Technik & Architektur
HSLU Lucerne University of Applied Sciences and Arts

Project Context 1

Review 2

$\text{My}_{\text{celium}}\text{Tent}$

The biodegradable tent

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Horw, 14th October 2024

Contents

1 Annotated research

1.1 Mycelium

1.1.1 What is mycelium

Research by Berner Nic

Mycelium is the underground root Network, created by the mushroom organism. Fungi nourish themselves by secreting digestive enzymes to break down organic material in their surrounding and absorb it through the cell walls of the Hyphen, the root network.

Moore, D., Ahmadjian, V., & Alexopoulos, C. J. (October, 2024). Fungus. Encyclopedia Britannica. https://www.britannica.com/science/fungus

1.1.2 Potential of mycelium

Research by Berner Nic

The potential of this material lies in the low carbon footprint, low energy and processing cost, biodegradability. The most common usecases in the industry so far is leather or composits used for building in the construction sector. Challenges are the lack of standardized treatment in the development of the material

Alaneme, K. K., Anaele, J. U., Oke, T. M., Kareem, S. A., Adediran, M., Ajibuwa, O. A., & Anabaranze, Y. O. (October, 2023). Mycelium based composites: A review of their bio-fabrication procedures, material properties and potential for green building and construction applications. Alexandria Engineering Journal, 83, 234–250. https://doi.org/https://doi.org/10.1016/j.aej.2023.10.012

1.1.3 Technical informations

Research by Frongillo Matteo

The potential of biodegradable materials based on fungal species combined with lignocellulosic residues is very high. The mechanical, physical and chemical properties of mycelium are extremely good, promising confidence for the future, which could see, as an environmentally friendly alternative to synthetic polymers, precisely mycelium-based materials.

Aiduang, W., Kumla, J., Srinuanpan, S., Thamjaree, W., Lumyong, S., & Suwannarach, N. (October, 2022). Mechanical, physical, and chemical properties of mycelium-based composites produced from various lignocellulosic residues and fungal species. Journal of Fungi, 8(11). https://doi.org/10.3390/jof8111125

1.1.4 The future of mycelium

Research by Frongillo Matteo

The current status of pure mycelium-based materials and its future prospects are a key focus for research on this material. Its versatile properties are a great strength, making mycelium the main rival to chemically produced materials.

Vandelook, S., Elsacker, E., Van Wylick, A., De Laet, L., & Peeters, E. (2021). Current state and future prospects of pure mycelium materials. Fungal Biology and Biotechnology, 8, Article 20. https://fungalbiolbiotech.biomedcentral.com/articles/10.1186/s40694-021-00128-1

1.2 Marketing

Research by Nyamdorj Narandavaa

The analysis of the marketing of camping tents and outdoor equipment is based on the use of strategies leveraged to reach and engage consumers globally, in Europe and Switzerland. Nowadays, the use of social media is a key focus for product promotion and customer loyalty through targeted advertising and influencers.

1.2.1 Worldwide

In 2022, the global camping tent market reached a total value of USD 2.65 billion. The future of this market is positive; in fact, it is set to grow further to USD 4 billion by 2028. This is possible due to the increase in outdoor recreation and nature tourism.

Expert Market Research. (October, 2023). Global camping tent market report and forecast 2023–2028. https://www.marketresearch.com/Expert-Market-Research-v4220/Global-Camping-Tent-Forecast-35387212/

1.2.2 In Europe

According to reported projections, by 2029 the European camping tent market will grow significantly, reaching a value of USD 1.50 billion. The analysis covers various product categories, materials, and capacities, highlighting the increasing demand for innovative and practical solutions in line with new camping trends.

Arizton Advisory & Intelligence. (May, 2024). Europe camping tents market - industry outlook and forecast 2024–2029. https://www.arizton.com/market-reports/camping-tent-market-europe

1.2.3 In Switzerland

The analysis of the camping tent market in Switzerland focuses on growth trends driven by increased outdoor activities and investment in sustainable materials. Changes in consumer preferences are also part of the analysis.

6Wresearch. (November, 2023). Switzerland camping tent market - industry outlook and forecast 2023–2030. https://www.6wresearch.com/industry-report/switzerland-camping-tent-market

1.2.4 Marketing strategies

Key marketing strategies for outdoor brands are analyzed based on their impact on their audiences. In fact, content posted on social media is strongly considered, facilitating one's visibility through influencers, who play a key role on product promotion and customer loyalty.

Michigan MITech News. (January, 2024). Most important strategies to market your outdoor brand effectively. https://mitechnews.com/guest-columns/most-important-strategies-to-market-your-outdoor-brand-effectively/

1.3 Structure

Research by Althaus Simon

Tent structures are the focus of this section, particularly those that offer practical and durable designs. Ease of set-up is also analyzed, providing an overview of suitable solutions for various usage needs.

1.3.1 Tent structure

The manufacturer Hilleberg produces tents in the high-quality and expedition sector. Hilleberg values the simplest possible handling, which is why it makes sense to look at the structures and set-ups they use.

Hilleberg. (n.d.). Products: Tents for 2 persons. https://hilleberg.com/deu/products/tents/2-person

1.3.2 Setup

A report on various tent structures, all of which promise to take little time to set up.

Outdoor Life. (May, 2024). The best instant tents of 2024, tested and reviewed. https://www.outdoorlife.com/gear/best-instant-tents/

1.4 Safety

In the construction industry, safety standards play a key role. Regulatory requirements ensure nationwide safety in the use of building materials and are a vital prerequisite for adapting new environmentally sustainable materials, whether for broader or more specific applications.

1.4.1 Mycelium safety

Research by Frongillo Matteo

The excellent properties of mycelium in terms of fire resistance, minimized smoke release and CO2 make the material a safer and environmentally friendly alternative to traditional building materials, as well as for construction.

Jones, M., Bhat, T., Huynh, T., Kandare, E., Yuen, R., Wang, C. H., & John, S. (May, 2018). Waste-derived low-cost mycelium composite construction materials with improved fire safety. Fire and Materials, 42(7), 816–825. https://doi.org/https://doi.org/10.1002/fam.2637

1.4.2 Tent safety

Research by Althaus Simon

The DIN EN ISO 5912:2020 standard provides information on safety requirements for tents, including mechanical performance and fire safety standards.

DIN Deutsches Institut für Normung e.V. (July, 2020). DIN EN ISO 5912 Camping tents – Requirements and test methods. https://www.din.de/en/getting-involved/standards-committees/nasport/publications/wdc-beuth:din21:316989855?destinationLanguage=&sourceLanguage=

1.5 Environment

Research by McCarthy Benjamin

The topic focuses on mycelium-bonded composites in the environmental context and analyzes their biodegradability and lifecycle properties.

1.5.1 Properties of mycelium-bound composites

This source compares different substrate and fungus combinations to test different properties of mycelium-bound composites. Some of the properties this source compares are growth conditions, water and moisture absorption as well as sound absorption. This study was presented at the International Conference on Bio-Based Building Materials, which is a conference for information exchange and discussions on research of bio-construction materials.

Amziane, S., Merta, I., & Page, J. (Eds.). (2023). Bio-based building materials: Proceedings of icbbm 2023. Springer

1.5.2 Biodegradation

This source demonstrates the biocycle for mycelium-bound composites (MBC) with the use of the fungus Pleurotus ostreatus grown on bamboo microfibers substrate. It shows that the MBCs can biodegrade in soil in as little as two months.

Gan, J. K., Soh, E., Saeidi, N., Javadian, A., Hebel, D. E., & Le Ferrand, H. (2022). Temporal characterization of biocycles of mycelium-bound composites made from bamboo and *Pleurotus ostreatus* for indoor usage. Scientific Reports, 12(1), 19362. https://doi.org/10.1038/s41598-022-24070-3

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Declarations

- *DeepL* has been used as a spell-checker;
  https://www.deepl.com/
- *ChatGPT 4o* has been used as the APA 7 citation corrector.
  https://chatgpt.com/