

Executive Summary

MyceliaPack is a recent innovation designed to rival the current dominating protective packaging industry by replacing hazardous synthetic foams, like Styrofoam, with mycelium based bio-composites (Abhijith et al., 2018). Currently a large portion of the global market relies heavily on Expanded Polystyrene (EPS), a petroleum-derived material that stains ecosystems for centuries and leaks toxins into the surrounding area. MyceliaPack solves this by utilising the roots of fungi to “grow” high performance packaging around custom molds using agricultural waste using feedstock.

The value proposition goes beyond environmental ethics: our mycelium packaging is fire resistant, shock absorbing and thermally insulating, beating out the specifications of other widely used packaging materials such as Styrofoam (Haneef et al., 2017). One of the most crucial components is that it is 100% home compostable, meaning consumers can put it into the soil of their garden and be left with nutrient rich soil rather than microplastics.

Project Overview

Over the next two years, MyceliaPack will achieve viability by targeting high-growth B2B sectors, helping provide these businesses with the opportunity to lower their carbon footprint as well as still providing safe and secure packaging to their consumers. By leveraging the low energy cost it takes to manufacture our packaging and using localised supply chains, the business is positioned to scale rapidly. Our current goal is a primary Phase 1 pilot program, where we are looking to partner with sustainable B-Corp organisations, so they can validate our durability and sustainability claims, as well as help us refine our delivery model for long term commercial use.

The packaging industry is undergoing a major shift, mainly driven by the need of environmental necessity, strict regulations and new consumer demands. Historically, Expanded Polystyrene (EPS) has majorly dominated the market due to its low cost and very light weight properties, however, its environmental cost is unreasonable. The production of EPS is energy intensive, requiring 42.4 MJ/Kg compared to just 4-6MJ/Kg for mycelium based bio foams (Enarevba and Haapla, 2023). Additionally, the remains of synthetic foams in landfill for centuries have led to a global push for biodegradable alternatives (European Environment Agency, 2024).

MyceliaPack makes use of fungal mycelium - the root part of mushrooms - to create and grow a mold around the required products, creating high performance composites. This innovation faces the global waste issue head on and addresses the requirements of fragile goods logistics:

- **Performance:** Mycelium composites have a high rebound resilience of approximately 65%, providing high shock absorption comparable to synthetic foams (Future Market Insights, 2025).
- **Safety:** Recent research confirms that mycelium-based materials possess fire retardant properties, meaning they produce significantly lower heat release and smoke compared to traditional packagings (Barta S, et al., 2024; Jones et al., 2020)
- **Circularity:** Unlike EPS, which has almost zero recycling rate and often ends in the oceans, mycelium packaging is fully home-compostable, breaking down within 30-90 days (Sustainability Directory, 2025; Jiang et al., 2020)

The current regulatory landscape serves as a significant headwind for this business venture. The EU's Packaging and Packaging Waste Regulation (PPWR), which comes into action August 2026, mandates that all packaging on the EU market be recyclable or compostable (European Commission, 2025). Similarly, the UK's reworked Packaging Extended Producer Responsibility (pEPR) scheme, which has been active since April 2025, has introduced higher fees for companies using non-recyclable materials like plastics, creating clear financial incentives for enterprises to switch to bio-based materials (UK Parliament, 2026). MyceliaPack is positioned at the ready for these trends, offering a superior and future-proof alternative to the current majority of petroleum-based packaging.

Longevity

To ensure MyceliaPack remains strong and we maintain our competitive advantage, we are focusing on 3 strategic pillars: supply chain circularity, technical niche expansion and a scalable micro-factory model.

Supply Chain Circularity

The longevity of MyceliaPack is tied to our “waste-to-wealth” model. Unlike synthetic packaging, which is vulnerable to volatile global oil prices, MyceliaPack's primary feedstock is agricultural waste. By establishing long-term supply agreements with local agricultural businesses, we have secured a low-cost, carbon-neutral way of obtaining material. According to recent life cycle assessments, utilising local waste reduces transportation emissions by up to 60% compared to centralised plastic manufacturers (Enarevba & Hoopla, 2023). In our first year, we will focus on local production, minimising the risk of global supply chain disruptions - a critical factor for long-term survival in a majorly volatile global market.

Technical Niche Expansion

Whilst the initial market entry focuses on general protection, the 2-year strategy involves moving on to high-value niches. Research by Barta (2024) confirms that mycelium-based composites are inherently fire retardant and thermally conductive (0.038-0.044 W/mK), comparable to glass wool and EPS.

This allows MyceliaPack to change from low-margin shipping boxes to high-margin pharmaceutical packaging and building insulation panels (Manan et al., 2021; Stelzer et al., 2021). By diversifying our product application, we reduce the risk of becoming a single product company. The thermal buffering capabilities make the material attractive for a large majority of companies worldwide, including pharmaceuticals, which is a sector under major stress to eliminate single-use plastics whilst also maintaining strict temperature control.

Micro-Factory Franchising Model

To scale without prohibitive capital expenditure (CAPEX), which is typical in industrial manufacturing, MyceliaPack is going to adopt a distributed manufacturing model. Rather than have one large centralised factory, we are going to make use of “micro-factories”, located near the agricultural supplies mentioned earlier. This approach reduces the risk of contamination of the fungi by isolating growth batches and allowing for rapid scalability. By our second year, our goal is to license MyceliaPack’s growth recipe and modular mould technology with already existing packaging distributors. This strategy ensures financial longevity by moving the revenue model toward high-margin licensing rather than just physical product manufacturing.

Risk Mitigation

The main threat to longevity with mycelium is material consistency (Appels et al., 2019). Fungi are living organisms; changes in humidity or substrate quality, such as soil, can affect the final mould’s density. To help combat this, MyceliaPack will use the help of AI-driven monitoring systems in growth chambers (Vaneechoutte, 2025). This system uses sensors to help adjust CO₂ and moisture levels, helping ensure every batch meets ISO standards. By documenting the improvement process, MyceliaPack can build a proprietary database that serves as a defence against competitors, helping us secure our position in bio-fabricated materials.

Business Model Canvas



Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
Collaborations are essential for us to be able to scale and avoid high capital expenditure. Agricultural Waste Suppliers: Local farms will provide the raw feedstock required, helping reduce transportation emissions by up to 60% Bio-tech research labs: Partners that assist in refining material properties and verifying fire resistance Logistics Partners: Essential for testing the packaging under real world delivery conditions Packaging Distributors: Aimed for in Year 2 for licensing the technology to reach global market rapidly 	To maintain our competitive edge, we will focus on technical optimisation and market expansion Mycelium growth optimisation: Using AI driven monitoring to adjust CO2 and moisture for material consistency Custom mold design: Using 3D printing for rapid prototyping and custom packaging solutions B2B Sales & Marketing: Actively targeting high value niches like pharmaceuticals and building insulation Key Resources Our survival depends on proprietary technology and localised assets Proprietary fungal strains: Specific fungal strains optimised for density and fire resistance (Cerimi et al., 2019) Modular growth chambers: Mobile and AI monitored micro factories that will allow for scalable distributed manufacturing Design/Engineering team: Expertise required to develop 3D printed thermoforming molds and manage the AI systems 	MyceliaPack's core value lies in offering a high-performance and sustainable alternative to EPS Environmental Superiority: 100% Home compostable packaging, customers can dispose of packaging safely and responsibly without worrying about leaking toxins into the environment Performance: Superior fire & shock resistance over competitors Safety: The material is naturally fire-resistant, producing lower heat and smoke than EPS Regulatory compliance: MyceliaPack provides a solution to Plastic Tax, helping businesses navigate the EU's PPWR and the UK's pEPR regulations 	Relationships are built on transparency and long term partnership rather than just transactions Dedicated account management: Providing personalised service to large scale to clients Sustainability impact reporting: Selling impact data, such as CO2 certificates, to help clients meet Scope 3 emission targets Co-branding opportunities: Partnering with B-corp organisations to validate claims and enhance mutual brand value Channels MyceliaPack utilises a mix of direct sales and online presence to reach our B2B targets Direct to manufacturer (B2B): Direct sales teams will engage solely with other enterprises corporate procurement departments. Sustainability Trade Fairs: Using events to demonstrate our packaging's durability and sustainability claims to potential partners Industry 4.0 Digital Platforms: Making use of modern digital infrastructure for sales and customer engagement  	Our company targets high growth B2B sectors that sell fragile goods and face pressure to reduce their carbon footprint. Electronics Manufacturers: Global brands like Apple, Sony, Microsoft that require high absorption for delicate components High-end E-commerce: Companies that specialise in luxury goods, glass and cosmetics where brand image is tied to their use of sustainable packaging. Pharmaceutical Companies: A sector requiring strict temperature control and looking to lower or eliminate their use of single use plastics. 
Cost Structure			Revenue Streams	
MyceliaPack focuses on a low energy manufacturing model to remain viable Raw Material procurement: Cost of obtaining the materials needed for production of the mycelium packaging Labor for mold preparation: Payment to workers who help print and prepare the fungi for the mold R&D for material density: Payment to researchers and developers that help improve our product any way possible Utility costs: Significantly lower than EPS production because mycelium grows at ambient temperatures (20-25 degrees) without high pressure steam			Unit Sales: Direct revenue from selling standardised and custom model packaging for specific clients needs Design & Tooling Fees: One-time charges for 3D printing custom molds tailored to specific clients product lines Licensing: By Year 2, licensing the MyceliaPack growth system to existing agricultural cooperatives. They provide the waste and space, we provide fungal strains and quality control tech.	

Viability, Finance and Resources

The financial viability of MyceliaPack depends on our significantly lower energy overhead compared to traditional polymer manufacturers. Producing EPS requires high-pressure steam and fossil fuel inputs, whereas mycelium grows at ambient temperatures, approximately 20-25 degrees Celsius, in dark, low-energy environments. This passive manufacturing lowers utility costs by an estimated 40% (Enarebva and Haapala, 2023; Lopez-Nava et al., 2022).

Resource Allocation

The primary CAPEX is concentrated in the initial tooling, such as moulds, and substrate sterilisation equipment. To minimise waste and prioritise efficiency, MyceliaPack uses 3D-printed thermoforming moulds, allowing for rapid, low-cost prototyping for new clients.

Revenue and Burn Rate

In our first year, the venture will maintain a high B2B model. Whilst the unit cost of mycelium packaging remains approximately 15% higher than bulk-bought Styrofoam, the gap is bridged by the UK Plastic Packaging Tax and the pEPR fees (UK Parliament, 2026), which penalises plastic users.

- Break-even point: Projected around month 14, following the acquisition of three anchor clients in the electronics sector, this will help MyceliaPack maintain a consistent and steady revenue stream.
- Runway: Seed funding will be prioritised for automated environmental controls to reduce labour costs, which currently account for 30% of operating expenses.

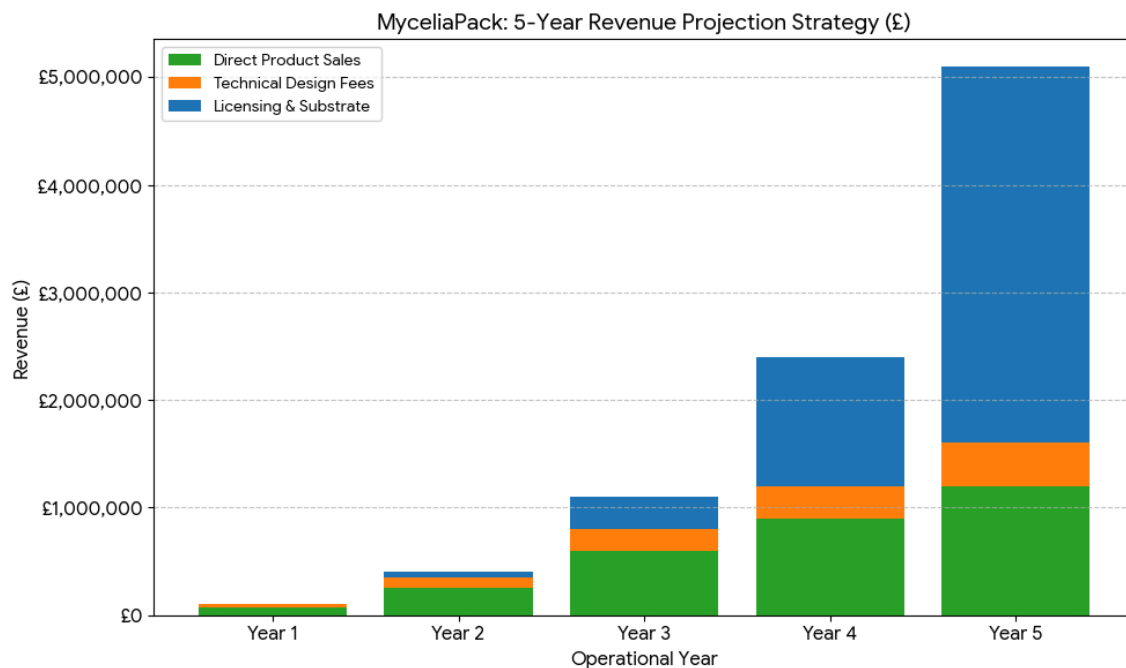
Future Viability

By our second year, viability will be sustained through diversification. By selling impact data (CO2 saving certificates) back to our clients, MyceliaPack can create a secondary revenue stream. This helps clients meet their Scope 3 emission targets, making MyceliaPack a vital partner in their corporate social responsibility strategy rather than just a disposable vendor.

Revenue Projection

As the visual below illustrates, MyceliaPack's financial trajectory is designed to mitigate the high cost of UK manufacturing by transitioning into a licensing model. The rapid growth in Years 4 and 5 is driven by the "micro-factory" licensing model, which allows for global expansion with minimal capital expenditure. By Year 5, the venture achieved a total revenue of £5.1 million, with 68% of that income being derived from high-margin licensing and substrate supply. This ensures long-term viability by dividing revenue growth from the need

for massive, centralised physical buildings in high-rent UK industrial zones.



Implementation and Learning Loop

To validate the viability of MyceliaPack, the first 12 months will follow a Lean Startup methodology centred on a “Build-Measure-Learn” feedback loop. This ensures that technical assumptions regarding mycelium performance are tested against real-world logistics stressors before scaling.

This makes it so that we don’t spend a large portion of our funding on production, only to have a flaw in our product, which is now being produced at a rapid rate. MyceliaPack must take into consideration real-world stressors. Since we test our products in labs, which are a perfect environment, we must make sure that our products are safe to ship off to our clients. We test areas such as physical stress, which could include being dropped by couriers, intense vibrations, or making sure it doesn’t break if heavy items are stacked on top of it. We also test environmental stress, such as sudden changes in temperature (being moved from a cold warehouse to a warm delivery vehicle) and humidity levels.

Phase 1

The testing will begin with a minimum viable product, such as a standard component for a high-end e-commerce partner. The main goal is to test for shock absorption and moisture resistance during delivery.

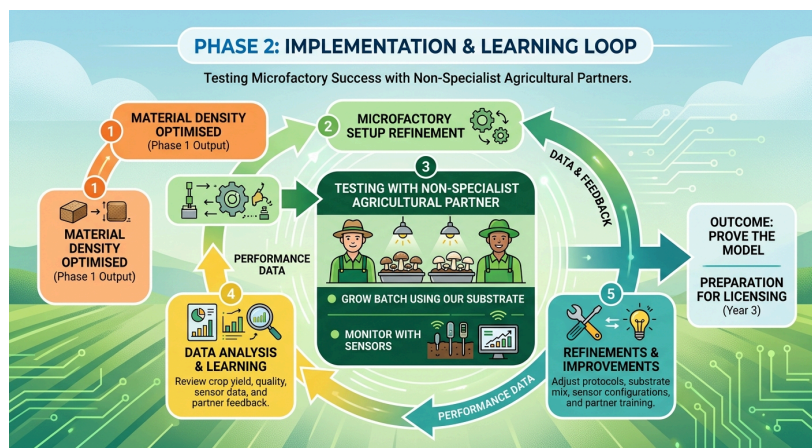
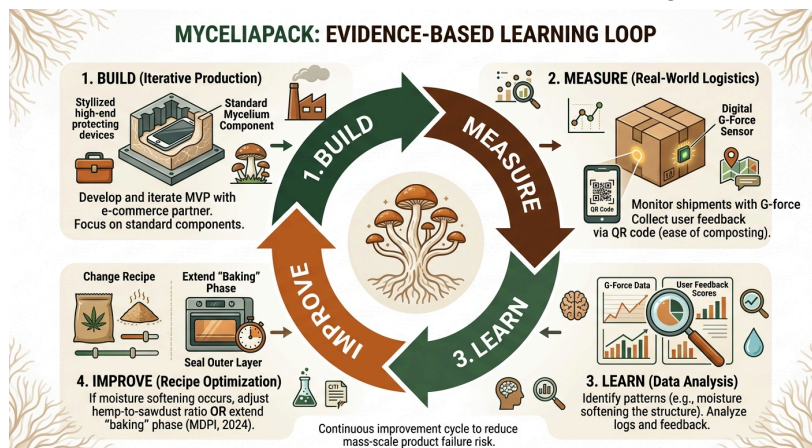
The Learning Loop

- **Measure:** Every shipment will include a digital sensor to record levels of G-force during transit. We will also collect data from users via QR codes on the packaging, specifically about the ease of at-home composting.
- **Learn:** If data indicates moisture softening the structure (a risk with bio-composites), we will change our growth recipe by adjusting our hemp-to-sawdust ratio or extending the “baking” phase to better seal the outer layer (MDPI, 2024; Elsacker et al., 2020)
- **Build:** We then repeat the production process for the next batch. This continuous evidence-based improvement cycle reduces the risk of mass-scale product failure.

Phase 2

Once the material density is successfully optimised for use, implementation shifts to refining the microfactory setup. We will test the ability of a non-specialist agricultural partner to successfully grow a batch using our substrate and monitoring sensors. Successfully closing this loop proves the model is ready for the licensing phase planned for Year 3.

Below is a visual of the implementation and learning loop:



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