

# Review of: "Science desperately needs disruptive innovation"

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**Potential competing interests:** No potential competing interests to declare.

## *General remarks*

The paper focuses on developing a framework for understanding and framing disruptive science practices, processes, and methodologies. Conventional science follows an incremental process and, by its nature, lacks the power to disrupt. All it can do is harvest low hanging fruits. This paper has touched on the nerve centre of what modern science – both hi-tech and remote – ought to become in its ecosystem processes ranging from ideation to funding of science.

The paper develops a disruption index. The motivation for the index is that current methods for measuring scientific impact of ideas such as indices, such citation indices miss the fecundity of scientific ideas, some of which will be in their infancy, and mere anecdote in grey literature. The index developed by the authors is relevant, strategically helpful, and sufficiently reorients our thinking about how to transform science into a beehive of productive and transformative ideas.

Using the disruptive index, the paper advances a framework that demonstrates that scientific ideas passes exploration, exploitation, plateauing, and exhaustion. Interestingly, they find that both deep tech science disciplines and remote science disciplines exhibit the same four-stage pattern cycle. As a result, they find significantly high correlations between deep tech sciences and remote sciences. The four-stage pattern seems to be driven more by exogenous factors such as climate change, droughts, and pandemics, among others. What is needed is to build capacity for science to have endogenous drivers of disruption. Funding models and incentive structures need to encourage adoption of complex systems of thought and research that produce disruptive ideas. They also need to encourage grey literature, that often is the source of highly productive ideas that have not. A venture capital model is the proposal that has the potential to transform science into high realms of disruption.

The study significantly extends Thomas Kuhn's scientific revolutions (Kuhn 2012), although the authors do not engage this work. Further, the paper can also draw parallels to the product life cycle which has the same pattern of four stage cycles and all the time this cycle is driven by monetisation of research ideas into wave after wave of new product offerings.

## *Overall comment*

The paper is a significant advance on our understanding of how science can be reinvigorated and transformed in ways that will bring sustained disruptions. As it stands, "universities and funding sources acknowledge that science has reached

stagnation". The only solution is to adopt disruptive ideational, funding and impact measurement methodologies.

I recommend the paper for publication. The paper needs minor proofreading and editorial corrections.

Best wishes to the authors.

#### Bibliography

Kuhn, Thomas S. 2012. *The Structure of Scientific Revolutions* University of Chicago press.