

# Thoughts about what disruptive innovation means for agriculture research organisations.

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Disruptive innovation is yet another piece of terminology that has captured the imagination of technologists, business analyst and even the international development sector. Imagine if there was a wave of disruptive innovation in agricultural and food systems that not only created new sources of market and economic value, but also delivered food and nutritional security, new sources of meaningful employment, and at the same time shifted the planet to a more sustainable mode of production. Could it really happen and where would you start in reframing science, business and policy to make this great leap forward?

But first, what does disruptive innovation really mean? There is a large literature on it in the field of business and innovation studies, where it is defined as:

*“A disruptive innovation is an innovation that creates a new market and value network and eventually disrupts an existing market and value network, displacing established market leaders and alliances.”*

Disruptive innovation is not a technological phenomena per se, but a market phenomena. New technologies may enable market disruption (as may new policy regimes), but few technologies are intrinsically disruptive. In reality disruptive innovation involves the perfect storm of novel business models, technological opportunity (new, but usually existing novel combinations) and policy support (or at least policy opportunity). This is different from evolutionary or revolutionary innovation that while introducing novelty, do so within existing markets. The introduction of mobile phones services were arguably disruptive where as smart phones were revolutionary and ever more powerful smart phones are evolutionary. The literature argues that smart phones were disruptive, because they created new markets for mobile phone

enabled services. It is easy to get lost in these distinctions, but the signature feature of the disruptive innovation phenomena is market disruption.

## WHERE DOES DISRUPTIVE INNOVATION COME FROM?

Large market players rarely drive disruptive innovation as their business models are usually geared to sustaining existing markets for their goods and services. Disruptive innovation involves offering customers a different product or service to the one they currently demand. Large established successful companies who are responsive to customer demands therefore struggle to develop products and service for which the market is initially very small. Instead, disruptive innovation normally emerges from the periphery of the market: small companies willing to take risk with new products and services in the hope that they can create markets that initially do not exist. The payback to this risk taking is that unlike other forms of innovation, once released to the market disruptive innovations penetrate rapidly and have high impact in the market. Think of the tiny niche market for fair-traded produce 25 years ago. It is global retail value is now approaching \$3 billion. However, the distinction between large incumbents sustaining existing markets and new players disrupting markets is not so clear-cut.

Disruptive innovation can arise in incumbent player's business models by introducing cost saving production methods (often technology enabled) that provides lower cost products and thus creating a new low cost segment



of existing markets: Mass production techniques are historically the most obvious example of this.

## **BUT SURELY NEW TECHNOLOGY CAN BE DISRUPTIVE?**

There is parallel literature on disruptive technology, where like innovation, disruptive core technologies can emerge that disrupt technological regimes and then incrementally over time these shift from being high-tech to normal tech. The economist's arguments around this topic are tortuous. However, most agree that disruptive effects cannot be understood without reference to how technologies are embedded in different forms of business model. The technology disruption school still hangs on in the literature, but generally the disruptive innovation perspective has disrupted the way economist think about this and this is currently the mainstream view.

## **WHAT DOES IT LOOK LIKE IN THE CONTEXT OF AGRICULTURE AND FOOD?**

Interestingly, there are very few examples in the literature on disruptive innovation in agriculture development. Candidates include the "green revolution", precision agriculture, conservation agriculture, inclusive agribusinesses, systems of rice intensification, low input sustainable agriculture, organic food movement, local food movements; gene technology enabled breeding (a mixed picture of improved production methods within existing markets?). My sense of these examples (and it may be just my own bias) is that these have a different feel to industry examples. More public sector initiated? More concerned with disrupting production methods towards sustainability? More focused on creating new types of value for customers, ethically produced, fair-traded etc. I haven't however stress tested that hypothesis and it deserves more analysis.

## **CHALLENGES AND RESPONSES TO DISRUPTIVE INNOVATION.**

Clearly disruptive innovation can be seen as a threat to incumbent market players in the agriculture sector, as it's the means by which new players leapfrog them by creating new products and services that can potentially make those incumbents in the market obsolete. Uber taxi services are the obvious example of this in the non-agricultural sector that everybody quotes. However, disruptive innovation also means the disruption of alliance and partnerships both in the business world and between

businesses and other partners including research organizations.

If you stretch the market incumbent / market periphery analogy a bit further, it could be argued that national and international agriculture research organisations historically & currently have a market incumbent position. They have an existing market of public policy and incumbent industry clients. They have established ways of working with these clients and over time they have developed a way of responding effectively to these clients' needs. Likewise agricultural industry funding mechanisms have their own internal processes for responding to the needs of their farmers thus reinforcing the incumbent / existing market position. This suggests a recipe for at best for revolutionary and evolutionary innovation. Therefore, the existing "business model" of agricultural research agencies makes them vulnerable to the Uber syndrome.

That's not to say that agricultural research organizations do not have a role in evolutionary and revolutionary innovation. However, it does suggest that to be part of disruptive innovation, they need to remap their partnerships and take the risk of creating new markets in public policy and industry sectors for products and services that these clients and wider customers don't currently know they need. This in turn probably means (a) working in different ways; and (b) finding an appropriate balance between: discovery research/ platform technology development; applied research with clients; innovation / new market incubation; research on market and industry trends; and research and engagement on "structural" policy barriers to disruptive change. A final point to emphasis is that if agriculture research organisations wants to engage in disruptive innovation they will need to engage much more with periphery market players. In all likelihood this means SMEs not just large corporates.

Of course in reality they need to find an appropriate and practical balance between the two. In the same vein, truly disruptive innovation in the agricultural sector (particularly around sustainability, nutrition and health) are going to need appropriate public policy responses to enable major impact on the market. This (rather counter intuitively perhaps) suggests that engaging more effectively in private sector driven disruptive innovation means pro-active engagement in public policy innovation as well.

## **WAYS FORWARD?**

In many senses this represent a challenging and unfamiliar future not just for agricultural research organizations, but for existing and new clients and partners in the business

and public policy sector. This requires a series of strategic and ongoing conversation and exchange of perspectives on what the look and feel of this brave new world might actually be. Topics that probably need attention include:

**Looking beyond the smart phone analogy.** Is agricultural disruptive innovation special and different? Do we know what it is when we see it?

**Investing in disruption for the long run.** What mix of public and private sector investments are needed to lay the foundations of disruptive innovation in agriculture? What things need to be done in the short term for quick wins? What things that are needed in the long term to sustain continuous disruptive innovation capacity into the future?

**Catching the next wave.** What are the emerging market demands in agriculture that have the potential to move from the periphery to the mainstream? Super foods, food trucks and the hipster phenomena.

**Brokering opportunities.** How can existing technological opportunities be coupled with business innovation to create new classes of products and services?

**Getting policy settings right.** How can an interplay between niche disruptive innovation and policy responses be enabled to ensure major market impacts?

**Technological futures.** What are the critical emerging technological frontiers that could underpin new classes of disruptive service and product innovations?

**The future market imagined.** What disruptive innovation ideas can be imagined that technology discovery and development can back fill - The Star Trek clamshell phone phenomena?

**Building disruptive capability.** How do we learn to work in this new environment? What format of engagement can build momentum around these ideas?

**There is never going to be a blueprint for how to proceed. However what is clear is that business as usual is the anti-thesis of disruptive innovation.** Just ask the folk who used to make Remington typewriters

## WANT TO KNOW MORE?

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