



Beyond the “rise  
and fall” of the  
*Appropriate  
Technology Model*  
as a development  
strategy

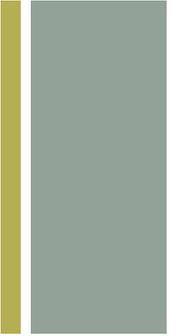


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International Economic Development, MIT

# + Outline

1. **Key issues for feedback**
2. **Background of the Study**
3. **Short history of the AT Model**
4. **Methodology**
5. **Preliminary Results**



# + Background of the Study

- Partnership between MIT and USAID, with an investment of 10 Million USD in 5 years.
- The idea: local markets are flooded with “appropriate technologies” (cook stoves, water filters, solar lanterns)
- There is no systematic way to identify “what works”
- Decision makers need a comprehensive technology evaluation framework.



Comprehensive Initiative on Technology Evaluation

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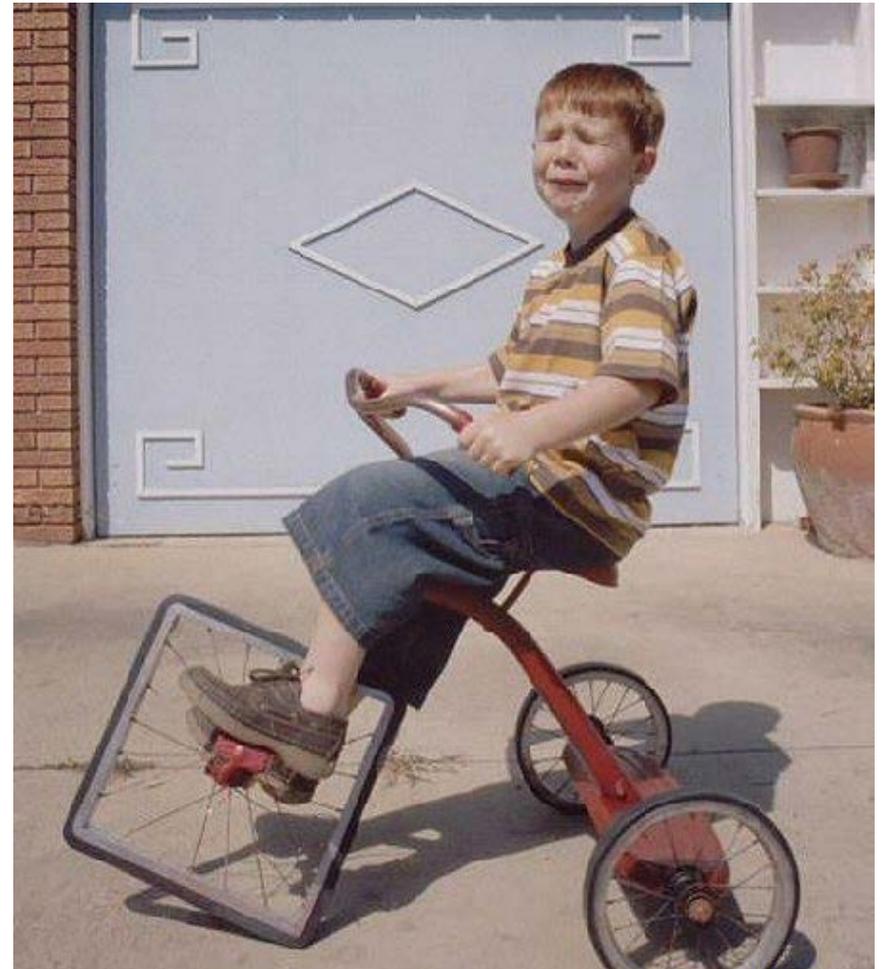


CITE is developing a rigorous methodology for *evaluating technological solutions to challenges in the developing world* to help donors and policy-makers identify and invest in the best of these solutions.



## Some of Development's greatest challenges:

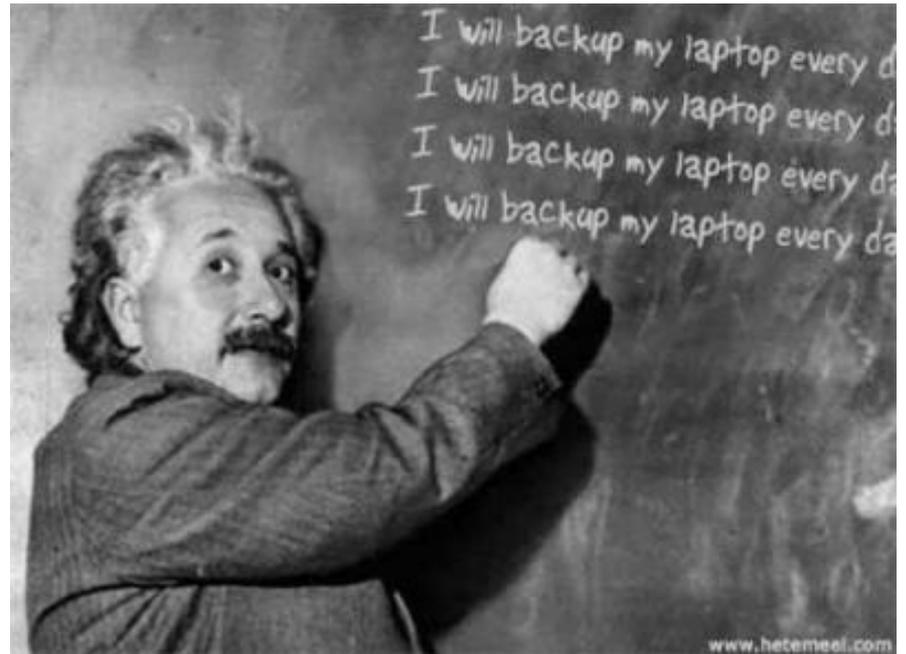
- Short Historical Memory = Reinvention of the wheels
- Weak contextual focus - Scaling-up = One-size fits all
- Technically sound, but Theory averse – biases are not clear





# Learning lessons through historical analysis

- CITE is interested in ***understanding prior efforts*** related to appropriate technologies, ***so past errors are not repeated.***
- Insights on how past initiatives were implemented, as well as ***the causes of their success***, will inform CITE project development.





# Step 1 - Literature Review

Time	Historical Context	Development Theory	The role of Technology on Development
<b>1945 through the 1960s</b>	<ul style="list-style-type: none"><li>• Post War</li><li>• Breton Woods</li><li>• Cold War</li><li>• Decolonization in Africa and Asia</li><li>• Dictatorships in LA after 1960s</li></ul>	<ul style="list-style-type: none"><li>• Growth Theory</li><li>• Predominance of Keynesianism</li><li>• Rise of Development Economics and a Separate discipline</li><li>• Initial Phase of the Developmental State &amp; Industrial Policy</li></ul>	<ul style="list-style-type: none"><li>• Modernization Theory</li><li>• Large scale technology transfer</li><li>• Exogenous Technological Change</li></ul>
<b>1970s</b>	<ul style="list-style-type: none"><li>• Nixon Shock</li><li>• End of Breton Woods</li><li>• Stagflation and rising unemployment under Carter and Nixon</li></ul>	<ul style="list-style-type: none"><li>• Crisis of Keynesianism</li><li>• Basic Needs approach</li><li>• starting of the rise of institutional economics</li></ul>	<ul style="list-style-type: none"><li>• Appropriate technology</li><li>• Rising of the Information technology literature</li></ul>
<b>1980s</b>	<ul style="list-style-type: none"><li>• Regan Administration</li><li>• Major economic crisis, especially in</li></ul>	<ul style="list-style-type: none"><li>• Neo-liberalism agenda</li><li>• Major macro-economic reform + Starting of the New institutional Economics</li></ul>	<ul style="list-style-type: none"><li>• Consolidation of the knowledge economy for rich countries</li><li>• technology takes the back seat for developing countries + Technological advances derived from macro-economic stability and business friendly environmental conditions</li></ul>
<b>1990s</b>	<ul style="list-style-type: none"><li>• Washington consensus</li><li>• Prosperity in the Developed World, Asian Crisis by the end of the period</li></ul>	<ul style="list-style-type: none"><li>• New Institutional Economics</li><li>• Consolidation of Neoliberalism</li></ul>	<ul style="list-style-type: none"><li>• Decline of Appropriate technology</li><li>• Rise of the environmental Movement with Rio 1992</li></ul>
<b>2000s - present</b>	<ul style="list-style-type: none"><li>• End of Washington Consensus</li><li>• Establishment of the MDGs</li></ul>	<ul style="list-style-type: none"><li>• New Industrial Policy</li><li>• Human and social Capital</li><li>• Endogenous growth Models</li></ul>	<ul style="list-style-type: none"><li>• Technology and Innovation are at the core of economic development, as consequences of well-functioning institutions</li></ul>

# + Development & Technology in the 1950s and 1960s

## Distribution of World's Output (Piketty, 2014)

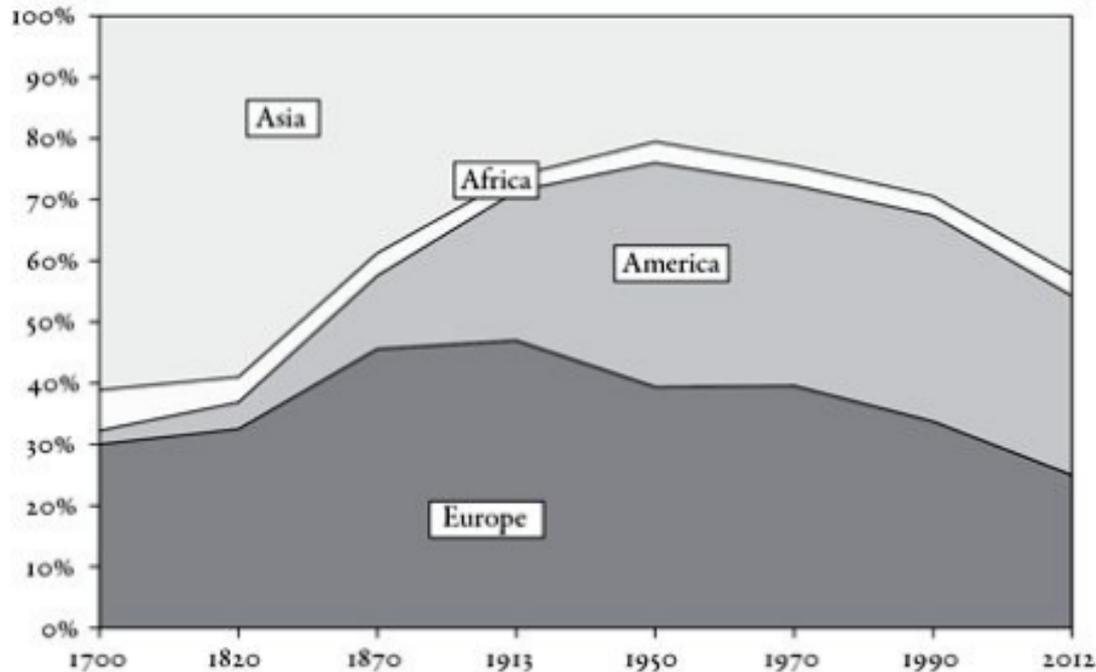


FIGURE 1.1. The distribution of world output, 1700–2012

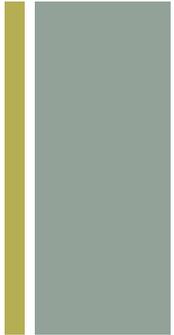
Europe's GDP made 47 percent of world GDP in 1913, down to 25 percent in 2012.

Sources and series: see [piketty.pse.ens.fr/capital21c](http://piketty.pse.ens.fr/capital21c).

- Push from developed countries for the **modernization of the Third World**, pushed by WWII and Cold War.
- Mechanisms of modernization were **mostly large scale technology transfer** programs focused primarily on **economic growth**.

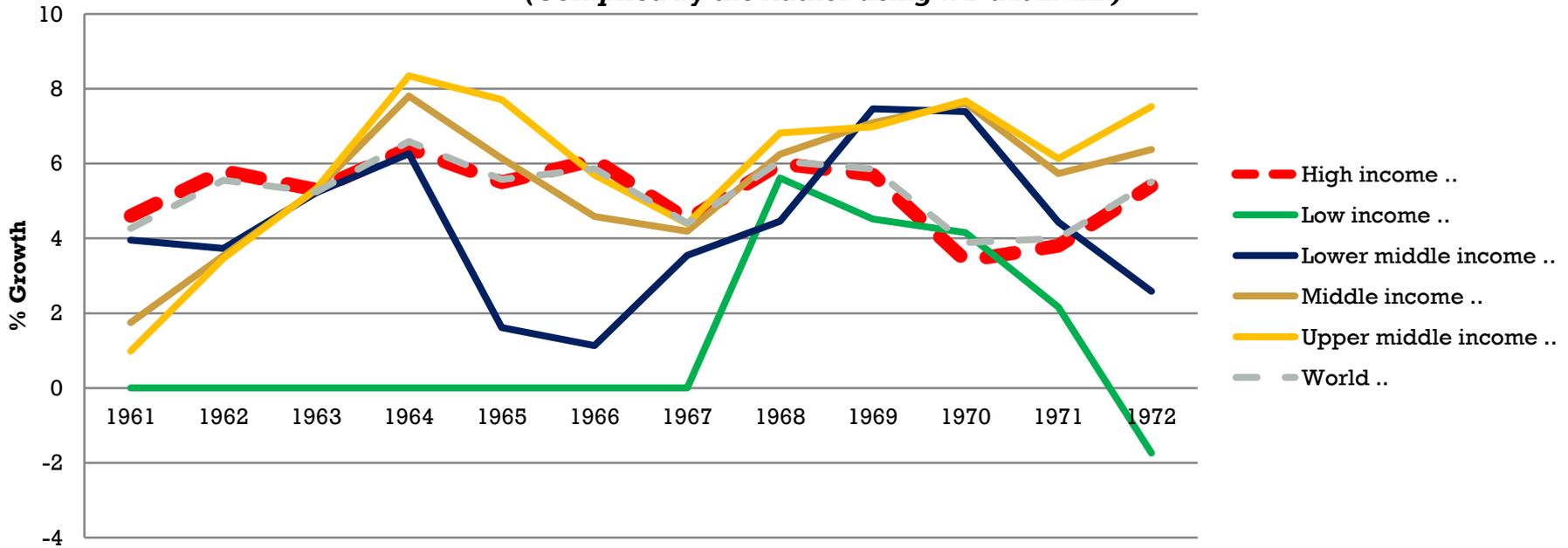


# Mixed results from the Development Policy of the 1950s & 1960s



## Global GDP Growth by Income level 1960 to 1972

*(Compiled by the Author using WB databank)*



# + But increasing inequality...

## Global Inequality measured by differences in GDP Per capita (Piketty, 2014)

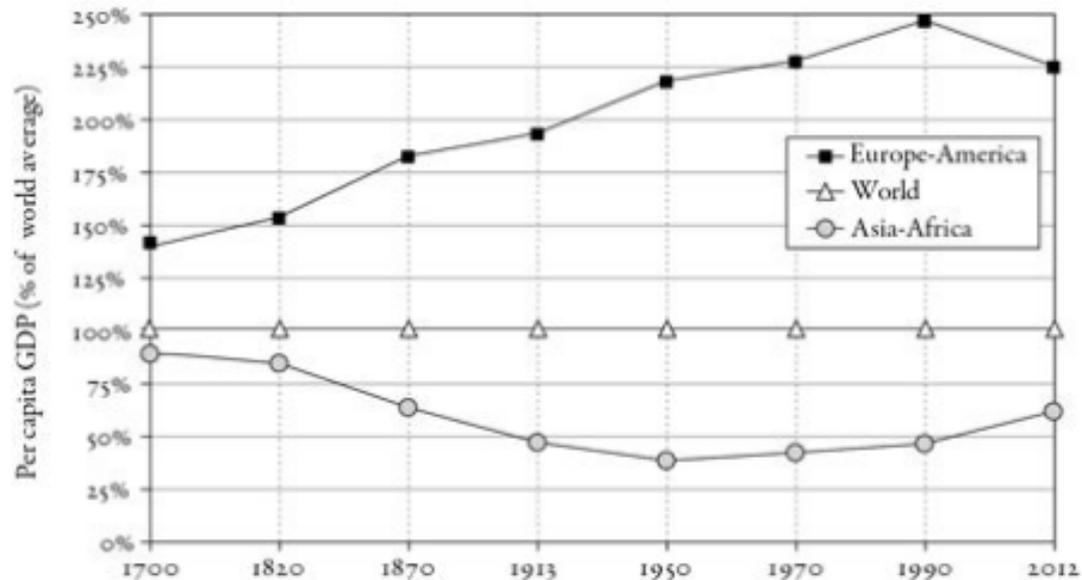


FIGURE 1.3. Global inequality, 1700–2012: divergence then convergence?

Per capita GDP in Asia-Africa went from 37 percent of world average in 1950 to 61 percent in 2012.

Sources and series: see [piketty.pse.ens.fr/capital21c](http://piketty.pse.ens.fr/capital21c).



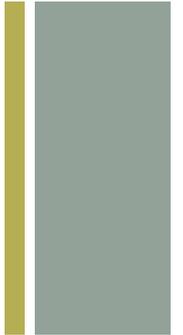
# Global context in the transition from the 1960s to the 1970s

## ■ **Developed countries**

- Growing unemployment,
- Criticisms with the impact of modernization on human life
- Stagflation

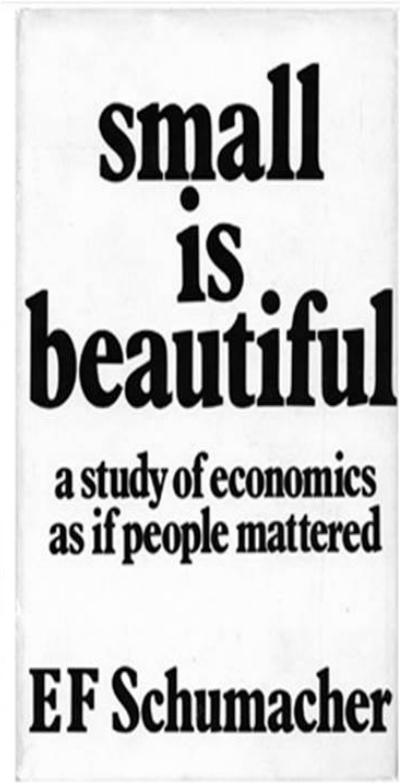
## ■ **Developing Countries**

- Increasing inequality
- Urban-rural divide
- Uncontrolled urbanization
- High population growth
- High unemployment



# + The Appropriate Technology Model (AT)

- **Objective:** Address the problem of employment and urban/rural inequality than large scale economic growth.
- **Approach:** Development should be promoted through Intermediate Technologies:
  - **low-cost,**
  - **small scale**
  - **Enhance human creativity**



# + Short history of the AT Model

## ■ 1970s and 1980s

- Emerging alongside with the “Basic Needs” approach , Schumacher’s framework had a significant influence in setting a human-based international development agenda. In 1983, there were over **1.000 organizations dedicated to AT initiatives** (OECD, 1983).

## ■ 1990s and 2000s

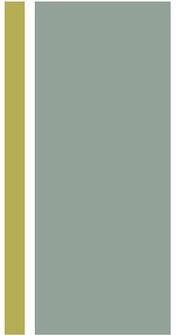
- The debt crisis and the rise of Neoliberalism coincided contributed with the AT model’s decline. Priority was given to macro-level reform and economic stabilization.

## ■ 2010s

- By the end of the 2000s, new strategies for the use of technology on poverty reduction start to become influential again. Examples can be seen in the sustainability movement, market-based BoP, MDGs and Open Source Technological platforms (e.g. Appropedia).
- **Several authors claim these newer movements are a separate phenomenon. (e.g. Polack (2009) and C. K. Prahalad (2004))**



# According to the experts, the AT model died because...



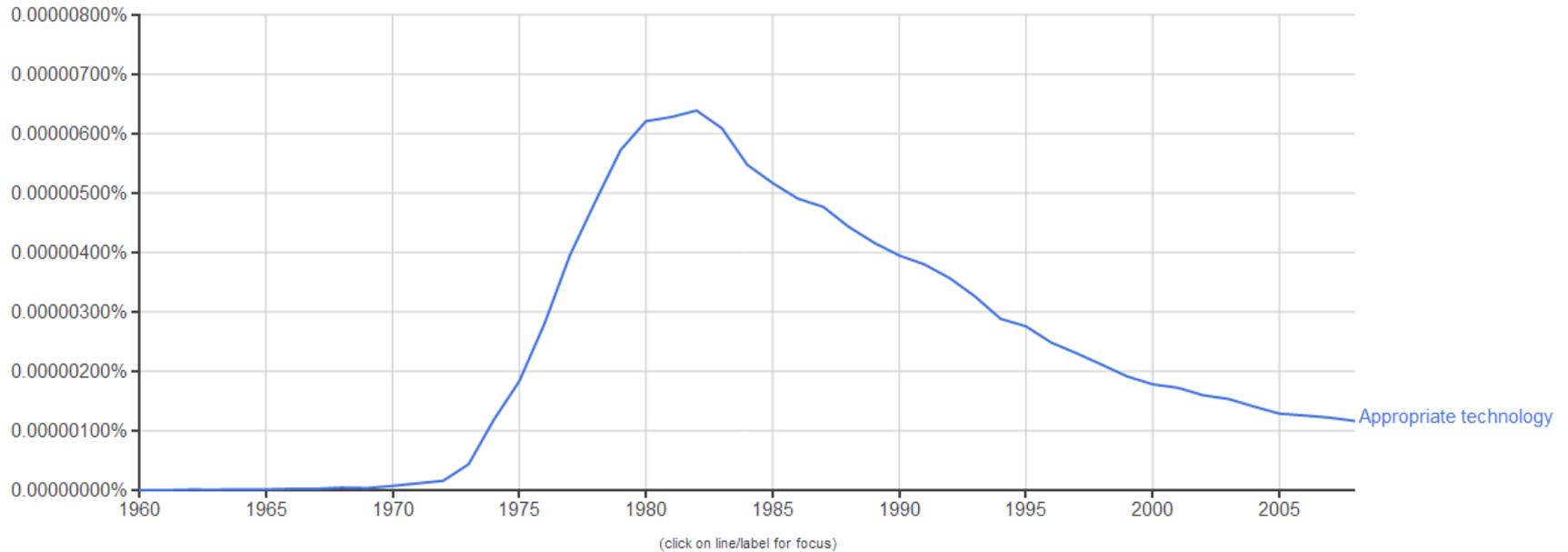
- Polack (2009) “the appropriate technology movement died because it was led by well-intentioned tinkerers instead of hard-nosed entrepreneurs designing for the market” .
- Starkey (1988) and Smillie (2000) - a “failure to learn from failure”, in which projects were not adequately evaluated due to the fear of organizations losing their funding and credibility as a result of poor performance.
- Florman (1981) and Zelenika (2011) - i) AT is not being as technically transferable and/or robust as expected; ii) insufficient funding for implementing AT at scale, iii) weak institutional support

# + Step 2 - Testing existing claims

## Google books Ngram Viewer

Graph these comma-separated phrases:   case-insensitive

between  and  from the corpus  with smoothing of  [Search lots of books](#)



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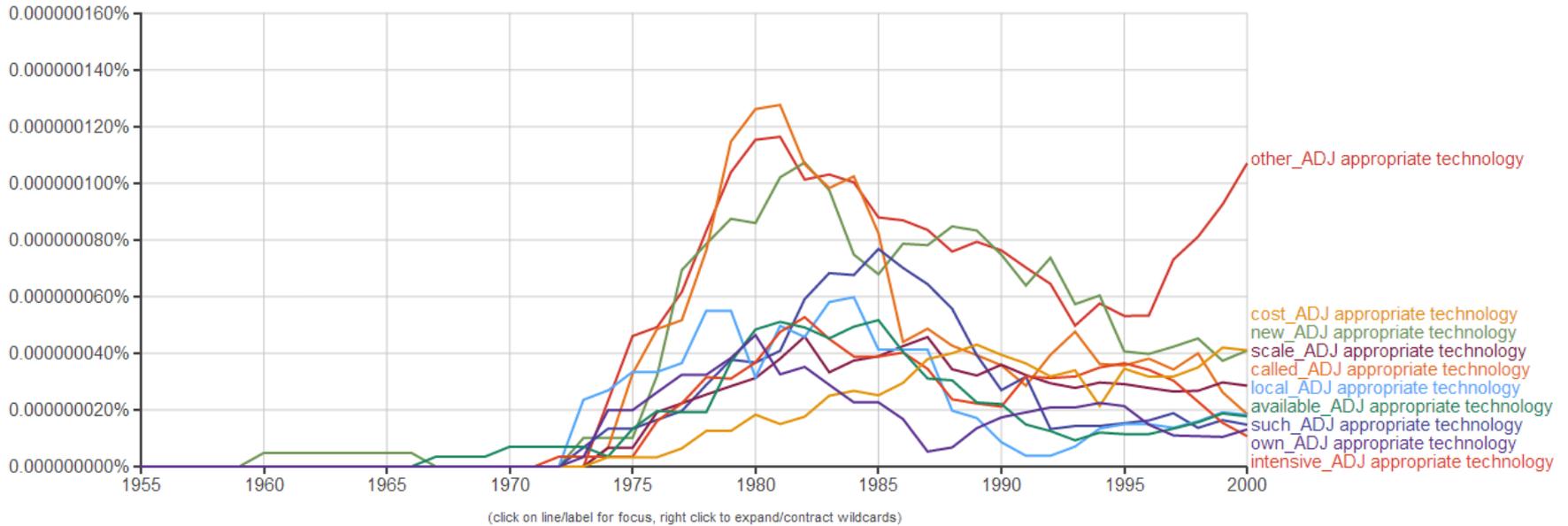
Graph these comma-separated phrases:   case-insensitive

between  and  from the corpus  with smoothing of  [Search lots of books](#)

Share

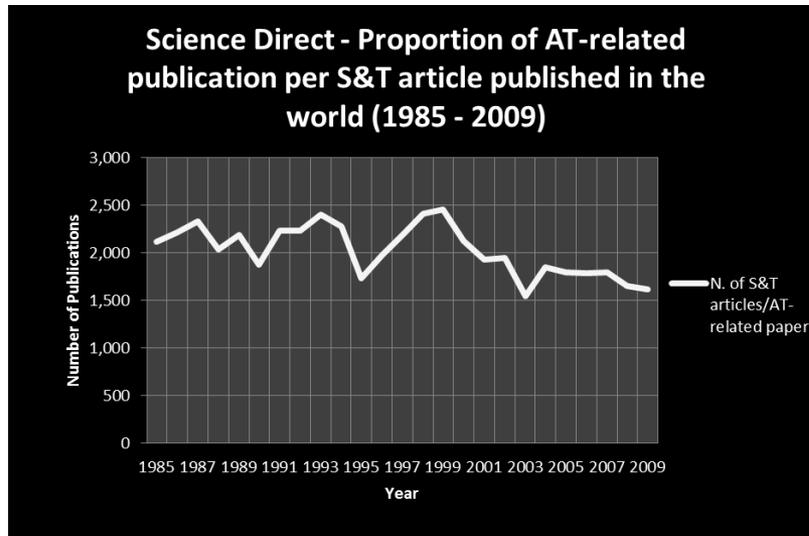
Tweet

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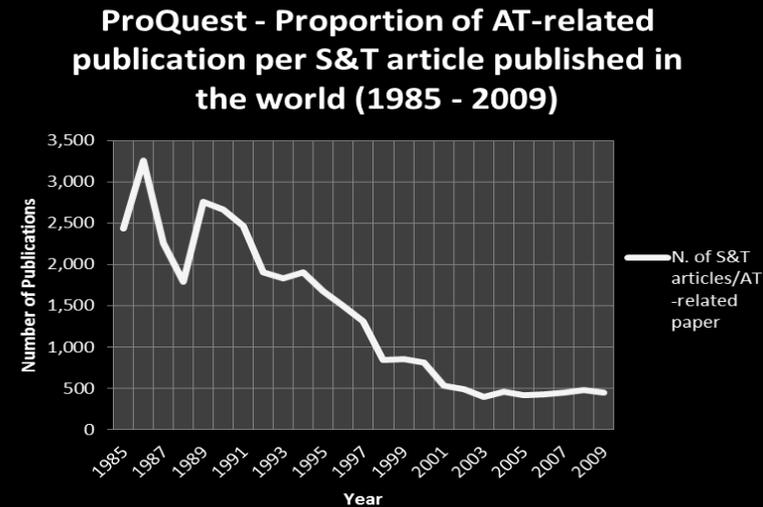
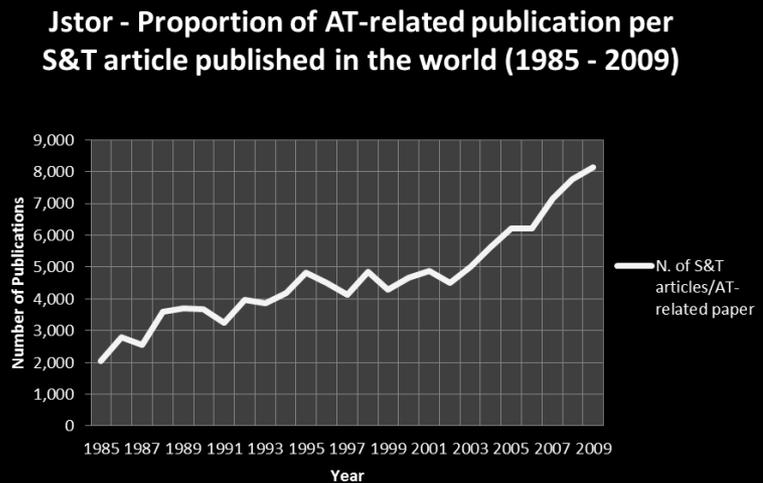


# + Identifying alternative explanations:

## *Assessing the number of AT publications vis-à-vis S&T Publications*

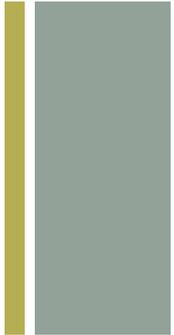


*(Data compiled by the Author using Jstor, Science direct and ProQuest databases)*





# Identifying alternative explanations: *Assessing Institutional Resilience*



<b>Organization</b>	<b>Year of Foundation</b>	<b>Most recent annual revenue available</b>	<b>Direct Beneficiaries per year</b>	<b>Source</b>
<b>Practical Action</b>	1966	US\$ 50Million (2011-2012)	4 million (2011-2012)	<a href="http://practicalaction.org/annual-report-accounts">http://practicalaction.org/annual-report-accounts</a>
<b>PATH</b>	1977	US\$300 million (2011)	74.5 million (2011)	<a href="http://www.path.org/about/finances.php">http://www.path.org/about/finances.php</a>
<b>IDE</b>	1982	US\$ 30 Million (2011-2012)	19 million (2011-2012)	<a href="http://www.ideorg.org/OurStory/Financials/IDE_FS_2011.pdf">http://www.ideorg.org/OurStory/Financials/IDE_FS_2011.pdf</a>

## +Step 3 – Developing my own qualitative analysis

### *Research Question and key Hypotheses*

- **Research Question:**

*How has the Appropriate Technology model changed from its inception in the 1970s to current practice as a development strategy?*

- **Most popular argument found in the existing literature**

*The AT Model reached its peak in the 1980s and fell out of favor shortly thereafter.*

- **Alternative Hypothesis proposed by the present study**

*The AT Model has not died. Instead, it was transformed as a result of changing socio-political contexts and adoption of the model by different development players with different development agendas.*



# Methods

## Systematic

## Review Process

(Adapted from Cooper, 2010)

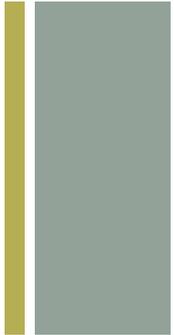
<i>Step in Systematic Review</i>	<i>Research question asked at this stage of the review</i>	<i>Primary function served in the review</i>	<i>Procedural variation that might produce differences in conclusions</i>
<b>Formulating the problem</b>	What research evidence will be relevant to the problem or hypothesis of interest in the review?	Define the (a) variables and (b) relationships of interest so that relevant studies can be distinguished.	Variation in the conceptual breadth and detail of definitions might lead to differences in the research operations (a) deemed relevant and/or (b) tested as moderating influences
<b>Searching the literature</b>	What procedures should be used to find relevant research?	Identify (a) sources (e.g. databases) and (b) terms used to search for relevant research	Variation in searched sources might lead to systematic differences in the retrieved research
<b>Gathering Information from studies</b>	What information about each study is relevant to the problem or hypothesis of interest?	Collect relevant information about the studies in a reliable manner	Variation (a) in information gathered might lead to differences in what is tested as an influence on cumulative results, (b) in coder training might lead to differences in entries on coding sheets, and/or (c) in rules for deciding what results are viewed as independent might lead to differences in the amount and specificity of data used to draw cumulative conclusions
<b>Evaluating the quality of Studies</b>	What research should be included in the review based on (a) the suitability of the methods for studying the review question and/or (b) problems in research implementation?	Identify and apply criteria that separate studies conducted in ways that correspond with the research question from studies that do not	Variation in criteria for decisions about study inclusion might lead to systematic differences in which studies remain in the review
<b>Analyzing and integrating the outcome</b>	What procedures should be used to condense and combine the research results?	Identify and apply procedures for (a) combining results across studies and (b) testing for differences in results between studies	Variation in procedures used to analyze results of individual studies (e.g. Narrative, vote count, averaged effect sizes) can lead to differences in cumulative results
<b>Interpreting the evidence</b>	What conclusions can be drawn about the cumulative state of research evidence?	Summarize the cumulative research evidence with regard to its strength, generality and limitations	Variation in (a) criteria for labeling results as important (b) attention to details of studies might lead to differences in interpretation of findings
<b>Presenting the results</b>	What information should be included in the report of the review?	Identify and apply editorial guidelines and judgment to determine aspects of methods and results readers of the report will need to know	Variation in reporting might (a) lead readers to place more or less trust in the synthesis outcomes and (b) influence other's ability to replicate results.



# Methods

## *Eligibility Criteria*

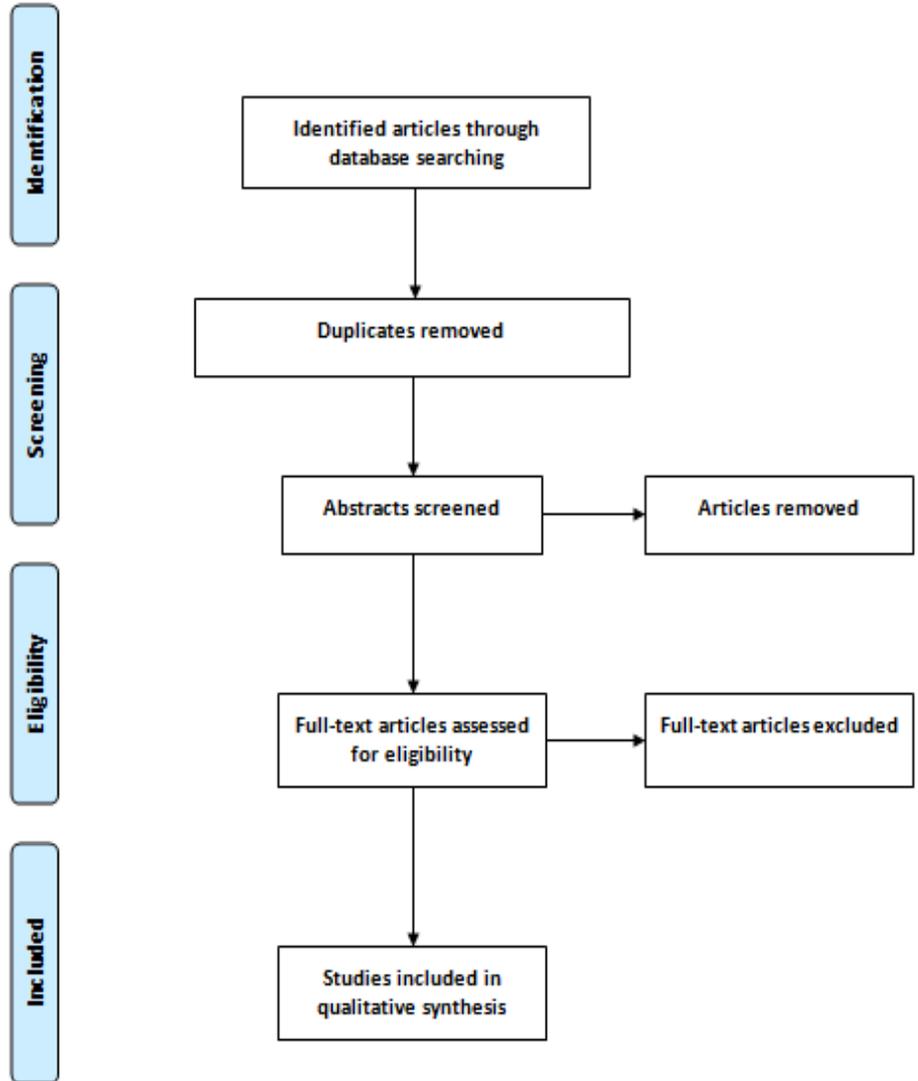
<i>Category</i>	<i>Criteria</i>
<b>Time Period</b>	In one of four decades: 1973-1983; 1983-1993; 1993-2003; 2003-2013
<b>Geography</b>	Developing Countries
<b>Type of Study</b>	Both qualitative and quantitative
<b>Language</b>	English
<b>Type of Publication</b>	Journal Article
<b>Discipline</b>	No restrictions
<b>Access</b>	Available to MIT
<b>Area of focus/study</b>	Studies AT in the context of international development; OR Analyses an aspect of AT within a developing country scenario.





# Methods

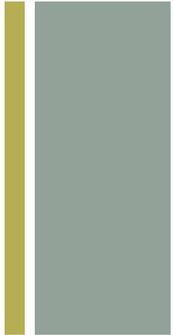
*Flow of information through the different phases of a systematic review (adapted from Moher et al., 2009)*





# Methods

*Initial results of literature search after the application of selection criteria*



Database	Additional Filters	Results			
		1973-1983	1983-1993	1993-2003	2003-2013
Jstor	--	24	41	7	2
Science Direct	Articles	31	56	51	22
Google Scholar	No citations	58	52	49	58
ProQuest	Peer reviewed + scholarly articles	51	64	51	62
<b>Total</b>	--	164	213	158	144
<b>Sample</b>	relevant results	17	15	13	15

# + The coding process

Indicator

Article Number

3

Article Name

Bertrand, W. E. & Levine, A. (1980) A Rapid Survey Technique for 'Appropriate Technology' Ecological Indicators in Developing Urban Areas. Social Indicators Research. Vol. 7, No. 1/4 (Jan., 1980) (pp. 237-249)

1. Study Characteristics

- Case Study [Bogota, Colombia] - The authors present a low-cost, rapid survey technique for gathering information on the urban ecology. The effort is developed from and validated in a research program correlating urban neighborhood (barrio) characteristics with infant and child mortality in Cali, Colombia.
- Study does not talk about AT model itself, but, as made clear in the article's title, they use the principles of appropriate technology in order to develop their rapid survey technique.

2. Reported AT goals or objectives

- The AT studied here (rapid survey technique) is suggested as a way to better understand the complex and rapidly changing context of emerging cities. Simple, not so tested, methods can provide the speed and specificity that formal tools (such as census) cannot offer within a reasonable timeframe.

3. Reported key AT characteristics

- Simple, low cost, locally specific, fast to be build and implemented, built independently from other resources.

4. Reported key characteristics of the AT model/movement

- The AT here is treated as a feasible solution for urban centers. Given the high level of urbanization that are ongoing in the developing world, many times without offering the proper infrastructure for the new dwellers. AT, therefore, helps to solve problems brought by hyper-urbanization of the developing world.

5. Reported AT strengths

- Besides being simple, low cost and easily implemented, these are techniques that are not normally available in developing countries.
- It is not as sophisticated as other methodological tools, but can gather "good enough information" so development interventions can be carried out.

6. Reported AT weaknesses

- The rapid survey method is hard to replicate at scale given the difficulties in dealing with a variety of different contexts.
- Lack of standardization of methods/techniques because of its cost, time consuming character and requirements of great cooperation and negotiation among those choosing one specific methodology.

7. Reported Assumptions of the model

- With increasing urbanization, formal, large-scale interventions of data collection and analysis are not appropriate to monitor the reality of informal settlements in developing countries.

8. Reported criticism of

- No clear criticism to other approaches is reported. In fact, there is a critique of large scale, standard, interventions like census in the sense that they cannot

# + Results - AT evolutionary pathway

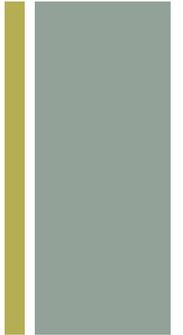
## First Decade (73-83)

- Variety of disciplines and points of view describing AT - Conceptual articles dominate the sample
- Born as a reaction of the failed development policies of the 1950s and 1960s
- AT was about employment, economic development, rural development
- The concept of AT is deemed too flexible. It was never a single model.
- Two main views of the model: reformist (technology as neutral, efficiency, adaptation) & radical (Growth-sceptic, value-driven).

# + Results - AT evolutionary pathway

## Second Decade (83-93)

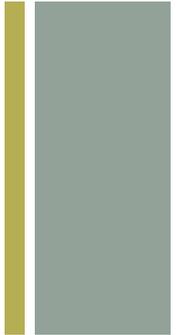
- Case studies dominate the sample with some conceptual papers
- Growing pragmatism about AT, concentration on lessons learned
- Macro-level criticism from the field: did not fully consider globalization and the rise of neoliberalism
- Micro-level criticism from the field: lack of suitability, lack of interaction between small and large scale systems, lack of participation and local ownership
- Beneficiary is seen in a more “passive” role than before



# + Results - AT evolutionary pathway

## Third Decade (93-03)

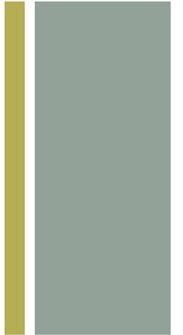
- Increase in the proportion of case studies and further decrease in the number of conceptual papers in the sample
- Learning lessons from the field continues to be a priority
- AT moves away from political considerations, debate get more technocratic, (“what works”) - values become implicit to the discussion.
- No “alternative development pathways” are discussed.





# Results - AT evolutionary pathway

## Third Decade (93-03)



- Basic needs becomes the most important goal, while employment disappears from the picture
- Micro-level criticism continues coming from the field: problems with implementation; lack of accountability; sense of “otherness” between implementers and locals.
- Emphasis on Projects’ sustainability over the long term and the importance of good quality human capital
- Trend: from the investment on technological characteristics to the development of human capabilities

# + Results - AT evolutionary pathway

## Fourth Decade (03-13)

- Sharp increase in the number of conceptual papers, followed by a sharp decrease in case studies
- Higher number of conceptual papers does not bring political consideration back to the AT debate
- (Western) values continue to be implicit to the discussion
- Basic needs continues to be an important goal, but now sustainable development becomes AT main objective almost without a challenge

# + Results - AT evolutionary pathway

## Fourth Decade (03-13)

- Characterization of AT does not change much (more emphasis on sustainability)
- AT & sustainability become an unified agenda for both developed and developing countries
- Excessive flexibility of the model continues to be questioned, since the same label is promoted by supporters of different paradigms
- Bottom of the Pyramid & Open Source Appropriate Technology are the present form of AT for the following decades

# + Preliminary Results (Summary)

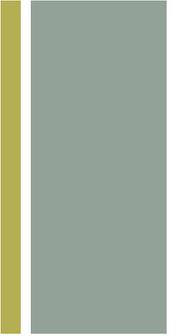
Indicators	Evolution of the AT model over different development decades			
	1973 - 1983	1983 - 1993	1993 - 2003	2003 - 2013
<b>1. Study Characteristics</b>	Conceptual papers	Case Studies	Case Studies	Conceptual
<b>2. Reported AT goals or objectives</b>	Employment	Employment Basic needs	Basic Needs	Basic Needs
<b>3. Reported key AT characteristics</b>	Low cost Small scale Contextualized Sustainable x Local Compatible with men's creativity	Low cost Small scale Contextualized Sustainable Local	Low cost Small scale Contextualized Sustainable	Low cost Small scale Contextualized Sustainable
<b>4. Reported key characteristics of the AT model/movement</b>	Reformist vs. Radical	Reformist empirical basic needs	Reformist empirical Capabilities Sustainability	Reformist Empirical (MDGs) Market-based BoP Sustainability Reformist conceptual (Open Source) Open source

# + Preliminary Results (Summary)

Indicators	Evolution of the AT model over different development decades			
	1973 - 1983	1983 - 1993	1993 - 2003	2003 - 2013
<b>5. Reported AT strengths</b>	Adaptable to local context Labor intensive Low intensity of Capital and Skills	Adaptable to local context Key to satisfaction of basic needs	Adaptable to local context Key to satisfaction of basic needs	Adaptable to local context Key to satisfaction of basic needs Can expand given new technological possibilities
<b>6. Reported AT weaknesses</b>	Implementation	Implementation Otherness	Implementation Scaling up Low human & Social capital	Implementation Scaling up Low human & Social Capital Weak IP
<b>7. Reported Assumptions of the model</b>	Value explicit Western & Eastern approaches	Value Implicit/ Western values	Value Implicit/ Western values	Value Implicit/ Western values
<b>8. Reported criticism of other approaches</b>	Critical on large scale technology transfer	Critical to unrealistic approaches	Critical to short term initiatives that do not increase capabilities	Criticism to non-market based. Critical to proprietary knowledge
<b>9. Reported level of influence of the model</b>	High	Low	Low	High

# + Preliminary Conclusions

- 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.
- **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 (e.g. strategies for the BoP and expansion of Open Source Appropriate Technologies)
- **The evidence indicates that the AT Model evolutionary pathway may be more complex than currently acknowledged by the literature.** There have been important qualitative changes in the debate involving technology, development and poverty reduction that have not yet been fully analyzed by the existing literature. Further research is required to fulfil this gap.



Thank You!

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