

3. Evolva



"I now feel that RRI just might possibly serve as a sort of inoculation (think of the flu shot metaphor) against future backlashes, and will help us better inoculate our partners and customers, although it won't guarantee that no backlashes will ever occur."

Stephan Herrera
VP, Strategy & Public Affairs, Evolva

The company and the technology

Evolva was created in 2004, as one of the first biotech firms to incorporate synthetic biology into its R&D platform. Evolva leverages modern biotechnology, including synthetic biology, to produce what are called yeast "strains," which are then brewed like beer in the traditional fermentation process. The purified end product contains no recombinant material. These end-products are molecularly identical to those traditionally extracted from plants, animals and petrochemicals.

In this way, Evolva seeks to replace ingredients that have 'issues'. Quoting the Evolva website about those issues: "The plant or animal that makes the ingredient is too rare, too hard to grow or does not make enough of it. Hence, the ingredient is not available at the right quality or price that allows most of us to benefit from it in a sustainable manner".³

Evolva's products include active ingredients such as Resveratrol, Nookatone and Valencene. Resveratrol, which is found in trace amounts in grapes, berries, nuts and other plants, is an example of a high-demand ingredient with a problematic sourcing history. Resveratrol is formulated into a number of products to promote healthy aging benefits.

Evolva has experienced resistance from some environmental organisations in the past with some of their innovations such as fermentation-produced vanillin. The company is committed to Responsible Innovation, however, so far this has not prevented resistance from some societal actors.

³ <https://www.evolva.com/wp-content/uploads/2016/03/Evolva-AR15-Preprint-30Mar2016-EN.pdf> accessed 19/12/18



Stephan Herrera
VP, Strategy & Public Affairs, Evolva



Working with Evolva

The following issues can be identified that are seen as problematic by those critical of Evolva:

Safety:

Genetically modified organisms are a potential threat to biological diversity if they escape to the environment. The regulatory process and framework for these products are not strict enough according to opponents.

Existing value chains/benefit sharing:

Long lasting tradition and knowledge of existing farming practices may in the long term become redundant if biotech and fermentation-derived products replace those from small, independent farms in developing countries. Producing products using a gene that can be found in a plant that has been traditionally harvested in geographies known for their fragile communities might in some cases require the biotech producer to provide some form of access and benefit sharing per the UN Convention on Biological Diversity and the Nagoya Protocol.

Sustainability:

Fermentation products are not environmentally sustainable because they require a carbohydrate feedstock. The most common feedstock used for the yeasts in South/North America and European fermentation production is sugar, the production of which may lead to deforestation.

Labelling/marketing:

Synthetic biology and many other forms modern biotechnology are considered to be "extreme genetic engineering" and hence their products should not be allowed to be labelled as "natural" even if these products are chemically identical to the product that was extracted from animals or plants, and contain no trace of the genetically modified yeast used in production.



Evolva's current response to these issues is as follows:

Safety:

Evolva states that its R&D is fully compliant with the UN Convention on Biological Diversity. From the website: "All our ingredients are produced in contained 'closed-loop' manufacturing facilities that are regularly inspected by regulatory authorities. The genes that we use are either sourced from various species, in compliance with the CBD, or constructed de novo based on online databases or other sequence data."

Evolva is a Swiss-US company. Both countries have comprehensive regulations governing research into and commercial uses of biotechnology. Per the website: "Evolva supports the public review and expert technical/legal assessment of such regulations, and when necessary, the strengthening of laws to ensure that they continue to be fit for purpose."

Existing Value Chains/benefit sharing:

Evolva states on the website that it is committed to "the fair and equitable sharing of benefits arising from genetic resources."⁴ Furthermore the company had at one point in time donated small sums of money to support the conservation of biodiversity and basic science education in developing countries.

Evolva claims to not target existing traditional value chains. When the company was developing vanillin, they aimed to provide an alternative to the vanillin which has for generations been produced from petrochemicals and paper pulp. They did not intend to compete with farmers of natural Vanilla. Due to cost and other issues, the vast majority of mass-market product producers use vanillin, not vanilla.

Sustainability:

Evolva invested in an analysis of the key LCA metrics involved in fermentation-derived vanillin. Most of the metrics supported the company's sustainability aspirations. However, there are many variables involved in the production of a first-generation fermentation ingredient (geography, yeast strain optimization, etc.) that will change in the near-term as the process is optimized. Sustainability remains, therefore, aspirational until the yeast strain and production process are perfected over time.

All of that considered, however, the environmental organisations concerned about the sustainability impact of Evolva's products, would not be convinced by a LCA. They would question its assumptions

⁴ <https://www.evolva.com/biological-diversity-and-the-environment/> accessed 19/12/18



or find issues that have not been sufficiently covered by the LCA. Also, most food and beverage producers focus on price and taste. They rarely pay suppliers a premium for ingredients that come with LCA data. There is rarely a green premium.

Labelling/marketing:

The company never described its products as 'natural'. But, it did describe its processing technology as 'natural' because fermentation is indeed natural. Evolva explained that the decision of how to label the ingredient is 100% in the realm of national regulatory bodies, not the companies that make the ingredient or produce a product that uses this ingredient.

However, in hindsight, Stephan Herrera from Evolva says that it was a complete waste of time trying to explain the difference between process and product. He also regrets wasting time and effort trying to explain that fermentation is a 'natural' process. This message was apparently too complicated to be communicated effectively. Critics exploited all of these gaps by framing the issue as one in which Evolva was seeking to deliberately replace vanilla made by poor farmers in Madagascar.

Herrera has called the public engagement effort around vanillin as something akin to walking into the perfect storm. Moreover, it was not productive to public engagement efforts to try and debate, counter, or define what qualifies as a 'natural' process or a 'natural' ingredient when most national regulatory bodies do not even have a uniform definition for 'natural'.

Transparency and public engagement:

Evolva invests in maintaining relationships with stakeholders. They invite critical perspectives from the beginning of their innovation trajectories and meet with nonprofits that follow biotech and emerging technologies with a sustainability narrative, such as Forum for the Future, Woodrow Wilson Centre and NGOs such as World Wildlife Fund.

However, its interactions with some NGOs proved very complicated with three particular groups in the US. Evolva did not want to mention them by name as they remain vehemently opposed to Evolva's use of synthetic biology, regardless of Evolva's efforts to be transparent and to seek collaboration. The lack of success in practicing RRI has led the company to become skeptical of the concept. There is concern that being transparent and actively pursuing public engagement with its critics made the company more vulnerable to criticism.



Advice

Four main issues emerge from the above analysis that deserve thorough consideration for Evolva to continue its RRI strategy.

1. How to select which ingredient to replace through various forms of biotechnology like synthetic biology and fermentation production?
2. How to establish whether the alternative is indeed more sustainable than the existing ingredient?
3. How to determine what fair and equitable benefit sharing implies?
4. how to collaborate with other actors to develop these frameworks and assessments in a societally robust way?

Some suggestions for concrete actions that could contribute to resolving these issues:

- Develop a robust framework for selecting the ingredient which deserves to be replaced by a synthetic alternative
- Co-operate in schemes for sustainability criteria for the specific ingredient
- Support sustainable practices for feedstock supply for the engineered yeast
- Create opportunities for vulnerable farmers in new value chains

If the above mentioned issues are answered in a collaborative practice with a wide range of constructive actors, Evolva could move from a defensive kind of RRI to a more pro-active, confident kind of RRI. Defensive RRI is geared towards damage control and risk-management. Confident kind of RRI is geared towards the development of a robust rationale underlying and motivating all steps in the innovation chain. Such a rationale will allow for a more confident engagement with critical NGOs and concerned consumers. The Agarwood case that Evolva is currently developing could serve as a showcase for such an approach.
