear if we look in more detail on the causal loops of economic development.

Following Smith, an increase of market demand fosters the division of labour, sectoral specialisation, and the accumulation of knowledge. This in turn leads to an increased competition between producers and a decrease of prices, at least in the long run. This leads to an increased productivity and revenues which, in turn, increase the market size and demand (Smith 1776, p. 31, see also Knell 2012, Antonelli, Gehringer 2015 for a detailed discussion on this issue). A diagram of this causal loop is shown in Figure 1.

![Diagram of Smith's Circular Growth](own illustration based on Antonelli, Gehringer 2015)

Figure 1: Smith’s Circular Growth (Source: own illustration based on Antonelli, Gehringer 2015).

So, although Smith never particularly stresses the role of demand on innovation, we still see with Smith a general acknowledgment of the size of markets as a