

GLYCOMAR

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A Scottish SME and a Norwegian SME in the biotech sector undertook several rounds of collaborative research, including a Eurostar project, and then formed a joint venture to make a business from their new product and process

Executive Summary

GlycoMar is a biotechnology company developing products for human healthcare and personal care markets. In 2015, GlycoMar formed Prasiotech, a joint venture between itself and a Norwegian - SME MicroA - to manufacture and refine the production of polysaccharides from microalgae. The microalgae-derived products have applications in healthcare, cosmetics, and nutrition. While GlycoMar discovered the molecule, MicroA has provided the manufacturing capability to reach a pilot production stage.



CASE N°: UKI52

SECTOR: BIOTECHNOLOGY

TECH INTENSITY: HIGH-TECH

LIFE CYCLE STAGE: ESTABLISHED

INNOVATION VECTORS: PRODUCT, PROCESS

OI PARTNERS: OTHER SME

KEYWORDS: Biotechnology, microalgae, joint venture, new company, manufacturing, polysaccharides

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BACKGROUND

Dr Charlie Bavington, founder and managing director of GlycoMar, studied as a biochemist. His previous work experience has included roles within an academic research organization as well as commercial organizations. His entrepreneurial aspirations led Charlie to set up GlycoMar in 2005 to discover and develop glycobiology products derived from marine resources for application in pharmaceutical, consumer healthcare, cosmetic and nutraceutical markets. GlycoMar is currently based at the European Centre for Marine Biotechnology in Oban, Scotland.

The company focused on an out-licensing business model for the technology and intellectual property it develops. In recent years the company has started to adopt a more flexible approach to enable it to get its products to market. This is expected to continue and may also lead the company to build its own production facilities, as part of its Prasinotech joint venture, to manufacture products in the volumes required by customers.

INNOVATION CHALLENGE & MARKET OPPORTUNITIES

GlycoMar has become a platform technology company with expertise in bio-chemistry, chemistry and immunology. It depended on a model of out-sourcing production or licensing out to other organizations in order to manufacture its products. The company undertook a previous collaborative project with funding from the Technology Strategy Board (now Innovate UK) and Innovation Norway to investigate how to produce microalgae.

The specific polysaccharides (a form of sugar) discovered by the company have specific useful properties, including being a weak anti-inflammatory. The managing director believed that this would be beneficial in cosmetic products for skin protection, as an after sun application and as a moisturizer. As cosmetics are subject to less regulation than other target markets identified by GlycoMar, it was seen as a good option for introducing the company's first product.

OPEN INNOVATION TRAJECTORY

Concept development

Traditionally, a bacterial fermentation process or extraction from a botanical source is required to obtain similar complex molecules to the saccharide molecules that GlycoMar discovered. In the case of the saccharides found by GlycoMar these techniques and other chemical processes are not suitable. A new process was therefore required to obtain saccharide molecules from microalgae.

The development process, IPR and competition strategy

In December 2015, GlycoMar and the Norwegian technology company MicroA set-up Prasinotech as a joint venture (virtual company) to be the first company in the world to specialize in the production of polysaccharides from microalgae. MicroA had developed a patented photo-bioreactor system that could grow the microalgae.

MicroA's bioreactor system had the inherent advantages of being highly sustainable while being an ethical production method. Only light and carbon dioxide is required for use in the photo-bioreactor to grow uni-cellular algae. This makes its use attractive in creating products in the form of ingredients for use in the cosmetics market, particularly as no genetic modification of the algae is required.

To develop the microalgae production further, the Prasinotech partners applied for a two-year Eurostar's funding package for the collaborative project. The project was important for validating the technical and commercial aspects of the manufacture of polysaccharides from microalgae. The challenges within the project were therefore focused on how to scale production and reduce production costs.

The IPR required for the development process within the project came solely from the two partners: GlycoMar's polysaccharides from Prasinococcales IP and MicroA's IP for its bioreactor system.

As the company's polysaccharides have unique properties and are protected by a patent, GlycoMar's approach has been to differentiate itself from potential competitors. The Prasinotech approach of ethical production without using any form of genetic modification and using a patented bio-reactor only using light and carbon dioxide

further enhances the joint venture product differentiation.

Commercialization and follow-up

Prasinotech has been successful in reaching a pilot production stage with MicroA undertaking the manufacturing. As the bioreactor is a closed system and only requires lighting, basing manufacture in Norway was preferable as electrical energy costs are relatively low there.

As with many new technologies, Glycomar expected technical challenges. The current challenge to overcome is the high cost of production. The joint venture expects to overcome this through gaining a better understanding of the new algae with a view to finding techniques to improve yields. Such gains could provide a 10-fold improvement in polysaccharide yields.

As production requirements increase, the Prasinotech joint venture may need to look for larger dedicated production facilities. An alternative option is that production is outsourced, leading Prasinotech to focus its efforts on sales and marketing.

As the product developed by Prasinotech is an ingredient initially targeting the cosmetics industry, the sales process is business-to-business and with a technical focus. This means that Prasinotech has had to demonstrate the validity and advantages of its use in cosmetics. Both partners are involved in this process. Key distributors have been engaged within specific territories and the partners are investing time in attending relevant trade fairs.

As a follow-on development from the project, the Prasinotech partners have engaged with a multinational food manufacturer to develop a novel sugar replacement ingredient. Funding has been acquired to support this new collaborative partnership.

Biorefining is also being investigated as it is theoretically possible to extract other useful material from microalgae, including protein, which could be used in feed additives.

BUSINESS IMPACT

GlycoMar is now able to manufacture their high-value microalgae-derived polysaccharides through the joint venture with MicroA. The pilot production facility is able to supply their first customers with the new product. This in turn has

created and verified a new process for manufacturing specific microalgae based on MicroA's technology. This is seen as a very important step to allow further development and commercialization work to be undertaken, as the alternative to outsource the production would have been prohibitively expensive.

In September 2016, GlycoMar was granted a patent by the European Patent Office for deriving polysaccharides from Prasinococcales microalgae.

GlycoMar had been focused on the discovery of new marine-derived materials and their early-stage biological and chemical characterization and development. Prior to collaborating with MicroA, there was no easy solution for manufacturing the required quantities of algae. In addition to a novel product, the joint venture has allowed GlycoMar to gain a greatly enhanced understanding of process engineering which has enabled laboratory-based production to be scaled to a pilot stage. As a result, the company now has unique expertise in a range of processes from discovery through to development and manufacturing.

A small financial impact can be directly attributed to the project obtained through selling the product to customers. A rapid increase in sales is expected over the next few months.

LESSONS LEARNED

Charlie Bavington advised SMEs managing an OI process that collaborative funding mechanisms are very useful for supporting collaborative projects. In his opinion, Innovate UK and Eurostar funding was "instrumental" in creating the Prasinotech joint venture with MicroA.

Charlie recommended that an SME should form a collaboration in which their IP is at the centre of the project and then look to other commercial and academic partners to collaborate with as a way to meet the requirements of the project.

Charlie further suggested that SMEs should be flexible in the business model adopted and that joint ventures and collaborative projects may not be suitable in every case, i.e. an out-licensing approach may be better in certain circumstances.

In terms of support, Charlie suggested that legal and business support with a focus on IPR would be useful in decision making situations. A method to assess different scenarios (collaborative approaches or not) to understand the effect on development costs and time would also be interesting.

A general suggestion made was the development of a Business Model Canvas tailored specifically to open innovation.

This case demonstrates how a joint venture can be an effective way in which two SMEs can successfully collaborate together to create a unique product and process. The case also demonstrates how two companies can retain their own IP while benefiting from gaining new knowledge in aspects of the product innovation journey which are not undertaken typically in-house.

Main lessons learned:

1. A joint venture between SMEs can be an effective method to collaborate openly to develop new products and processes while retaining background IP.
2. Sometimes when innovating there is no option but to collaborate, as other options are prohibitively expensive.
3. Market regulation can fundamentally affect the approach an SMEs takes in its innovation journey to create its first product, and can therefore influence the type of partner the SME requires.
4. Funding open innovation can be instrumental in forming successful collaborations between SMEs, in which at least one partner is at a pre-sales stage.