will be insufficient statistically to generate a new technology entering in use. On the other side a low efficiency in exploiting GRDK may lead to a number of new proposals inferior to the initial number of R&D projects decreasing the number of projects with the number of cycles that, if not enough compensated by available past knowledge, will lead to a situation of decline and abandon of the R&D activity by lack of innovative ideas. In the second one there is a sufficient number of initial R&D projects and acceptable ISE with an increase of the available GRDK, however the number of generated new technologies, after a reasonable number of cycles, may be statistically insufficient to have at least one successful technology to implement the socio-economic growth of the territory. In this case, the technology evolves but without assuring a real development eventually entering in a stagnation phase typically of the Red Queen regime (Bonomi, Marchisio 2016). In the third one, there is a sufficient number of initial R&D projects and a good innovative system originating a reasonable high number of new technologies and possibly successful technologies achieving a socio-economic growth of the territory. In this case, GRDK increases rapidly with the sequence of cycles and then the number of financed R&D projects becomes potentially enormous although in the reality it will be limited by actual availability of R&D investments or by available human resources and structures for R&D activity of the territory.

3 PARAMETERS OF THE MODEL

In order to make calculations it is necessary to establish the value of the various parameters used for calculations with the model. As cited previously, most of statistical data necessary for parameters are practically not available and we might consider only reasonable indicative estimations made possible by experience in R&D activity. The only parameter that might have a relation with statistical studies concerns the rate r determining the success of a technology following equation (2). In fact, we have a study about value of patents showing their skew distribution (Scherer, Haroff 2000). This study considers various groups of patents the greatest including 772 German patents hold valid for at least ten years. An elaboration of data in this case shows that less than 1% of patents have very high outcomes and that only about 20% of patents result in substantial outcomes (Bonomi, Marchisio 2016). Considering these results we may indicate a value of 0.2 for the parameter r selecting the number of successful new technologies. Much more difficult is the estimation of parameter v determining the number of new technologies entering in use in respect to the number N of R&D projects carried out in a cycle following equation (1). The rate of success of R&D projects becoming a new technology is quite variable depending, beside socio-economic factors, on the radical degree of the new technology, while rate of discontinuation of R&D projects is different depending on the reached phase of the innovation process (Bonomi 2017). It is well known for example that the development phase of the innovation process, in respect to the feasibility phase, is particularly selective and it is also called the “Valley of Death” of the projects (Auerswald, Branscombe 2003). On the other side an R&D project concerning an innovation with a limited novelty or low radical degree may have a much more chance to become a used technology. Taking account of previous considerations and experience in R&D we might indicate a number of 40 R&D projects necessary to obtain a new technology entering in use and then an indicative value for parameter v of 0.025 that however should be considered the most uncertain parameter value of the model. The assigned parameters of r and v are set as constant in the studied application of the model. That means that on average it is necessary a total number of 200 R&D projects to generate five new technologies entering in use and only one technology of these five be successful triggering a sensible positive socio-economic impact on the territory. Considering now parameters concerning the flux of knowledge of the R&D model, we have already defined the measure of knowledge in term of number of information packages circulating in the flux. Quantitative data on generation of information packages by R&D projects and number of packages necessary for the combinatory calculation of innovative ideas are not available but experience in R&D indicates that they cannot be for a single project a very high number.