

IMPORTING CORK FOR INSULATION INTO MONTANA MANUFACTURING: PORTUGAL INTERNATIONAL BUSINESS PROJECT

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Abstract:

This work aims to contribute to internationalization of "Amorim Cork Composites" and improve the quality of life in Montana through better thermal and sound insulation. The project involves collaboration between the Polytechnic Institute of Gaia and the University of Montana, focusing on research and practical implementation. It consists of three parts: the project's scope, including literature review and methodology; an analysis of the state of the art of cork, its evolution, and market research in Montana; and the development and implementation process, highlighting motivations and compliance with requirements. The goal is to educate Montana's residents about cork's benefits and establish Amorim Cork Composites in the state, promoting sustainable and durable products for residential and industrial use.

Keywords: cork, internationalization, insulation, sustainability, durability, quality

IMPORTAÇÃO DE CORTIÇA PARA ISOLAMENTO NA INDÚSTRIA DE MONTANA: PORTUGAL INTERNATIONAL BUSINESS PROJECT

Resumo

Este trabalho visa contribuir para a internacionalização da "Amorim Cork Composites" e melhorar a qualidade de vida em Montana através de um melhor isolamento térmico e acústico. O projeto envolve a colaboração entre o Instituto Politécnico de Gaia e a Universidade de Montana, com foco na investigação e implementação prática. É composto por três partes: o âmbito do projeto, incluindo a revisão da literatura e da metodologia; uma análise do estado da arte da cortiça, a sua evolução e a pesquisa de mercado em Montana; e o processo de desenvolvimento e implementação, destacando as motivações e o cumprimento dos requisitos. O objetivo é educar os residentes de Montana sobre os benefícios da cortiça e estabelecer a Amorim Cork Composites no estado, promovendo produtos sustentáveis e duráveis para uso residencial e industrial.

Palavras-chave: cortiça, internacionalização, isolamento, sustentabilidade, durabilidade, qualidade

1. Introduction

In a future that demands more, product conformity is crucial for improving decision-making and organizational performance. Clear objectives and an efficient economy are needed to achieve positive results, based on quality standards, social responsibility, and environmental preservation. This work emphasizes the importance of planning in creating a business idea, particularly in a globalized world where sustainability is key.

The project focuses on applying learned concepts to create an international project for Amorim Cork Composites. The aim is to internationalize this significant Portuguese company, highlighting the benefits of cork.

The research involves the internationalization process of Amorim Cork Composites in Montana, gathering data on demographics, market trends, and economic comparisons. The goal is to demonstrate the superiority of cork products.

The cork business

Cork, from the cork oak tree, has been used for thousands of years. Portugal is the largest producer, transforming it into high-value products. Ecologically, cork maintains temperature and comfort, with diverse applications from aerospace to construction. Its properties include lightness, compressibility, resilience, impermeability, insulation, energy absorption, high friction, wear resistance, low thermal and sound conductivity, and durability. Cork, a 100% natural plant tissue, comes from the bark of the cork oak, Portugal's national tree since 2011. It can be harvested about 17 times over 200 years, every 25 years. Production is limited to the Western Mediterranean Basin.

Portugal is a leader in cork production and processing, represented by APCOR. The cork sector is strong in northern Portugal and includes preparation (CAE 16293), cork stopper manufacturing (CAE 16294), and other cork products (CAE 16295). Portugal leads in cork oak area (34%) and production (49.6%), followed by Spain and Morocco. Key companies include Corticeira Amorim and Oeneo.

Portuguese cork exports reached €1,232 million in 2023, with the trade balance exceeding €900 million for the third consecutive year. The USA is the second largest market after France. Cork stoppers are the main export product. Despite economic challenges, the sector remains optimistic, focusing on sustainability and technological development. Cork is used in construction, decoration, and insulation.

The main destinations for Portuguese cork exports are France (18.7%), the USA (17.1%), Spain (13.4%), Italy (10.1%), and Germany (7.4%), accounting for 66.7% of the total. Corticeira Amorim, founded in 1870, is the world's largest cork processing group, operating in over 100 countries. Amorim Cork Composites develops high-performance solutions for various industries, promoting sustainability and innovation. The company focuses on a circular economy, reusing by-products and ensuring sustainability.

Sustainability emphasizes economic viability, ecological responsibility, and social justice. Cork, a 100% recyclable product, supports the sustainability of cork oak forests, aiding hydrological regulation, soil protection, and carbon sequestration. Enhancing circular economy, Amorim Cork reuses by-products and converts surplus into biomass, covering over 60% of its energy needs, promoting efficient raw material use. In 2018, Corticeira Amorim aligned with UN SDGs, setting goals for 2030 focusing on transparency, environmental features, people's development, and R&D+I.

On the other and, Montana state offers tax credits, low-interest loans, and energy code compliance to promote energy efficiency and renewable energy systems. The Department of Environmental Quality supports energy conservation through various measures to help homeowners and businesses save energy and reduce costs.

Details of the Cork market: sector framework

As Portugal is one of the world's largest producers of cork and one of its largest processors, we decided to study this raw material, linking our research to the evaluation of the sector, its sustainability and the diversification of its products and services.

The cork sector is represented by APCOR (Portuguese Cork Association), whose objectives are to represent, promote, publicize and research the portuguese cork industry. This association is based in the north of Portugal, in Santa Maria de Lamas, in the municipality of Santa Maria da Feira, and has 238 member companies which account for 85% of the sector's exports. This is a sector with a strong presence in the north of the country, more precisely in Santa Maria de Feira, where the world's largest cork processing center is located, a center we visited on March 6 this year.

In the cork industry, the activity of preparing cork has the CAE code 16293, the manufacture of cork stoppers with CAE 16294 and the manufacture of other cork products identified with CAE 16295. It will be through these that we will carry out our analysis and later evaluation and, finally, our considerations for possible solutions for continuous improvement both in Portugal and in the state of Montana.

Industry Analysis

The cork oak, which is the tree from which cork is extracted, only occurs in this part of the world: Portugal has 34% of the world's cork oak area, followed by Spain with 27% and Morocco with 18%. In terms of total cork production, which is around 300 thousand tons per year, Portugal leads even more, with 49.6% of production, then Spain with 30.5%, Morocco with 5.8%, Algeria 4.9%, Tunisia 3.5%, Italy 3.1% and finally France with 2.6%.

Although France is a small cork producer, it is there that we find the 2nd largest cork product producer in the world (after our Corticeira Amorim), which is Oeneo, listed on Euronext Paris. These two large companies dominate the world market for cork products (especially cork stoppers), in a kind of duopoly.

International trade

Portuguese cork exports reached 1,232 million euros last year, an increase of around 2% compared to 2022, a “new record for the sector”, according to the Portuguese Cork Association (APCOR). The association also highlighted the balance of trade and the performance of sales to the USA, in a statement. “Portuguese cork exports reached an all-time high of 1,232 million euros in

2023, a new record for the sector, corresponding to growth of around 2% compared to 2022”, it said.

According to APCOR, “the trade balance exceeded 900 million euros for the 3rd consecutive year, reaching 938 million euros”, due to “a 4.2 times coverage rate of imports by exports”, which the association says is “a solid performance”, showing “the importance and competitiveness of the sector in the international market and the great added value”.

The association also pointed out that

“exports to the USA grew to 214 million euros, surpassing the 200 million barriers for the first time in history”. This market thus consolidated second place “in the hierarchy after France and ahead of Spain, Italy and Germany (...). It is for all these reasons that, despite the current economic climate, we face the future with optimism. In a strategic sector for the country, in the different dimensions of sustainability: environmental, economic and social, and to consolidate world leadership, it will be necessary to rapidly strengthen and activate international promotion programs, as well as continue the technological development of the sector,” concluded the secretary-general. (Observador, 2024)

This evolution in cork exports is due to the affirmation of the cork stopper product in the wine sector, which continues to be the closure of choice, and the manufacture of other cork-based products, particularly for construction, decoration, insulation, etc. which has become more important, with an increase in demand from abroad.

Amorim Cork Composites

Amorim Cork Composites aims to reinvent the world every day: reusing, recycling and reinventing entirely natural and organic materials.

Cork not used by the stopper industry is the raw material we use to develop a portfolio of materials intended for various industries – from construction, with thermo-acoustic solutions, home and office decoration, design and functional objects that bring cork closer to the end consumer, leading to the development of materials for high-tech industries.

The importance of the responsibility of contributing to the future today is, for Amorim Cork Composites, a central aim. Therefore, they incorporate various raw materials into their products

that seek to respond in an innovative way to the demands of competitive markets and achieve cutting-edge advances and processes that make unique products available to the end consumer.

Amorim Cork Composites researches, develops and produces high-performance cork composite solutions. Aimed at redesigning the world in a sustainable way, the company attributes new forms, uses and functionalities to cork in response to the biggest challenges. The result is a portfolio of products, applications and solutions for some of the most technological, disruptive and demanding activities on the globe, such as the aerospace, automotive, construction, energy, mobility, footwear, sports surfaces or interior design industries.

Founded in 1963 with the aim of taking advantage of the 70% of waste produced by the cork stopper industry, and then called Corticeira Amorim, Amorim Cork Composites would begin a successful story of Circular Economy, adopting the principles of reduction, reuse and recycling. Reinventing end-of-life materials, combining heterogeneous raw materials and employing innovative methods, formulas, and technologies. But always sublimating the unique premises of cork, the basic guarantee of superior performance of the final product.

2. Literature Review

The literature review in this project addresses a range of critical topics essential for market analysis and the strategic internationalization of businesses, particularly in the context of the cork industry. Below, the main themes are outlined individually, providing a structured perspective on the theoretical and practical foundations of this study.

Market Analysis

This section highlights tools and methodologies for evaluating competitive environments and understanding market dynamics. Key frameworks include:

- **SWOT Analysis:** A strategic planning tool that identifies strengths, weaknesses, opportunities, and threats, offering a comprehensive overview of an organization's positioning.
- **PESTEL Analysis:** Examines external macro-environmental factors such as political, economic, social, technological, environmental, and legal influences.
- **Porter's Five Forces Model:** Focuses on competitive forces, including supplier and buyer power, threats of substitutes, industry rivalry, and barriers to entry.

These methodologies provide a robust foundation for assessing opportunities and challenges in the cork industry's international market expansion.

Theories of International Trade

The review delves into foundational trade theories, including:

- **Mercantilism:** The earliest trade theory emphasizing the accumulation of wealth through exports and limited imports.
- **Theory of Comparative Advantage:** Proposed by David Ricardo, this theory suggests countries should specialize in producing goods with lower opportunity costs, enabling mutual benefits from trade.
- **Heckscher-Ohlin Model:** Argues that countries should export goods that intensively use their abundant production factors, such as labor or capital.

These theories provide essential insights into global trade mechanisms and their applicability to the cork industry.

Internationalization Strategies

The literature outlines several approaches for companies seeking to expand internationally:

- **Exporting:** The most common strategy, involving direct or indirect exports. Direct exporting grants more control, while indirect exporting leverages intermediaries.
- **Subsidiaries:** Establishing a physical presence in the target market, offering greater control but requiring significant investment.
- **Acquisitions:** Acquiring existing companies in the target market to mitigate risks and leverage local expertise.
- **Franchising and Joint Ventures:** Collaborative methods allowing shared risks and resources with local partners.

These strategies demonstrate the range of options available to businesses aiming to enter international markets effectively.

Motivations and Barriers to Internationalization

The review explores factors driving or hindering internationalization, categorized as:

- Proactive Motivations: Include market growth, risk diversification, and leveraging competitive advantages.
- Reactive Motivations: Driven by domestic market saturation or customer demands in foreign markets.
- Internal Barriers: Limited resources, innovation constraints, and managerial capacity.
- External Barriers: Political instability, legal complexities, and cultural differences.

Understanding these factors is crucial for businesses to navigate challenges and capitalize on international opportunities.

Sustainability in Internationalization

Sustainability emerges as a vital theme, with a focus on balancing economic, environmental, and social dimensions. The cork industry exemplifies a circular economy, emphasizing renewable, recyclable, and durable products. This alignment with sustainable practices positions the industry as a leader in meeting modern demands for eco-friendly construction and environmental stewardship.

3. Methodology

This project employed a mixed methodology, combining both qualitative and quantitative methods. Qualitative methods offer detailed descriptions of complex phenomena, while quantitative methods examine associations between variables that can be generalized to a population. Mixed methods research aims to generalize qualitative results, deepen the understanding of quantitative results, or corroborate findings.

Qualitative research focuses on understanding phenomena in their natural settings through methods such as interviews, observations, and case studies (Walia, 2015; Mohajan, 2018). For this project, qualitative data were gathered from reports, surveys, and meetings with sector associations to analyze the cork industry and its potential internationalization.

Quantitative research quantifies data to solve problems through statistical analysis (Machado, 2023). This project utilized data from reports, sector statistics, and economic data from

Montana to understand trends in the cork sector. The goal was to identify gaps in sound insulation, anti-vibration, and acoustic insulation in Montana's buildings.

4. Discussion

Montana's economy in 2023 had a population of 1,155,097, growing at 1.7% annually, and a Gross State Product (GSP) of \$50.7 billion. Employment stood at 538,653 people, also growing at 1.7% annually, with the top sectors being Real Estate, Healthcare, and Professional Services. In construction and building trends, non-residential construction was valued at \$1.5 billion, and residential construction at \$22.6 million, with 2,035 building permits issued in 2023. Regarding housing, 69% of housing units were owner-occupied in 2022, slightly down from 69.1% in 2021, and the largest share of households paid over \$3,000 in property taxes.

When comparing Montana to Portugal, Montana covers an area of 381,154 km², while Portugal spans 92,391 km². Montana has a low population density, characterized by vast grazing lands and scattered human habitation.

Table1. *Economic & social indicators for Montana and Billings*

Category	Billings, Montana	Montana, USA
Population	120,864	1,132,812
Owner-occupied Housing Units	64.8%	69%
Average Monthly Costs (with Mortgage)	\$1,601	\$1,660
Average Monthly Costs (no Mortgage)	\$571	\$519
Average Gross Rent	\$1,064	\$974
Number of Families	49,228	443,917
Average People per Household	2.32	2.39
Secondary/Tertiary Education (>25 years)	95.7%	94.5%
Bachelor's Degree or Higher (>25 years)	37.2%	34%
Median Household Income	\$69,692	\$66,341
Per Capita Income (last 12 months)	\$40,679	\$37,837
People in Poverty	11.1%	12.1%
Total Employment	-	380,268
Population per Square Mile	2,615.3	7.4
Land Area in Square Miles	44.78	145,550.36

Source: elaborated by authors

Cork is a material with unique characteristics and great potential in terms of sustainability and reuse economy. Portugal is one of the largest producers and exporters of cork, with the USA being one of the main markets. The demand for cork used in new products is growing, especially to

improve environmental sustainability. The construction sector consumes many resources and energy, impacting the environment. This project highlights cork as a viable and sustainable material for construction, with various applications. Life Cycle Assessment (LCA) is used to measure the environmental impact of cork compared to other materials, showing its environmental viability. The main limitations include language barriers, resistance to data dissemination in Montana, and difficulties in collecting information on the use of cork in construction due to its novelty in the sector. It is recommended to conduct sensitivity and uncertainty analyses, study the long-term behaviour of materials, and explore strategic partners in Montana. Future studies could include other insulation materials and evaluate life cycle costs to economically compare cork with alternative materials.

The manufacturing process at Amorim Cork Insulation involves several steps. First, cork is harvested from cork oak trees every nine years without damaging them, and the harvested cork is sorted by quality. Next, the cork is ground into granules and classified by size. The granules are then heated in autoclaves, expanding and binding together to form expanded agglomerate, which is molded into blocks or slabs. These blocks or slabs are cut to the required dimensions, and surfaces may be treated or coated. If applicable, coatings are applied to enhance properties like waterproofing or fire resistance, and cork may be laminated with other materials. Each batch undergoes rigorous quality control, including physical and thermal property tests to ensure insulation effectiveness. Finally, the finished products are packaged for protection and transport and distributed to markets and customers.

Different types of products and applications include expanded insulation corkboard for thermal, acoustic, and anti-vibration insulation for walls, roofs, floors, and more; MDFACADE for high-performance exterior wall cladding, interior walls, and ceilings; LAMBOURDE for low thickness insulation solutions for floors and walls, ensuring excellent thermal and acoustic insulation; Corkoco for acoustic insulation for ceilings, walls, and floors using cork and coconut; expanded cork granules for lightweight filling with acoustic insulation properties for screeds, flooring, and cavity walls; and Corksorb for absorbents for hydrocarbons, oils, solvents, and organic compounds, excellent for water environments. Images and detailed product descriptions are available on the official Amorim Cork Insulation website.

Import and export regulations in Montana are primarily governed by federal guidelines, with state-level support. Key federal entities include U.S. Customs and Border Protection (CBP) for customs control, the Bureau of Industry and Security (BIS) for overseeing technology exports, the Food and Drug Administration (FDA) for regulating food, medicines, and medical devices, the U.S.

Department of Agriculture (USDA) for controlling agricultural imports, and the Environmental Protection Agency (EPA) for managing chemical imports/exports. The Montana Department of Commerce supports companies with import/export processes, which may require specific licenses and compliance with tariffs and duties. The Export Administration Regulations (EAR) govern dual-use items and less-sensitive military items, with the BIS ensuring compliance through site visits and end-use checks (EUCs).

Montana's tax code includes an individual income tax ranging from 4.70% to 5.90%, a corporate income tax of 6.75%, no sales tax, a property tax of 0.69% on owner-occupied housing, a gas tax of 33.75 cents per gallon, and a cigarette excise tax of \$1.70 per pack. Montana's exports in 2023 amounted to \$2.2 billion, supporting 10,000 jobs. The top export markets are Canada, South Korea, Japan, China, and Belgium. Manufacturing exports total \$1.3 billion, with chemicals as the largest category, while agricultural exports total \$1.5 billion, with wheat and beef as top products. Foreign investment supports 9,800 jobs in Montana, with major metropolitan areas like Billings, Missoula, and Great Falls contributing significantly to goods exports.

5. Conclusions

Cork is an increasingly popular material due to its unique characteristics and its strong potential for sustainability and reuse in various industries. As an eco-efficient natural product with an infinite lifecycle, cork can be recycled and reused, provided it is disposed of properly. This requires active participation from consumers to ensure it is reintegrated into new production cycles. Portugal, one of the largest producers and exporters of cork in the world, plays a significant role in this global trend, with the USA emerging as a key recipient of this material in recent years.

Cork's natural properties—such as its lightness, flexibility, fire resistance, soundproofing, thermal insulation, and vibration dampening qualities—make it an exceptional choice for a wide range of applications. These qualities make it particularly relevant in industries like construction, where sustainability is becoming a central focus. In the USA, there has been a growing demand for recycled and reused cork to incorporate into new products, particularly within the residential sector, as companies aim to make their products more eco-friendly and reduce their environmental impact.

One of the most compelling opportunities for cork is its potential application in Montana, a state known for its extreme temperature variations. The insulation properties of cork make it an ideal solution for enhancing energy efficiency in homes and buildings located in such temperature-

diverse environments. By improving the thermal and sound insulation of buildings, cork has the ability to provide long-term benefits in terms of comfort, energy conservation, and reduced environmental impact.

This project has not only showcased the immense potential of cork but has also opened a unique market opportunity in Montana, where sustainable construction practices are gaining traction. As one of the few materials that combine environmental friendliness with exceptional physical properties, cork presents an attractive alternative to traditional insulation materials. The growing emphasis on sustainable building materials, particularly in regions with extreme climates, presents a timely opportunity to integrate cork into the construction sector, positioning it as a future-forward material for energy-efficient, environmentally responsible building solutions.

The project's success has been fuelled by international collaboration, particularly through a study trip to the United States, which provided valuable insights into American culture and market dynamics. Visiting companies like Corticeira Amorim, a global leader in cork production, further deepened understanding of the art of cork and its broad potential across industries. This experience not only broadened perspectives but also solidified the relevance of cork in sustainable construction practices.

However, several challenges were encountered, including language barriers, resistance to sharing data in Montana, and a lack of extensive information on cork's use in construction. Despite these challenges, the project has highlighted the significant advantages cork offers as a building material and underscored its potential to disrupt the traditional construction market, particularly in areas like Montana where energy-efficient solutions are essential.

Moving forward, further research is needed to refine the application of cork in construction. Future studies could involve sensitivity and uncertainty analyses to validate the environmental benefits of cork. Additional exploration into its long-term life cycle, alongside a comparison with other building materials, could provide valuable data for broader adoption. Furthermore, a cost analysis of the life cycle of cork versus other materials could strengthen the case for cork as an economically viable and sustainable choice for construction. The project also suggests exploring potential strategic partnerships in Montana to expand the use of cork in the local construction market, further solidifying its place as a sustainable building material for the future.

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