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Re-legitimizing the power of smallness: the rise, fall, and rise of appropriate technologies as a development strategy

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Small-scale technological solutions to poverty alleviation have become increasingly popular in the 21st Century. Markets are flooded with "appropriate technologies" (AT), such as cook stoves, solar lanterns, and even inexpensive cellphones and computers, as they promise to address the basic needs of the poor for a price they can afford. Despite the growing popularity of these gadgets within the international development community, most recognize that some are more effective than others. To date, development planners have not yet found a systematic way to identify "what works" and "why", thereby compromising their ability to design more effective interventions based on this improved knowledge. Better methodologies are necessary, but insufficient for the creation of a comprehensive and effective technology evaluation framework. It is also paramount to understand the causes of success or failure of prior AT efforts, so past errors are not repeated, flawed assumptions dismissed, and newer solutions emerge capable of improving the quality of life among the poorest in a sustainable way.

Indeed, the use of the notion of appropriate technologies in development planning as is not new. The AT model became prominent in the 1970s through the work of the economist Fritz Schumacher's *Small is Beautiful* (1973). He promoted a development planning approach based on small-scale, low-cost, labor-intensive, context specific, and environmentally friendly technologies focused on benefitting populations living in poverty. Standard accounts of the movement's legacy contrast the AT movement's influence in the international development agenda in the 1970s and 1980s, when over a thousand of organizations dedicated to the topic were operational (Jéquier & Blanc, 1983), to its fast demise shortly thereafter. Scholars and practitioners

have identified several causes for such decline. One argument emphasized the lack of concern with affordability and marketability of AT products (Polack, 2009). Others pointed to the "failure to learn from failure", which caused continuous "re-invention of wheels", leading to a deterioration of the relationship among donors, implementing organizations and beneficiaries (Starkey, 1988; Smillie, 2000). Finally, there were those who argued implementation problems were decisive barriers to the survival of the AT model. Many technologies were not as technically robust as expected, and funding and institutional support often inadequate for diffusing appropriate technologies at scale (Florman, 1981; Zelenika, 2011).

In this paper we argue that these analyses provide an incomplete account of AT's legacy. In particular, because they fail to explain the relationship between the earlier models and the small-scale development technological approaches that, once again, became popular in the 21st Century. This left unexplained the ways in which changing socio-political contexts, and adoption of the ATs by different development players helped to shape the model into its current form. We address this gap in the literature by conducting a Systematic Review approach (SR) to AT-related articles published in the last 40 years. SR is a specific type of literature review that allows the analysis of a large volume of individual publications through an explicit and reproducible method, thereby minimizing bias and producing more reliable findings (Higgins & Green, 2011). Studies were identified through searches in four databases - JSTOR, ProQuest, Science Direct, and Google Scholar – out of which a primary sample of 600 papers was selected. A secondary sample with 60 of those papers was built for coding, following relevance and quality criteria.

Our results show that the AT Model, despite being born as a critique of the industrialization model of the 1950s, was never a single, cohesive model, but a very flexible concept incorporated by groups following different paradigms. The evidence indicates that the AT Model evolutionary pathway may be more complex than currently acknowledged by the literature. As a result, it seems precipitated to affirm that the AT Model failed and "died" after its most influential period in the 1980s. AT continues to be at the center of some of the most relevant topics of the current international development agenda - technologies for the "bottom of the pyramid" (BoP) and Open

Source Appropriate Technologies are some of the recent examples. Still, some "lessons" were "learned" better than others. Many of the problems with the AT model, such as difficulties with implementation, scaling-up, and establishment of local ownership, compromised their impact 40 years ago and continue to do so today.

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