problems and their solutions is also emphasized by Popper (1959) in the philosophical analysis of the process of scientific discovery (*cf.,* Lai, 1989, p. 363).

Although scholars recognize that there are different and contextual determinants of path-breaking innovations, in management there has not been a substantial effort to define a common factor, a *prime mover*, among major and minor innovations (*cf.,* Dosi, 1988; Christensen, 1997; Christensen *et al*., 2015; Coccia, 2012)[5]. In fact, a theory of innovation is supposed to explain the determinants of minor and major technological breakthroughs in markets, such as the drivers of disruptive innovations. The theoretical frameworks just discussed suggest a general relation between relevant problems and emergence of disruptive technologies that deserve to be explored.

Suppose that:

- disruptive technologies are major innovations that make prior technical knowledge obsolete and sustain industrial and corporate change.

- there exists, at a given time, a relevant problem/need unresolved for consumers in markets.

The working hypotheses of the study here are:

$HP\theta$: Relevant *problems/needs* and their *solutions* generate disruptive innovations, *ceteris paribus*.

$HP\sigma$: Development of disruptive technologies needs a division of scientific labour in the R&D function, *ceteris paribus*.

The principal *HPθ, called problem-driven disruptive innovation,* is the core of the causal model in Figure 1. Unlike the theoretical framework of disruptive innovation (Christensen, 1997), the model here shows that, in a market with high intensity of R&D investments, the emergence of disruptive innovation *A* can be driven by the coevolution of *relevant problems* and their solution in R&D labs of incumbent firms ϕ, but a small (entrant) firm ε can generate a major technological breakthrough *B* by solving a *consequential problem* of previous (disruptive) technology. This new technological shift triggers a competitive reaction of incumbent ϕ with a new major innovation *B'* (similar to *B*).

Figure 1: Disruptive innovation driven by consequential problems in an industry with high intensity of R&D investments.
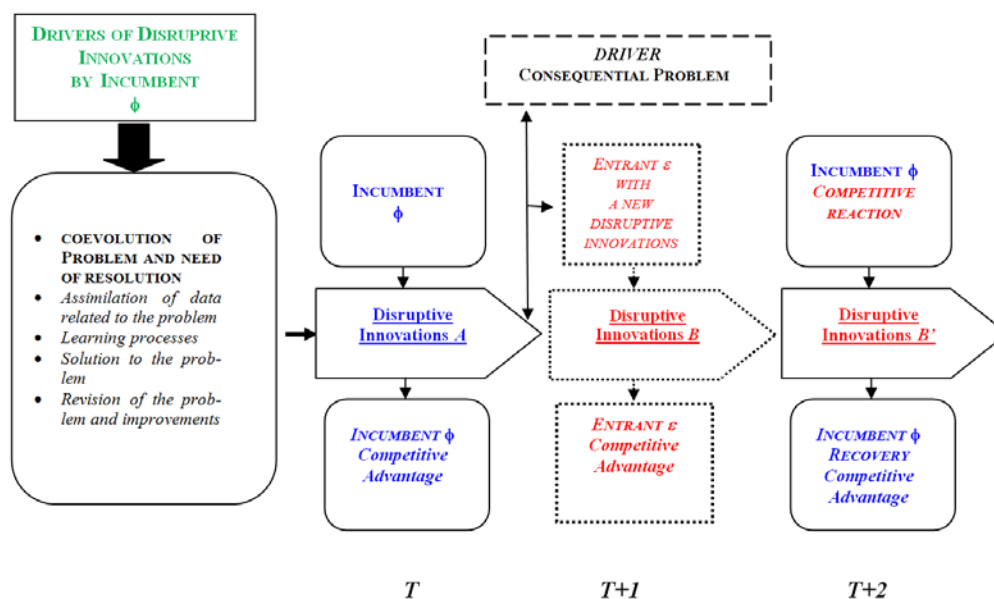
5 *Cf.* also Cavallo *et al*., 2014, 2014a, 2015; Coccia, 2004.