

A work project, presented as part of the requirements for the award of an Executive Master's degree in Innovation and Entrepreneurship, from the Nova School of Business and Economics.

ASSESSING THE FEASIBILITY OF A SEARCH FUND IN THE NATURAL STONE  
INDUSTRY IN PORTUGAL

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## **Abstract**

This collaborative thesis examines the feasibility of a Search Fund (SF) in Portugal's ornamental stone (OS) industry. It starts with an individual literature review of (i). industry 4.0's challenges, opportunities, and companies' progress; (ii). the Industrial Design as a leveraging factor; (iii). the OS technology evolution and its inherent possibilities; and (iv). the SF concept and what metrics to use. Group research validated the possible use of a SF and 25 companies were short-listed. An investment memorandum is crafted to attract funding, while a detailed business model outlines modernization and growth strategies. This research offers a roadmap for investors and entrepreneurs to revitalize the OS industry.

**Keywords:** Natural Stone; Ornamental Stone; Portugal; SME; Search Fund; Industry 4.0; Business Opportunities; Industrial Design; Business Models; Stone Technology; Digital Transformation; Succession; Acquisitions.

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## Abbreviations Index

|                       |                                                                |
|-----------------------|----------------------------------------------------------------|
| <b>APS</b>            | Advanced Planning and Scheduling                               |
| <b>AR</b>             | Augmented Reality                                              |
| <b>ATC</b>            | Average Total Cost                                             |
| <b>AVG</b>            | Average                                                        |
| <b>B2B</b>            | Business to Business                                           |
| <b>BI</b>             | Business Intelligence                                          |
| <b>BIM</b>            | Building Information Modelling                                 |
| <b>BM</b>             | Business Model                                                 |
| <b>BMC</b>            | Business Model Canvas                                          |
| <b>BPM</b>            | Business Process Management                                    |
| <b>CAC</b>            | Customer Acquisition Cost                                      |
| <b>CAD</b>            | Computer-Aided Design                                          |
| <b>CAE</b>            | Classificação das Atividades Económicas                        |
| <b>CAGR</b>           | Compound Annual Growth Rate                                    |
| <b>CAM</b>            | Computer-aided manufacturing                                   |
| <b>Capex</b>          | Capital Expenditure                                            |
| <b>CENFIM</b>         | Professional Training Centre                                   |
| <b>CEO</b>            | Chief Executive Officer                                        |
| <b>CFO</b>            | Chief Financial Officer                                        |
| <b>CNC</b>            | Computer Numerical Control                                     |
| <b>CO<sub>2</sub></b> | Carbon Dioxide                                                 |
| <b>COO</b>            | Chief Operation Office                                         |
| <b>CRM</b>            | Customer Relation Manager                                      |
| <b>CTO</b>            | Chief Technology Officer                                       |
| <b>EA</b>             | Entrepreneurship Through Acquisition                           |
| <b>EBITDA</b>         | Earnings Before Interest, Taxes, Depreciation and Amortization |
| <b>EC</b>             | European Commission                                            |
| <b>ERP</b>            | Enterprise Resource Planning                                   |
| <b>ESG</b>            | Environmental, Society and Governance                          |
| <b>ETA</b>            | Entrepreneurship Through Acquisition                           |
| <b>ExCom</b>          | Executive Committee                                            |
| <b>GDP</b>            | Gross Domestic Product                                         |

|                      |                                                       |
|----------------------|-------------------------------------------------------|
| <b>GPS</b>           | Global Positioning System                             |
| <b>I4.0</b>          | Industry 4.0                                          |
| <b>IOI</b>           | Indication of Interest                                |
| <b>IoT</b>           | Internet of Things                                    |
| <b>IP</b>            | Intellectual Property                                 |
| <b>IRR</b>           | Internal Rate of Return                               |
| <b>HGF</b>           | High Growth Firm                                      |
| <b>KPI</b>           | Key Performance Indicator                             |
| <b>LOI</b>           | Letter of Intent                                      |
| <b>M&amp;A</b>       | Mergers and Acquisitions                              |
| <b>MES</b>           | Manufacturing Execution System                        |
| <b>MVP</b>           | Minimum Viable Product                                |
| <b>NACE</b>          | Nomenclature of Economic Activities                   |
| <b>NS</b>            | Natural Stone                                         |
| <b>OECD</b>          | Organization for Economic Cooperation and Development |
| <b>OS</b>            | Ornamental Stone                                      |
| <b>PLM</b>           | Product Lifecycle Management                          |
| <b>PPM</b>           | Private Placement Memorandum                          |
| <b>PPT</b>           | People, Processes and Technology                      |
| <b>PRR</b>           | Recovery and Resilience Plan                          |
| <b>PY</b>            | Previous Year                                         |
| <b>R&amp;D&amp;I</b> | Research, Development, and Innovation                 |
| <b>RFID</b>          | Radio Frequency Identification                        |
| <b>ROA</b>           | Return on Assets                                      |
| <b>ROI</b>           | Return on Investment                                  |
| <b>ROS</b>           | Return on Sales                                       |
| <b>RRP</b>           | Recovery and Resilience Plan                          |
| <b>SDG</b>           | Sustainable Development Goals                         |
| <b>SF</b>            | Search Fund                                           |
| <b>SME</b>           | Small and Medium Enterprise                           |
| <b>SWOT</b>          | Strengths, Weaknesses, Opportunities and Threats      |
| <b>YTD</b>           | Year to Date                                          |
| <b>WACC</b>          | Weighted Average Cost of Capital                      |
| <b>WMS</b>           | Warehouse Management System                           |

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## Introduction

Wood and stone were the first materials to be used as shelters and continue to be one of the most durable, recyclable, and sustainable materials used by humankind. The use of Portuguese stone out of its origin can be traced back to the Romans that used marble from Estremoz as architectural and decorative materials in temples in Merida (18 B.C) (Casal Moura et al. 2007). In the XV century, with the discoveries, the use of Portuguese marble and limestone was spread to Africa, India, and Brazil to build monuments, symbolizing the power and richness of the country.

In 2020, global ornamental stone (OS) quarrying reached a record 318 million tons, marking a 40% increase from 2010. However, the trend has recently stabilized over the past five years due to factors such as the pandemic-induced construction slowdown and heightened ESG policies surrounding quarrying, (Carlo Montani 2021). OS is expected *“to be valued at \$60,367.30 million by 2030, surging from \$35,998.50 million in 2021, a CAGR of 5.0%”* (Research Dive, 2022).

With a long history of quarrying and processing natural stone, exports valued 493M€ in 2022 (Assimagra 2021b) and a growth +13,3% in comparison with the previous year, Portuguese OS Sector is well-positioned to continue to grow, leveraging on the rising of global affinity for natural stone in interior design, the escalating need for eco-friendly construction materials, and the emergence of advanced quarrying and processing technologies. These avenues for expansion maybe limited by some hurdles that persist, including a notably fragmented market, 98% comprising small-scale firms (#1855), yielding an EBITDA under 1M€ and fewer than 10 employees. Additional challenges involve suboptimal managerial skills, modest digital proficiency, minimal R&D, and limited customer service capabilities.

In summary, the OS Portuguese Industry has big opportunities which also come with big challenges, and this brings us to our research question for this thesis: **Can a Search Fund**

**effectively acquire and transform an OS company by aligning with market trends, enhancing customer value, and scaling for increased profitability, paving the way to elevate the Portuguese stone industry's global relevance?**

This thesis is divided in four parts: Introduction, Literature Review, Research and Conclusions. The Literature Review involved individual contributions while the remaining parts represent collaborative efforts. The **thesis objectives are the following:**

- Analyse Portugal's Natural Stone (NS) extraction and transformation markets, studying its dynamics, challenges, and potential business prospects;
- Investigate the feasibility of utilizing Search Funds for acquiring and expediting the industry transition within the Natural Stone sector, pinpointing the suitable company profiles for acquisition;
- Explore what business model could make it work to scale.

This document focuses on the individual contribution about the importance of industrial design in the stone industry. This part is articulated about a wider concept in order to arrive to specifics to the stone industry, highlighting its importance as a key success factor for a SF taking over an existing traditional industry. Up to date the Portuguese stone industry is old fashion and enveloped into a basic craftsmanship universe. Industrial Design rises the challenge of putting the Portuguese marble industry in the map of the most glamorous designs in the world.

## **Section A. The importance of the Industrial Design in Stone Industry<sup>1</sup>**

### **A.1 What is Industrial Design?**

Industrial design is a creative process that consists of developing manufactured products, devices, and services for millions of users with particular attention to their function and usability. Industrial designers investigate the possible uses of a specific product, then work with other professionals, including engineers and marketers to create the necessary concepts and designs that will suit the taste of hedonist consumers or followers of a trend/fashion expressed by opinion leaders, (Barré-Despond A. 1996).

Industrial designers can specialize in a product category, among those most associated with this discipline: automobiles, furniture or household appliances. The creative is interested in all aspects of a product, from its functionality to its manufacturing possibilities, including its ability to meet the needs and expectations of the target consumer.

### **A.2 How is it done?**

The industrial designer designs the appearance of industrial objects, mass-produced. Working for a company, a design agency or on his own account, most of his work consists of careful thought to imagine the perfect shape of the object.

Whatever the mission entrusted to them, industrial designers must approach projects by respecting very precise steps and using increasingly powerful tools that assist them in their tasks. Among this panoply of aid to creation we find systematically:

1. The product study or the Minimum Viable Product (MVP);
2. Making sketches or creating drafts from different ideas;

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<sup>1</sup> Section done by Filipe Souto, Individual Contribution



3. The use of 3D software to create renderings of various designs to determine if a design is feasible in terms of safety, mass, stable weight, appearance, and function of the product.
4. Consultation with specialists to choose materials, calculate production costs and determine manufacturing constraints.
5. Presentation of designs and prototypes to customers for approval using 3D printing and augmented reality (AR).
6. The use of problem-solving methods to create a quality product for real consumers.

### **A.3 Industrial Design origins and evolution**

The history of design merges with history. From the origins of the Industrial Revolution (1760 to 1840) to contemporary design, here is a brief illustrated chronology, (Raymond Guidot 2004).

Industrial design takes its first steps in England and continental Europe, especially in Germany and Scandinavia. In England, William Morris founded a school of arts and crafts in design and "production" that was anti-industrial, while Henry Cole advocated the introduction of art into industry. In 1837, a school of design was founded, which was later called the Royal College of Art. In 1849, the Journal of Design appeared for the first time. In 1851, the Great Exhibition opened in London. In Germany, the path is almost similar. In 1907, industrialists, businesspeople, artists, and architects came together to form the Deutscher Werkbund. Their manifesto protests the ugliness of today's architecture and demands the revival of an artistic, moral, and social ethic in the industry. Their philosophy would eventually give rise to the Bauhaus, a design school that influenced the development of contemporary industrial design in Europe and elsewhere. In Scandinavia, particularly Denmark and Sweden, industrial design adopts a very cultural and democratic attitude, advocating the use of natural materials and

organic forms, mainly in furniture and household items. All these objects have a homogeneous style, which will take the name of "Scandinavian modernism", (Gary Laski 2011).

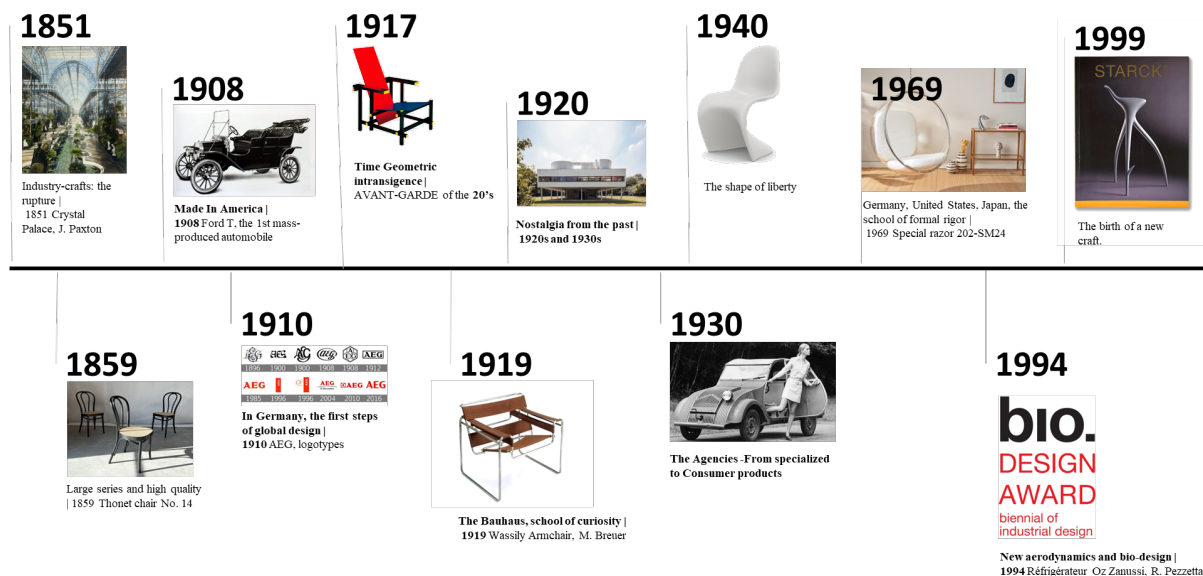


Figure 1 Industrial design from its birth to today

## Serial production

With mechanized production, the XVIII century, begins a new story of the human creativity written by industrialists and not only by artisans and artists. From the steam engine to the first skyscrapers, Industrial Design will be based on technological innovation and precise manufacturing in series, (Noblet Jocelyn de 1974).

### Industry-crafts: the rupture | 1851 Crystal Palace, J. Paxton

Designed by Joseph Paxton for the 1851 London World's Fair, the Crystal Palace was built in a **record time** of eight months from **standardized**, factory-prefabricated modular units. The building is gigantic: 563 meters long and 263 meters wide, for a surface of 70,000 m<sup>2</sup>. At 36 meters high, it has 3,300 cast iron columns, 2,224 beams and 300,000 glass elements. This hymn to the glory of the new industrial society met with very strong opposition from the critic and art historian John Ruskin, relayed, a few years later, by the Arts and Crafts movement, of which William Morris was one of the leading figures. The debate thus opened between the

proponents of technology and industry and those who defend a historicist line, and the beauty of the single object would continue throughout the twentieth century and to the present day.

**Large series and high quality | 1859** Thonet chair No. 14, 8 screws, 5 bentwood elements

At the end of the nineteenth century, industrial production took over all areas of everyday life, from buildings to everyday objects. With his bentwood furniture, built from components easily assembled by screwing, the Austrian Michael Thonet demonstrates that **series production can combine quantity** (50 million copies of the Bistrot chair sold between 1859 and 1930) and formal **quality**. This design icon is still produced and edited as original or replicas by numerous companies in the world.

**Made In America | 1908** Ford T, the 1<sup>st</sup> mass-produced automobile.

Born with the industrial revolution, free from any historical reference, the United States offers an ideal framework for the rise of large-scale mechanization. In 1908, Henry Ford, seduced by the efficiency of the devices that equip the slaughterhouses of Chicago, has the idea of mechanizing the manufacture of the Model T, the first economical motor car, manufactured to 15 million copies from 1909 to 1926. Ford applied the principles of scientific organization of work developed by Taylor to develop the production line.

**In Germany, the first steps of global design | 1910** AEG, logotypes

The collaboration between architect Peter Behrens and the electromechanical company AEG gives rise to the first great example of "global design". Behrens is involved in the design of the products, redesigns the logotype, designs the letterheads, advertising posters, packaging, and even imagines the new buildings of the Berlin factory of AEG and the cities in which the workers are housed.

**Time Geometric intransigence | AVANT-GARDE of the 20's**

In the effervescence of the 1920s, movements inherited from Cubism and Futurism – constructivism, Russian suprematism, Dutch De Stijl movement – were born, which would

mark the entire twentieth century with their audacity. Throughout Europe, these artistic avant-gardes combine theoretical research and confrontation with reality.

### **The Bauhaus, school of curiosity | 1919 Wassily Armchair, M. Breuer**

Born in a defeated and impoverished Germany, the Bauhaus, at its beginnings, was not, for obvious economic reasons, turned towards mass production. Its founder, Walter Gropius, wants above all to train creators capable of designing everything that, apart from the building, concerns the production of the environment. The approach is based on a fundamental course, the development and teaching of which are entrusted to visual artists from avant-garde trends. It was not until 1925, with the adjustment of the war debt and the arrival of American capital, that the Bauhaus was able to move towards industrial production. With furniture with tubular structure by Marcel Breuer, it was then recognized as a high place of innovation. In 1933, the Nazis closed the school.

### **Nostalgia from the past | 1920s and 1930s**

From Europe to America, the interwar period oscillates between technological passion and nostalgia. In France, the flourishing of Art Deco was matched by the Union of Modern Artists, which was part of the Modern Movement. In Finland, Alvar Aalto reconciles artisanry and rationalist functionalism. In Germany, the avant-garde that flourished at the dawn of the 1920s became "degenerate" with the advent of Nazism. Albert Speer's ancient references to urban planning coincide with the birth of a futuristic design car, the famous Volkswagen "Beetle".

In France, all those who thought that modernity and the need for wide dissemination required an intelligent and rational use of materials and the means of industry gathered in 1929 within the Union of Modern Artists (UAM). The modernist movement, where Le Corbusier is one of the spokespeople and which promotes a rationalist way of thinking, takes off. But few within the UAM, like Jean Prouvé, go all the way to the end of the reflection on series production,

adopting metal as the basic material of a house and imagining that it could be manufactured as one manufactures a car.

### **The Agencies - From specialized to Consumer products**

The first major industrial design agencies are born. They offer the public everyday objects inspired by the aerodynamic shapes of the latest technological marvels – cars, trains, boats, planes. This is the streamline, whose fluid and smooth lines coincide with the generalization of techniques for stamping sheet steel and the "shell" casting of aluminium alloys or synthetic materials, such as Bakelite.

### **Sober and functional, a design for the masses | 1936 "*Beetle*" Volkswagen, F. Porsche**

On the eve of the Second World War, it was time to restore order, both in countries under dictatorship and in democratic countries. Anything that refers to the Modern Movement is suspect, even accused of degeneration. Everywhere in Europe, people are more concerned with offering the working masses an economical car: in Germany, Ferdinand Porsche designs the Volkswagen "Beetle", in Italy, the Fiat 500 is launched,

### **The shape of liberty**

The post-war period opened new avenues for experimentation and action for designers. Materials, technologies, consumption habits: everything changes, and everyday objects gradually become cultural products, (Adamson 2015).

### **1945 *Nylon*, new material**

The war of 1939-1945 was also a technological war, which gave considerable impetus to innovation, particularly in the field of materials. Germany has a head start in this field with the Buna-S, a remarkably strong artificial rubber developed by IG Farben, capable of replacing natural rubber from Asia, whose supply is cut off. In the United States, DuPont triumphed with Nylon, a synthetic silk used for both women's lingerie and manufacturing.

### **Flexible form and synthetic material: the meeting of two new concepts | 1959 Panton chair**

Other synthetic materials that benefited from the war effort: polystyrene, polyvinyl chloride, polymethyl methacrylate (Plexiglas), polyethylene, polyester reinforced with fiberglass, polyurethane. Some designers were seizing the new possibilities offered by these materials. It's the case of Charles Eames and Eero Saarinen. For their respective clients, Hermann Miller and Knoll, they designed shell seats based on polyester reinforced with glass fibres, following up on their winning project at the MoMA's 1940 Organic Design for Home Furnishing competition.

Streamline and free forms, thanks to the possibilities offered by new materials and new manufacturing techniques. Thus, at the end of the 1950s, the Danish Verner Panton took up the idea of the Zig-Zag seat imagined before the war by Rietveld.

While the consumer society is radically questioned, it is marginality, musical, sartorial, artistic, that sets the tone. This nonconformism is expressed in the search for a new comfort, with low furniture, flush with the ground. Italian designers Piero Gatti, Cesare Paolini and Franco Teodoro imagined for Zanotta the Sacco, a Skai pocket filled with expanded polystyrene beads, which takes the shape of the body when you sit on it.

### **From 1970 until today**

Industrial design does not escape a generalized questioning of the perverse effects of industrial society. Against cold formalism, postmodernity brings forgotten values back to the forefront: historicism, regionalism, symbolic or even sacred universe.

**Germany, United States, Japan, the school of formal rigor** | 1969 Special razor 202-SM24 Braun, D. Rams and H. Fisher

Founded in 1955 in Germany, the Ulm school takes up and exceeds the ambitions of Bauhaus teaching, developing rationalist thinking, which finds its application, for example, in the collaboration between Hans Gugelot, a teacher at the school, and the Braun firm. "Neutral scientific collaborator" and "critical coordinator".

## **Le design contre le design | 1981 Bibliothèque Carlton, E. Sottsass**

After the great rupture of the 1960s begins the era of postmodernity. Against a backdrop of alternative energies, recycling, self-construction, the protest denounces the functionalism of industrial design, which appears as an alibi intended above all to sell the product. We then see the emergence, especially in Italy, of protest approaches: anti functionalism, anti-design, the Ulmian designer seeks to give the serial object a role of essential actor of industrial civilization. We find this functionalist approach in the United States, in the program launched by IBM around the Ramac 305 computer, for example, but also in Japan, where Sony is imposing itself on the international market thanks to devices of high technical quality, great simplicity of line and reduced volume. It is the school of formal rigour, (Bayley 1985).

### **The birth of a new craft**

In France, eclecticism dominated: while Garouste and Bonetti evolved towards neo-baroque, Philippe Starck, who becomes a leader, develops a global approach, turned towards industrialized production. It embraces all aspects of design (product, graphics), but also interior architecture and even architecture, ('Leymarie C., Forms to Consume: Thoughts and Practices of Industrial Design in France (1945-1980), Doctoral Thesis in History, École Des Hautes Études En Sciences Sociales, 2010—).

Mendini, Studio Alchimia develops a discourse on the banal object and its redesign, a personalization through decoration that borrows the avant-garde research of the visual artists of the beginning of the century. As for the Memphis group, founded around the strong personality by Ettore Sottsass and made up of designers from all over the world, it pursues a path that will make a school, with objects and furniture with simple shapes, bold polychromies.

The "new design" embarks on research such as that which combines artisanal production and industrial mass production. Thus, the French Élisabeth Garouste and Mattia Bonetti imagine

the Rocher table, composed of a triangular tray in enamelled steel sheet, perfectly industrially feasible, stuck by its three summits in three rocks left raw which constitute the base.

#### **New aerodynamics and bio-design | 1994 Réfrigérateur Oz Zanussi, R. Pezzetta**

Revived by the conquest of space, a new aerodynamics is born. It is the return of curved lines in automotive design, with the Ford Sierra, in 1982, or the Vesta, an experimental model of Renault, or with the streamlined fairing of Honda and Suzuki motorcycles. The phenomenon also affected the new high-speed trains: the TGV Atlantique designed by Roger Tallon found the breath of American design in its heroic period of the late 1930s. This research on the curve also led to "bio-design" whose fluid forms imposed themselves in the automotive industry and spread, with the work of Luigi Colani, cameras (Canon) and little by little all the objects of domestic life.

#### **Today's Trends**

With the generalization of CAD and CAD/CAM tools, new perspectives are opened for designers. The progressive dematerialization of objects may suggest that tomorrow, more than matter, it will be a question of implementing today's trends.

#### **A.4 What are the customers looking for when buying a stone product?**

Customer success, CRMs, user experience, customer service... those 4 terms are now a must for any successful enterprise strategy. With the era of digitalization customer satisfaction is now the main driver for exponential growth for innovative companies wanting to become leader in their sector and impose innovative designs marking trends for decades. The long-time unique criterion of QUALITY is now complemented by 4 new and essential concepts: customization, door to door delivery, consulting services, industrial design (or a hybrid so called "creative process" merging industry and art into a single very representative piece or creation) around a product or a specific service. But before going further let's talk a little bit about China: the new worldwide economic superpower which has now become the factory of the world (even for



typical European products handcrafted traditionally in Europe such as marble) able to clone the best designs but not only: the smart Chinese companies are now in the front row of innovative market approach applying all occidental tricks to make their customer more and more happy. So, we occidentals, and more precisely the Natural Stone Portuguese companies what role are we aiming to play in this big game of fast and furious conglomerates: compete using big investments funds, use public investment, buy a company using the search fund mechanism, buy more machines, educate our craftsman's ...?

All those strategies are right, can lead to substantial quick growth if well implemented, but let's keep the focus on the essential and build the best market knowledge with intuition and sensibility towards the customer king! What the customers want and why industrial design is key for success.

### **A.5 Stone Industrial Design**

More generally in Europe and between WW I (and the Bauhaus style of the “crazy years”) and WW II the new architectural boom brought again marble as a decorative material for stairs, building facades and so on. Then after all the destruction and during the first half of the XXI century big construction conglomerate (wanting to go fast) started to specify and massively produce new “composite materials” from chemicals or derivatives including a lot of: cements, plastic flooring, mix of porcelaneous and many other “revolutionary” compounds. Light, easy to implement, cheap, resistant, and colourful materials for your household! Stone Industrial Design disappeared from the scene until two brands, from Italy, KNOLL and CASSINA, among others started to reuse stone industrial design as a new way of democratising furniture combining design and materials: **the wedding of industry and art**. Le Corbusier, Jean Nouvel, Starck everybody was mad about stone. In Portugal it is remarkable to see that stone disappeared sadly until a few years ago.

The latest trends want to extremize its domestic use, putting it to the test once again: experimenting with original uses in the field of interior decoration and design, exploiting the extraordinary nature of its veins, the constant versatility of its shades and its ductility.

If, until a few years ago, synthetic stones were preferred for certain uses, today, thanks also to the renewed taste for decorations, this extremely durable material is once again in vogue, but still able to innovate. The watchword for young marble designers is creativity, namely, to reinterpret in an innovative and nonconformist way one of the most classic materials in existence.

Why? Because marble is a fascinating material, extraordinarily elegant, still able to move us, immerse us in the oldest tradition and, at the same time, is extraordinarily modern, (Businessscoot 2023).

To understand the leadership of Italian modern stone design, the objective view of Italian handcrafters Salvatori gives a very interesting perspective:

*"In the beginning, the company was tiny, and it was difficult to make ends meet," recounts Gabriele Salvatori, the third generation at the brand's helm. "The real moment of initial growth only came years later when my father took over and decided to invest in research and innovation.*

*The first innovations came with stone-cutting machines and a new technique called 'spaccatello', which involved striking the block so that the weaker veins would give way to create surfaces with visible splits. It was an absolute novelty in a market dominated by polished finishes. It caught on and became a global success a few years later.*

*These are the roots of a company that has grown over time to become a genuine design brand. From that world, we inherited the desire to experiment and constantly innovate with obsessive attention to the product, carefully crafted to the smallest detail. Respect for an ethical and transparent approach has also accompanied us over the years", (Fraccalvieri 2022).*

## **A.6 The Industrial Design opportunities for the PT OS Sector?**

Emerging countries such as Peru, Chile, South Africa, Malaysia are creating new opportunities because they are dying to have our beautiful Portuguese stones dressing with glamour in their homes.

Despite the Italian leadership and the insolent growth of Turkish manufacturers, Portugal can play a role not sending blocks and non-finished products but establishing a corporative mindset to sell the Portuguese “savoir faire” and prepare stunning pieces, handcrafted but not only: made on order and simply listening to the customers. Iconic is the future of Portuguese marbles all around the world, compete on basic products and against artificial stones is a lost quest we need to switch, be smart and push the sector towards a corporate point of view combining 3 key aspects: innovation, human resources, and local wise use of local stones. A true challenge in a sector traditionally led by local families averse to modern management concepts.

Portuguese Industrial Design capabilities used in architecture, clothing, decoration, and shoes among other famous sectors must be transferred to the oldest traditional sector in Portugal with more of 2000 years of handcraft experience since the romans made us discover, under our feet, that stones could be gold and vest our palaces and homes.

It is obvious that Industrial Design is a key success factor but without the incorporation of innovation, technology, and modern management methods the Portuguese Stone industry will not survive in the “low cost-mid cost market” driven by price and volume. Resources are there and Portugal for the first time on its history is in the front row of an industrial revolution, more widely from a tech point of view but also for the stone industry. Previously we had no tools to be the leaders of the transformation: no coal, no oil, no software, no design brains... but now we have the best universities, the best competencies in AI, the best internet and road infrastructure and access to huge markets through ocean and land accesses. Combined to extraction reserves, tooling engineering (Fravizel, Construal, CEI, among others). Portugal can

make a difference targeting the high-end, complex and beautiful design made in order, not necessarily massive but full of added value creating an iconic ESG glamorous Portuguese Stone Design Creative Manufacturing process. In the next points we will explain why challenges are ahead and suppose a drastic change in the market and technology integration approach from very traditional and old fashion family companies.

## 1. Research

### 1.1 Research Questions

**Can a Search Fund effectively acquire and transform an OS company by aligning with market trends, enhancing customer value, and scaling for increased profitability, paving the way to elevate the stone Portuguese industry's global relevance?**

To solve this question, we propose a stepwise approach that will investigate:

- How do the OS key stakeholders see themselves regarding the Industry 4.0 challenges and how do they project their future?
- What factors potential influence OS customer journey, in particular, why do they opt for a natural stone or a substitute?
- What companies meet the Search Fund KPIs for success and what business model should be used?

### 1.2 Methodology / Research design

Our line of research follows, according to the Research Onion method (Saunders 1997), a combination of cross-sectional data collection, mixed methods (integrating qualitative and quantitative elements), and a sequential approach involving interviews and surveys. This strategy embraced an inductive approach for theory-building and adhered to a pragmatic research philosophy, ultimately facilitating a comprehensive and practical exploration of the research topic divided in the following 3 phases and respective objectives:

- **Qualitative research, in-depth 1:1 interview**, face to face or via Microsoft Teams, with a total of at least **20 individuals** representing OS Companies and OS Machinery Factories Owners, OS Project University Professors and OS Sector Associations Representatives, *convenience* sampled from a database of Assimagra associates or following referenced companies by interviewed subjects, conducted from April to July 2023. Our objective is to identify the core values OS key stakeholders used to navigate

in this sector over the past years and to assess the challenges they feel will be critical in the foreseen future.

- **Secondary Research**, in depth review of sector reports, official websites with financial data of OS related companies to extract information according to KPIs referred in the literature that could inform us on what companies to interview on the qualitative research and lead us on the choice of the potential targets for a Search Fund. Conducted by us from February to June 2023.
- **Quantitative research phase**, completion of at least **50 web surveys**. The 15 questions survey was sent by mass email to a mailing list convenience sampled from Orbis<sup>®</sup> by Moodis of national and international architects, to identify the profile of the end customers understanding their criteria when choosing natural stone materials. Conducted in July 2023.

## 1.3 Research results

### Section B. Qualitative research

Below we describe the Qualitative Questionnaire used to interview the companies' stakeholders.

1. **Company name?**
2. **Interviewed name** and position?
3. What type of **supplies** are used? How and from where do they select them?
4. What **production processes** are used (level of automation)? What type of technology is used, type and number of machines? What is the level of machine interconnectivity?
5. What **type of products** do they do? Who develops them? Do they have IP or other authorial protection? Do they sign/brand their products? How do they innovate?
6. Who are their main **customers**? Buying frequency? Level of exports? Is there a customer acquisition/retention policy?
7. HR, how many **employees** do they have? How are they organized? How are they recruited and maintained? What type of benefits do they give them?
8. What are the **main challenges they face**? How do they prepare for them?
9. What is the **company organogram**? What's the company's CEO succession plan?
10. Can you provide a name of a company we should interview to have a different perspective on the sector?
11. Type of collaboration we got from the interview.

*Figure 2 Qualitative Questionnaire*

### Sample method

We began by validating our 1:1 Interview Questionnaire with local OS companies in Pêro Pinheiro and seeking referrals for additional interviews. Later we added to the list, companies referenced by Assimagra that we met remotely. More names were added after our participation in the Global Stone Congress 2023 (<https://globalstone2023.stonebyportugal.com>) and in the Stone Expo 2023, in June, where we met several OS experts and scholars that gave us new perspectives on Stone trends and uses in other parts of the world. If initially our difficulty was to get to the OS Stone CEOs for lack of references in the end, we lacked the time to conduct more interviews that we ended up loving for the richness of the conversations. We chose from

a pool of over 72 key stakeholders and companies, prioritizing diversity in backgrounds, product specialization, size, and positioning, Figure 3.

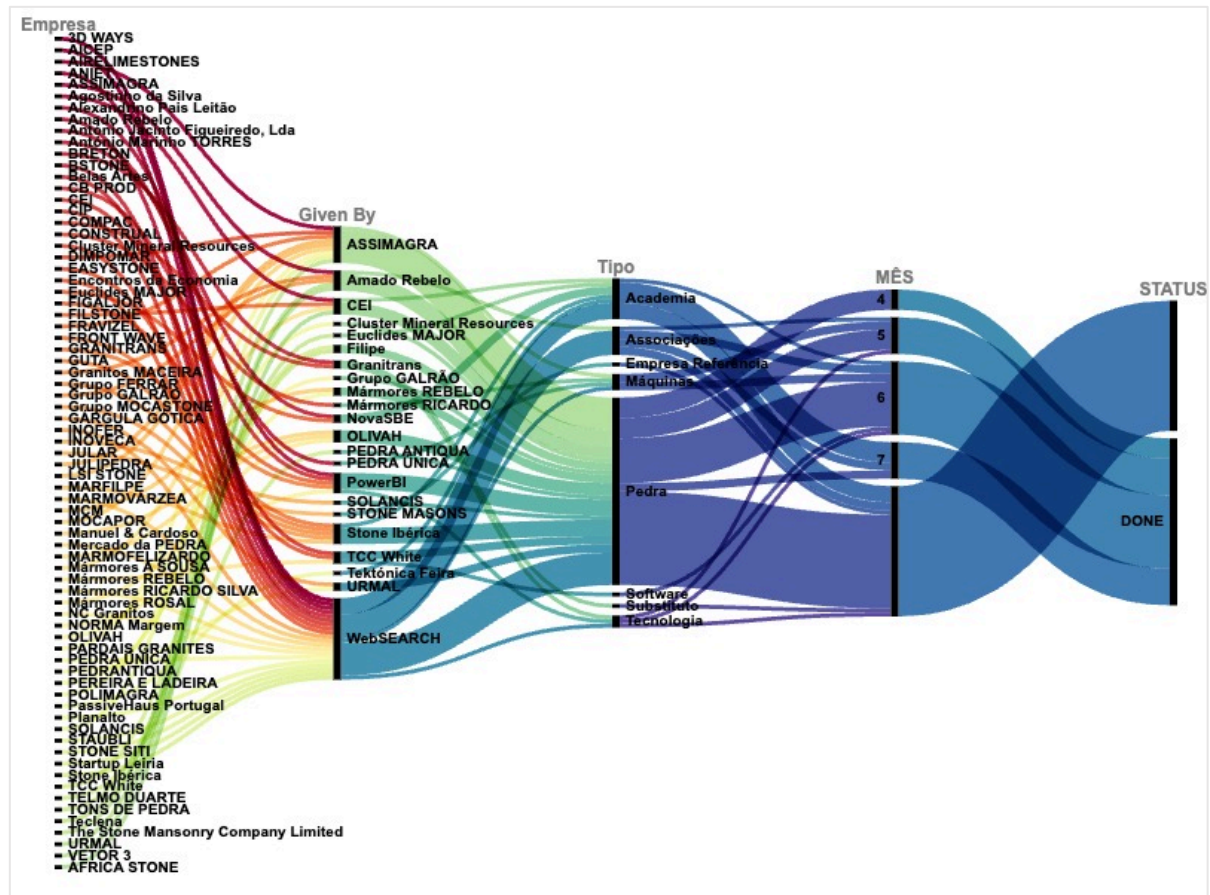


Figure 3 Alluvial Diagram of the Interviewed Companies

We were able to collect 37 contributions that we categorized in clusters depending on insights gathered: positioning in the OS Value Chain, raw material used, types of products offered, number of employees, type of machinery, level of customer service, I4.0 maturity, management type, generation, EBITDA, operating revenue and revenue per employee, see Figure 4. The different combinations of these attributes generated 7 homogeneous clusters: (i) small businesses (not specialized: do it all type of businesses), (ii) medium businesses (specialized: retailers of slabs or sellers of raw blocks of stone), (iii) small to medium size differentiated offer of products including co-creation and personal brand (iv) large companies covering all steps of the value chain (v) producers of machinery and software (vi) institutional players (vii) others (academia, congresses, experts).



| Company Initials Code | Industry | Interview |        |                | Line of Work | Size   | Business Type Cluster | Value Chain Position | Industrial Design | Tenure Cluster | Management | CEO Generation |
|-----------------------|----------|-----------|--------|----------------|--------------|--------|-----------------------|----------------------|-------------------|----------------|------------|----------------|
|                       |          | DATE      | TYPE   | Role           |              |        |                       |                      |                   |                |            |                |
| IIM                   | NOS      | 11/jul    | F2F    | NA             | A            | NA     | 6                     | 1/2                  | NA                | NA             | NA         |                |
| EEF                   | NOS      | 12/jul    | Online | NA             | A            | NA     | 7                     | 4                    | NA                | NA             | NA         |                |
| AG                    | NOS      | 17/jul    | F2F    | NA             | A            | NA     | 7                     | 2/4                  | NA                | NA             | NA         |                |
| AMT                   | NOS      | 18/jul    | Online | NA             | A            | NA     | 7                     | 4                    | NA                | NA             | NA         |                |
| GU                    | OS       | 22/jun    | F2F    | Employee       | E            | Small  | 2                     | 1                    | N                 | 2              | Prof       |                |
| FJ                    | OS       | 24/abr    | F2F    | Employee       | ET           | Medium | 2                     | 1/2                  | N                 | 2              | Family     | 3              |
| DPC                   | OS       | 12/mai    | Online | Employee       | ET           | Medium | 4                     | 1/2/3                | Y                 | 3              | Family     | 2              |
| EMEVN                 | OS       | 5/jun     | Online | Owner          | ET           | Medium | 4                     | 1/2/3/4              | Y                 | 3              | Family     | 3              |
| UR                    | OS       | 9/jun     | Online | Owner          | ET           | Medium | 4                     | 1/2/3                | N                 | 3              | Family     | 3              |
| APL                   | OS       | 13/jun    | F2F    | Owner          | ET           | Medium | 2                     | 1/2                  | N                 | 1              | Family     | 3              |
| PA                    | OS       | 16/jun    | F2F    | Owner          | ET           | Medium | 3                     | 2/3/4                | N                 | 2              | Mixed      | 2              |
| GF                    | OS       | 22/jun    | F2F    | Owner          | ET           | Medium | 1                     | 1/2                  | Y                 | 2              | Family     | 1              |
| SC                    | OS       | 3/jul     | F2F    | Owner          | ET           | Medium | 4                     | 1/2/3/4              | Y                 | 3              | Family     | 2              |
| GT                    | OS       | 4/jul     | Online | Owner          | ET           | Medium | 2                     | 1/2                  | N                 | 2              | Family     | 1              |
| CGS                   | NOS      | 22/jun    | F2F    |                | I            | NA     | 6                     | 1/2                  | NA                | NA             | NA         |                |
| ASS                   | NOS      | 24/mai    | Online | Vice President | I            | NA     | 6                     | 1/2/4                | NA                | NA             | NA         |                |
| CMR                   | NOS      | 30/jun    | Online | President      | I            | NA     | 6                     | 1/2                  | NA                | NA             | NA         |                |
| SSL                   | NOS      | 5/jul     | Online | President      | I            | NA     | 7                     | 4                    | NA                | NA             | NA         |                |
| AI                    | NOS      | 20/jul    | Online | Employee       | I            | NA     | 6                     | 1/2                  | NA                | NA             | NA         |                |
| ES                    | NOS      | 9/jun     | Online | Employee       | M            | NA     | 5                     | 2                    | NA                | NA             | Prof       |                |
| ST                    | NOS      | 13/jun    | Online | Employee       | M            | NA     | 5                     | 2                    | Y                 | NA             | NA         |                |
| AJ                    | NOS      | 26/mai    | F2F    | Owner          | M            | Small  | 5                     | 2                    | N                 | 2              | Family     | 3              |
| CT                    | NOS      | 26/mai    | F2F    | Owner          | M            | Small  | 5                     | 2                    | N                 | 2              | Family     | 2              |
| FV                    | NOS      | 16/jun    | F2F    | Owner          | M            | Medium | 5                     | 1                    | Y                 | 3              | Family     | 1              |
| C                     | NOS      | 22/jun    | F2F    | Employee       | M            | Small  | 5                     | 2                    | Y                 | 3              | Prof       |                |
| PU                    | OS       | 24/abr    | F2F    | Employee       | T            | Micro  | 1                     | 2                    | N                 | 0              | Family     | 2              |
| RSM                   | OS       | 24/abr    | F2F    | Owner          | T            | Micro  | 1                     | 2                    | N                 | 0              | Family     | 2              |
| CP                    | OS       | 24/abr    | F2F    | Employee       | T            | Small  | 2                     | 2                    | Y                 | 2              | Prof       |                |
| NM                    | OS       | 3/mai     | Online | Employee       | T            | Small  | 1                     | 2                    | N                 | 2              | Family     | 1              |
| AR                    | OS       | 10/mai    | F2F    | Owner          | T            | Micro  | 1                     | 3                    | N                 | 0              | Family     | 1              |
| TW                    | OS       | 11/mai    | Online | Owner          | T            | Small  | 3                     | 2/3/4                | Y                 | 3              | Family     | 1              |
| 3DW                   | NOS      | 23/mai    | F2F    | Employee       | T            | Micro  | 7                     | 3                    | Y                 | 0              | NA         |                |
| PL                    | OS       | 10/jun    | Phone  | Owner          | T            | Medium | 2                     | 2/3                  | Y                 | 3              | Mixed      | 1              |
| OH                    | OS       | 14/jun    | Online | Owner          | T            | Micro  | 3                     | 3/4                  | Y                 | 2              | Prof       |                |
| GGG                   | OS       | 22/jun    | F2F    | Owner          | T            | Micro  | 3                     | 3/4                  | N                 | 1              | Prof       |                |
| MPF                   | OS       | 23/mai    | Online | Owner          | T            | Micro  | 1                     | 2/3                  | N                 | 3              | Family     | 2              |
| TSM                   | OS       | 28/jun    | Online | Owner          | T            | Small  | 3                     | 3/4                  | Y                 | 3              | Prof       |                |

Line of work: E(Extraction); T(Transformation); M(Machines); I(Institutional); A(Academia)  
Value Chain: 1 (Quarry); 2 (Simple Transformation); 3 (Bespoke Products); 4 (Co-Creation)  
Tenure: 0(<5Years);1(<20Years);2(>20Years)  
Industry: ornamental stone industry (OS); non-ornamental stone industry (NOS)

Figure 4 Example of the interviews processing clusters

| Cluster         | Number of Companies in the Cluster | Number of Companies with Info | Avg. Cluster Employees | Avg. Cluster EBITDA | Avg. Cluster Op. Revenue | Avg. Cluster Revenue per Employee |
|-----------------|------------------------------------|-------------------------------|------------------------|---------------------|--------------------------|-----------------------------------|
| 1               | 6                                  | 4                             | 11                     | 92.515              | 700.417                  | 71.338                            |
| 2               | 6                                  | 6                             | 63                     | 1.411.934           | 10.198.270               | 438.042                           |
| 3               | 5                                  | 2                             | 29                     | 203.211             | 1.715.035                | 72.211                            |
| 4               | 4                                  | 4                             | 90                     | 1.037.694           | 6.914.743                | 76.501                            |
| <b>Subtotal</b> | <b>21</b>                          | <b>16</b>                     |                        |                     |                          |                                   |
| 5               | 6                                  |                               |                        |                     |                          |                                   |
| 6               | 5                                  |                               |                        |                     |                          |                                   |
| 7               | 5                                  |                               |                        |                     |                          |                                   |
| <b>Total</b>    | <b>37</b>                          |                               |                        |                     |                          |                                   |

Figure 5 The 7 homogenous CLUSTERS summary

The 37 interviews took place in 5 different formats, 15 were in person, 14 online via Microsoft Teams, 4 in person during the congress and stone fair, 3 were online but after a personal approach on-site and 1 by telephone. Out of all the interviews, the majority, 21, were with OS businesses, with 14 being family-managed, 5 having professional managers, and 2 transitioning towards professional management. Regarding family-type businesses, out of the 14 in total, 5

are currently managed by the founders, 5 belong to the second generation, and 4 are under the management of the third generation of the family.

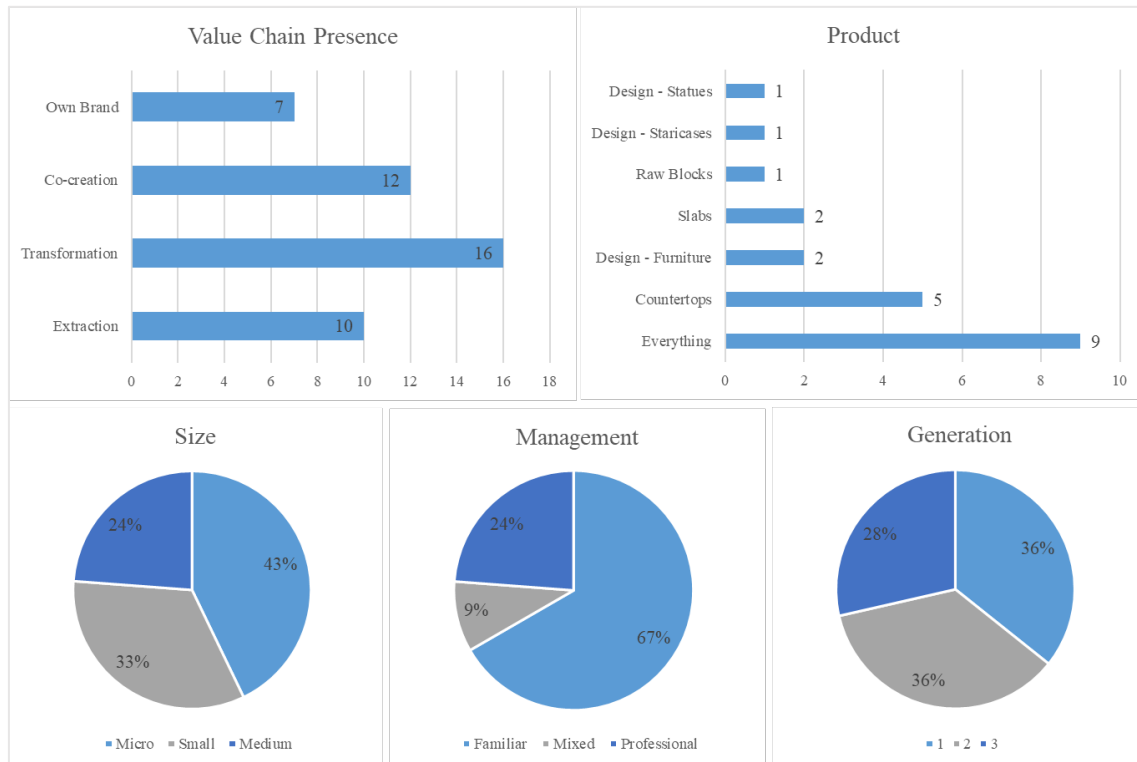


Figure 6 Summary of company's main characteristics.

In classifying the maturity level of adopted technologies, we obtained the following distribution: 0 indicating no technology use in daily operations or customer engagement, and 3 indicating system interoperability and a certain level of customer-centricity.

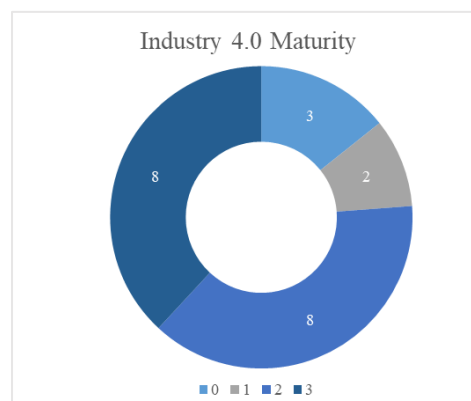


Figure 7 Interviewed Companies I4.0 maturity (own classification)

## Findings

We attained a collaboration level of 4.3 out of 5 in the interviews conducted, yielding valuable key insights that we detailed over the next paragraphs.

The OS Portuguese companies have evolved to be specialized by stone type and product types. Some work primarily with limestone, others with granite, others with marble and others may even work with substitute products but that does not mean that they do not commission or work with other materials upon customers' specific requests. Regarding product types, most companies manufacture facades, flooring, surfaces, countertops, exterior pavements, fireplaces, or cemetery stones. There are some, more specialized that produce bathtubs, washbasins, pre or post-tensioned staircases, blocks as structural elements in buildings or employ artistic handwork to create replicas of statues or design pieces, see Figure 8.



*Figure 8* Products viewed during visits, photos Nuno Castanheira

- **A highly resilient sector with powerful sector associations.**

Our interviews encompassed stakeholders from various stone generations and diverse backgrounds, including those from academia, consultancy firms, and quarry operations. Across this spectrum, a common thread was evident - resilience and a steadfast commitment to the path ahead. There was also a profound respect expressed for industry associations (Assimagra, Aniet, Cluster Mineral Resources) and for the pioneering efforts of top companies in charting the industry's future course.

The past years financial crisis, the changes in trends regarding the natural stone export market value, the new emerging competitors (ceramics, Dekton®, Silestone®...), the Industry 4.0 acceleration together with the difficulty to retain and gain new international customers made surviving an objective for many OS companies. Only some show a clear view of their situation and of the challenges ahead, the majority seems to be focus on their day-to-day business.

- ***“The OS Industry has a culture of competition instead of cooperation.”***

Portuguese OS companies often struggle with size limitations that hinder their competitiveness on a global scale. While there are exceptions, the formation of consortiums to secure procurement processes for significant international projects, which require large quantities of stone, a wide range of product categories, and stringent timelines, remains infrequent. This is primarily due to the structural constraints that individual OS companies face in meeting such demands. Many times, OS companies run against each other, **crushing prices** to stay ahead, **owning quarries**, in an environment of immense difficulties to get new extraction licenses, to control accesses to raw materials, **betting on the latest technology** to gain efficiency. The competitive advantage of quarrying licenses and heavy capital investment in factories and machinery create strong barriers to entry, limiting new business and scale-up opportunities. Additionally, most of the value for the OS customer comes from intangible characteristics like the uniqueness of the product stone or design, the quality of the sales and post sales service, the

respect for the delivery times, areas in which much of the OS sector is not focused on. Businesses keep copying each other in terms of products and technology used so any advantage they may have been time limited. The industry is “*commonly focused on what is easier*”, as one of the CEOs said, “*they lack the skills, curiosity, and creativity to do more*”.

Although there have been several public supported projects (JETSTONE, INOVSTONE, INOVSTONE 4.0, INOVMINERAL 4.0 and mobilizing agendas of RRP) to promote innovation in this industry, digitalization and interoperability between different technologies is still a mirage for most companies. The interconnection between production plants (upstream-downstream and downstream-downstream) is the future and only few are ready to tackle it.

- ***“It’s impossible to get licenses...”***

Portugal has 4 main areas of quarrying: granite, in the north, that shows a growing trend in volume and value, evolving from block to processed products; lioz, a marble-type stone, in the Lisbon Area, declining due its low export market value; limestone, in the centre, growing supported by Assimagra projects and Government programs, and with high export market value, and Estremoz marble, trending down due to difficulties related with quarrying laws & licensing.

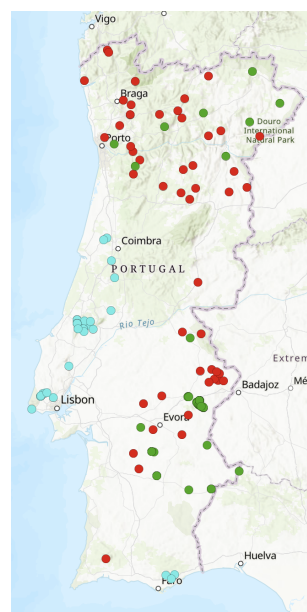


Figure 9 Portuguese Natural Stone Quarries (LNEG 2023)

Irrespective of the quarrying area or the location of the processing factories, to get an OS business permit shows to be a daunting and complex process. The accident in Borba in November 2017, that killed 2 workers, brought extra difficulties on the quarrying activity, and made the public perception of this industry worse than before making it hard to get endorsement from municipalities to approve new projects or extensions of the current licences. Politicians take ages to develop and apply new laws that, like Italy did, give to the country's natural resources the correct framework to make it sustainable and profitable. The execution of the law number 54/2015 ("Lei n. ° 54/2015 | DR" n.d.) is still being discussed and its content being widely disputed by the sector as it limits opportunities and closes businesses.

- ***"I can't afford to have R&D."***

We found many different forms of innovation but when making investment decisions, money, or FTEs, most of the companies do not choose R&D, that they consider to be a luxury, "*we do not have the size to do it*". OS innovation comes mainly from **heavy investment in technology** and its frequent renovation cycle, **hand finishing** of the products, by adapting, in a typical Portuguese way, **practices from other sectors** (e.g., shoes industry) or by **tweaking the business models** (e.g., using the vacant containers to ship back block of stones to China, signature brands, pieces booklet with the story from block to final product). **Industrial design** is rare, usually the projects come in drawings that just need some small adjustments to be produced and that is the only thing they do.

- ***"Environmental, Social and Governance" could be the next big thing.***

Regarding ESG, OS companies need to take more advantage of working with a durable, recyclable, sustainable natural product offsetting the impact traditional business operates to downplay potential substitutes.

## **Environmental**

Product height, width, length, price, packaging, production time, waste use, energy production/consumption balance, overall CO2 footprint, air, water, and visual pollution are all aspects that need to improve moving forward. OS companies use only **3% of what is extracted** from quarries and for each raw piece extracted 5x its volume goes to waste.

Technology already allows low quality blocks, stone leftovers, and muds to give way to new business opportunities cleaning the stone region landscapes. Recent technology machinery strips dust, noise, and muds out of the working areas but it needs to be more widely used since innovation pace is high and once cutting-edge technology become obsolete in less than a decade. There are also opportunities to explore more the machinery in place in % of working time or in technical features. Additionally, there is value to be captured in repurposing recycled OS stone.

CO2 emissions of concrete fabrication process is a drawback in the construction sector giving stone as a structural **element** for the buildings an opportunity. Latest trends for nearshoring might be an opportunity for the stone industry to sell products at a fair price with production close to the consumption site.

## **Social**

OS companies are frequently the heart and soul of the small villages nearby, different family generations, complete households, side business depend on them. In the good examples recruitment, training and retaining policies can be found. Some CEOs call the teens in their communities to promise them jobs after their graduation and plan to distribute production prizes amongst their best employees. These actions might help overcome the challenges of recruiting and retaining employees, even though tech enhanced, and exports focused companies have less problems with recruitment since they provide a cleaner environment to work and better salaries. The same progressive thinking cannot be found in terms of Inclusion & Diversity, many of the

workers are men, women can be found often in quality control or administrative areas. Also, regarding the visual *impact caused by the OS* activities, with some exceptions, companies live peacefully with it, not worrying about the feelings of nearby populations which later affects them when trying to get new licenses.

## **Governance**

Industry associations are actively engaged in formulating strategic workstreams aimed at steering the sector towards greater alignment with governance principles, however factors such as the small size of the businesses, family-based management structures, intense market competition, the prevalence of tax informality, and a culture of confidentiality collectively contribute to creating formidable barriers for the elevation of this ESG pillar.

- **BIM, a friend, and an enemy**

BIM may shape the future of certain Portuguese firms, particularly those focused on robotic mass production and cost-efficient units. Such ventures rely on standardized quality stone, which is increasingly scarce due to challenging quarry operations. Potential threats for these businesses encompass competition from cheaper materials, imitation stone ceramics, and yearly launched products. An alternative, as advocated by Agostinho da Silva (da Silva and Almeida 2020) is escaping the BIM trap, a strategic approach involves leveraging stone's imperfections as unique features to co-create distinctive highly valued pieces, engaging directly with architects and contractors. This bypasses BIM but adheres to its principles of transparency, ESG concerns, and more.

**We have identified three paradigms that could dictate the future of this sector:**

- I. **“Bloco é ouro, Chapa é prata, Ladrilho é lata “**

Despite significant investments in technology and a strong customer-centric approach driven by Industry 4.0 principles, a prevalent sentiment in the industry remains, encapsulated in the saying, "Bloco é ouro, Chapa é prata, Ladrilho é lata" (stone blocks are



gold, slabs are silver, and standardized pieces are loose change). This adage underscores the enduring importance of tradition within the sector. It highlights that there is still considerable revenue to be generated from traditional, non-future-proof, low-value-per-ton, and non-strategic products. In essence, while the industry embraces technological advancements, it also cherishes its heritage and recognizes the continued significance of conventional stone products in generating revenue and sustaining the sector.



*Figure 10 Examples of low-quality raw blocks, photos Nuno Castanheira*

Low quality blocks of stone or stone leftovers can be found everywhere in the OS Industry regions. Superior quality blocks are sold in Portugal or sold to Europe, lower quality blocks are sent to China while medium quality blocks are transformed and sold as slabs, the remaining stay stockpiled in the confines of the quarry or the vicinity of the processing factory. The work Italians are doing in educating their customers of how *defects* give personality and uniqueness to the stone pieces is still to be done amongst us and it is felt by many of the interviewed CEOs as a critical step moving forward for economic and ESG reasons.

## **II. They say they must focus on the customer but...**

Most of the companies tailor their processes and/or products to meet their customers' needs, their execution is flawless, but they are closed in august, they give scarce information on the

status of the order or its time for completion, they lack the post sales service and that makes it exceedingly difficult to compete against more reassuring/standardized products.

Businesses lack commercial strategy, they have passive sales processes, and they lack orientation for innovation. When selling to foreign countries it is most often done using the services of local agents. Many business contacts are still made in international or national sector fairs Global Stone (Batalha, Portugal), Marmomac (Verona, Italy); Xiamen Stone Fair (Xiamen, China); Vitória Stone Fair (Vitória, Espírito Santo, Brazil) or using showrooms. Websites are mainly used as business cards with no other value in terms of budgeting, product tracking or customer support.

Photographing the piece encompassing the transformational journey from raw material to the final product and giving a booklet to customers so that they utterly understand what they have bought could be essential to establish higher value, “... *to buy OS is an experience full of sensation and emotions*”. Only a handful of companies have a brand they imprint in the work they do or number their pieces.

Embracing a paradigm of co-creation in collaboration with customers and architects emerges as the transformative trajectory for the evolution of this industry. To allow designers and architects to breathe life into their projects by using premium stones, incorporating its inherent imperfections as unique features it is necessary to bypass the challenges posed by alternative materials’ prices & standard looks competition.

Design pieces and partnerships with renown artists, designers, architects could be a way to add extra value like the Primeira Pedra Project by Assimagra showed (<https://www.primeirapedra.com/en/>). Only four of the companies we have talked to demonstrated evidence of possessing intellectual property safeguards for their proprietary processes and machinery or have sought protection through authorship mechanisms.

### **III. OS Company's trade worldwide *but they die where they were born.***

OS companies import machines from Italy, blocks or slacks from Europe, Africa or Asia, export worldwide, yet an intriguing phenomenon emerges: a propensity to remain entrenched in their geographic origins, notwithstanding the advantages that lie 50 kilometres away. This vantage point offers more favourable access to specialized fiscal incentives, European Union financial backing, and enhanced logistical infrastructures. Paradoxically, all interviewed companies steadfastly uphold their founding places, evincing a pronounced affinity for sharing their success with their communities. They do not care that out of the Lisbon region or out of their small village, motorways and ports are closer, governmental programs available to support them and municipalities that gladly would license expansion projects they cannot approve in their current environs.

When asked about their immediate challenges, most of the CEO's points to the scarcity of skilful workers. They face problems in recruiting and retaining the talents they desperately need to operate increasingly sophisticated technologies. This sector contends with more lucrative options in cleaner industries, emphasizing the urgency to communicate the significance, potential, and future of the stone industry to prospective young employees. CEOs don't seem to be focus on their succession, they don't anticipate their children entering the sector, but they remain vigilant and somehow hopeful. A minority has already embraced external investments, and a subset has definite plans for complete divestment.

In summary, in the Portuguese OS industry tradition, opportunities and difficulties live side by side. Some of the companies seem to lack the investment, capacity, and technology to survive, others are adapting for the future, supported by the industry associations, unsure if what they are doing is enough. We've met some of these latter companies but do we have a solution that could made them bigger and stronger to compete? Can we find out what the customers are truly looking for? That's what we will try to find out in the next research section.

## Section C. Macroeconomic and Financial Characterization of OS Industry

### Sources

| Dataset                                            | Type of Data            | Date of Extraction | Observations   | Last Period Available | Type of Data |
|----------------------------------------------------|-------------------------|--------------------|----------------|-----------------------|--------------|
| ORBIS, BUREAU VAN DIJK                             |                         |                    |                |                       |              |
| PT OS companies from Extraction and Transformation | Integer, Currency, Text | 31-05-2023         | 1.892          | 2022                  | Microdata    |
| International OS companies Extraction              | Integer, Currency, Text | 18-06-2023         | 55.939         | 2022                  | Microdata    |
| International OS companies Transformation          | Integer, Currency, Text | 18-06-2023         | 70.192         | 2022                  | Microdata    |
| INE – Instituto Nacional de Estatística            |                         |                    |                |                       |              |
| Exports                                            | Currency                | 13-08-2023         | 5.220 (5 var.) | 2022                  | Aggregated   |
| Number of Employees                                | Integer, Currency       | 08-06-2023         | 770 (24 var.)  | 2021                  | Aggregated   |
| Legal Form                                         | Integer, Currency       | 08-06-2023         | 126 (28 var.)  | 2021                  | Aggregated   |

We've developed a Power BI analysis of the sector which can be accessed with this [link](#).

### Findings

The international distribution of companies in the ornamental stone industry, Brazil is the country with more companies (45k), followed by the USA (12k), China (11k), India (9k) and Portugal (2k) in 14<sup>th</sup> place. If one ranks these companies by EBITDA, Portugal takes the relevant 8<sup>th</sup> place, by operational revenue 13<sup>th</sup>, while by number of employees 15<sup>th</sup>.

Regarding the OS PT Industry, exports more than doubled since the beginning of the century, however, its contribution to the country total exports is orbits around 1% over the observed horizon. This increased value exported is related to an increased importance of transformed products.

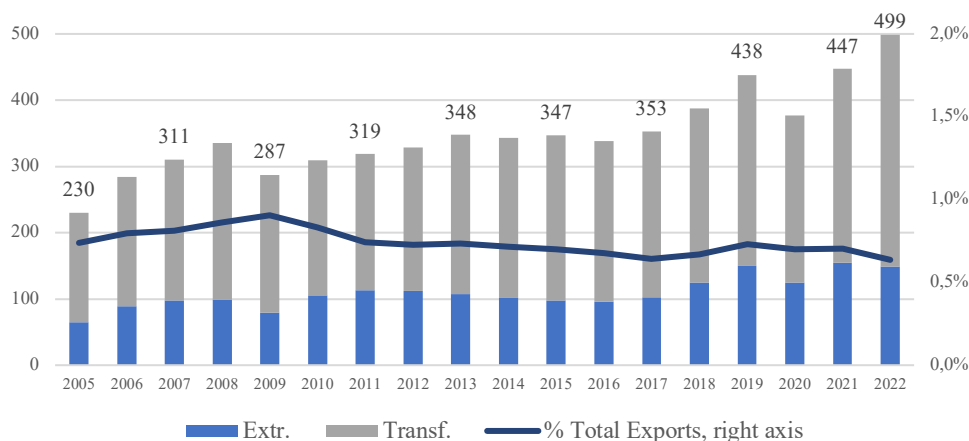


Figure 11 OS Industry PT Exports

The graph below shows the slow decay of marble exports while limestone and granite exports gain importance since 2005.

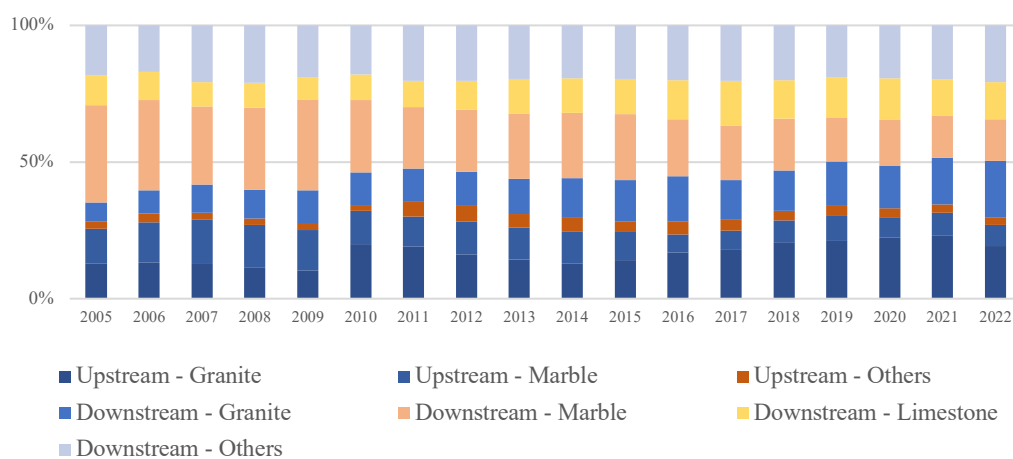


Figure 12 Products Exported

|                         | Exports 2022<br>(millions of euros) | 2022-2012<br>% Variation | Contributions |
|-------------------------|-------------------------------------|--------------------------|---------------|
| Granite                 | 96                                  | 81%                      | 25%           |
| Marble                  | 39                                  | -2%                      | 0%            |
| Others                  | 14                                  | -30%                     | -4%           |
| Subtotal Extraction     | 149                                 | 32%                      | 21%           |
| Granite                 | 103                                 | 154%                     | 37%           |
| Marble                  | 75                                  | 2%                       | 1%            |
| Limestone               | 68                                  | 96%                      | 20%           |
| Others                  | 104                                 | 55%                      | 22%           |
| Subtotal Transformation | 350                                 | 62%                      | 79%           |
| <b>Total</b>            | <b>499</b>                          | <b>52%</b>               | <b>100%</b>   |

Figure 13 Evolution of PT exports by type of product

As referred above in **Error! Reference source not found.**, acquiring a company through the search fund model requires an exhaustive investigation, including macroeconomic context, ornamental stone industry particularities and identify the best financial criteria for benchmarking companies and reaching a short-list of potential targets. The strategy for identifying the target company was analysing enormous amounts of data, starting at a macroeconomic perspective, and making a drill-down toward a micro perspective with the analysis of the unit economics of the targeted company. We started by mapping opportunities with industry-wide information from (Gabinete de Estratégia e Estudos, 2022 and Instituto Nacional de Estatística, 2023) where indicators by NACE<sup>2</sup> 0811<sup>3</sup> and 2370<sup>4</sup> were analysed, such as number of companies, turnover, legal form, gross value added, net income, return on equity (ROE), number of employees, within others. Using Orbis from (Moody's 2023) database, microdata was analysed bringing a clearer vision of potential targets, from this dataset, information about shareholders, employees, location, legal form, foundation, VAT number, contacts, operating revenue, EBITDA, assets, solvency, cash flows, stocks, liquidity, cash, and long-term debt was retrieved. Afterwards some calculations were made to complement the information such as the 5-year or 3-year average of important financial variables and the revenue per employee. Complementarily, information from IAPMEI and AICEP was also looked at where information about exporting companies and type of products produced. This search phase was supported by the development of a dashboard in Microsoft Power BI (see link above and print screens in appendix) to help draw conclusions from the data and share our conclusions in an appealing visual format. This analysis was the starting point for

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<sup>2</sup> Statistical Classification of Economic Activities in the European Community

<sup>3</sup> Upstream/Extraction of raw stone blocks

<sup>4</sup> Downstream/Transformation of stone blocks into slabs

giving an intelligible format to numbers and allow a clear photograph of the Portuguese ornamental stone industry and used for preparing interviews with the owners of the potential acquirable companies.

According to INE, in 2021, there were over 2200 companies in the ornamental stone industry in Portugal, around  $\frac{1}{4}$  in the extraction and  $\frac{3}{4}$  in the transformation. These companies translate into an operating revenue of 1.2 billion euros, 35% extraction and 65% transformation while the gross value added achieved 450 million euros, distributed 40%-60% between upstream and downstream. Since 2012, both variables moved in an upward trajectory (>50%) whereas the number of companies keeping decreasing (-300) showing some consolidation in this industry. On average, the financial statement of these companies improved decreasing the ratio of liabilities to assets. Over the same period, employee costs increased 30% to 261 million euros (around 20% of operating revenue) while the number of employees decreased (-700 to 14,8 k) and minimum wage rose 37% (from 485 to 665 euros per month). This industry is also characterized by a proliferation of small enterprises, >80% have less than 10 employees, only 161 companies have medium size (>50 employees). These 161 companies (7,3% of total) take 57% of operating revenue and 59% of gross value added. If one also adds the companies with more than 10 employees, 388 companies (17,5% of total), capture 76% of operating revenue and 79% of gross value added.

While INE considers two types of companies, individual companies (655) and societies (1556) summing a total of 2211 in 2021, Orbis, which provide disaggregated individual microdata, shows only 1890 companies in both sub-industries (upstream and downstream). According to Orbis data, these companies employ a total of 15k employees, an operating revenue of 1.3 billion euros and an EBITDA c. 0.2 billion euros. The maturity of the companies of this sector has the following distribution:

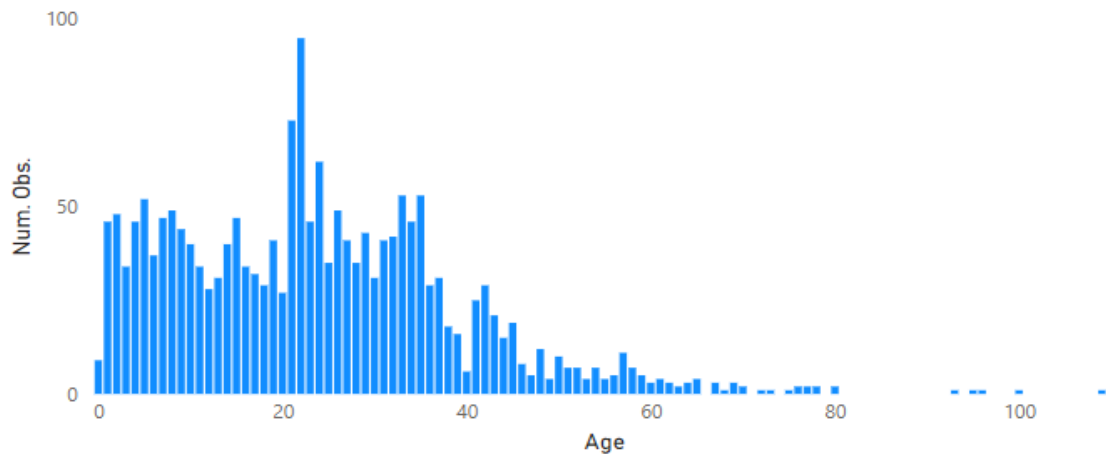


Figure 14 Distribution of Companies per Tenure

Over 70% of the companies have 1 or 2 shareholders and 94% take the form of a limited liability company while 5% are public limited companies (94). From the 1890 companies in the disaggregated dataset, 67 have an EBITDA over 0.5 million and 162 have operating revenue over 1.5 million. The Power BI dashboard allows making several comparisons easily, testing several intervals and combinations of restrictions.

Another example of what is possible to do in this dashboard is a scatterplot with the average EBITDA and the revenue per employee, where the size of the dots is governed by the operating revenue. One can immediately see different profiles of companies which one can cluster in subgroups.

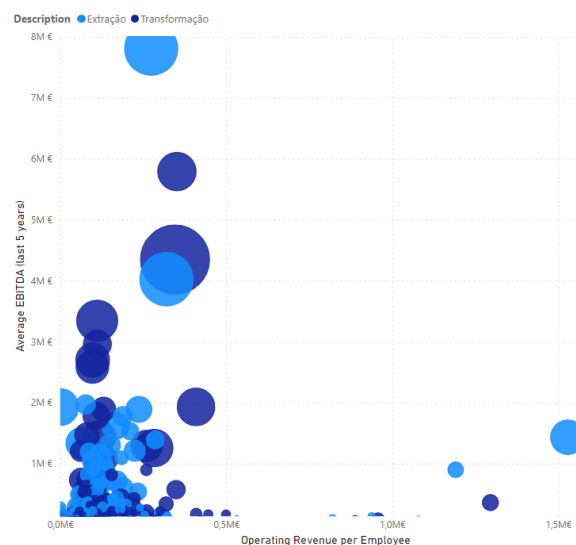
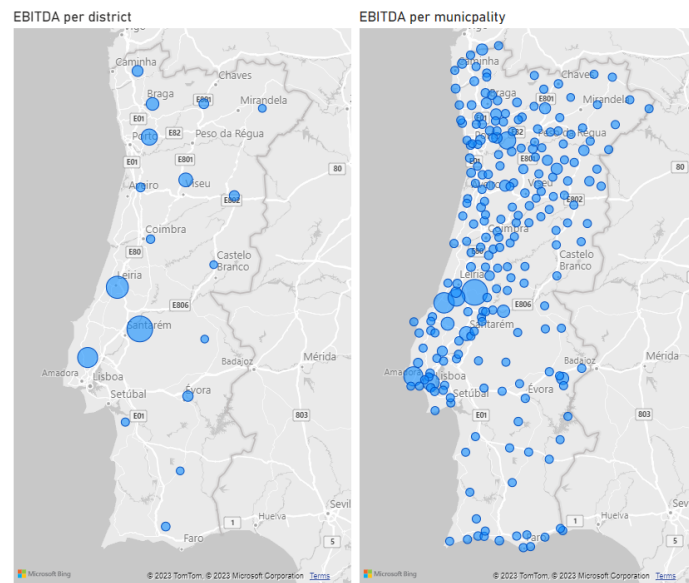


Figure 15 EBITDA vs Operating Revenue per Employee





*Figure 16 EBITDA per District & Municipality*

The national distribution of EBITDA per district and municipality can be seen in the next map where one can see bigger bubbles in centre region (Leiria and Santarém) showing the importance of Serras de Aire e dos Candeeiros (Ourém, Alcobaça and Porto de Mós). In a smaller dimension, per municipality it is also possible to see the importance of the companies registered in Sintra, Lisboa, Marco de Canaveses and Vila Viçosa.

In a more interactive format, the remaining pages of the Power BI desktop pretend to complement this macro information with a deeper view into a dozen companies view with filters by region (district or municipality) to compare several at the same time, interval of financial indicators (EBITDA or operational revenue), firm specific with the selection of the name of the company from a drop-down list. The power BI also allows to see multiple dimensions plotted all together, Figure 17, showing a bird's eye view of the 1890 companies and their positioning vs. the measure's averages represented by the blue dotted lines.

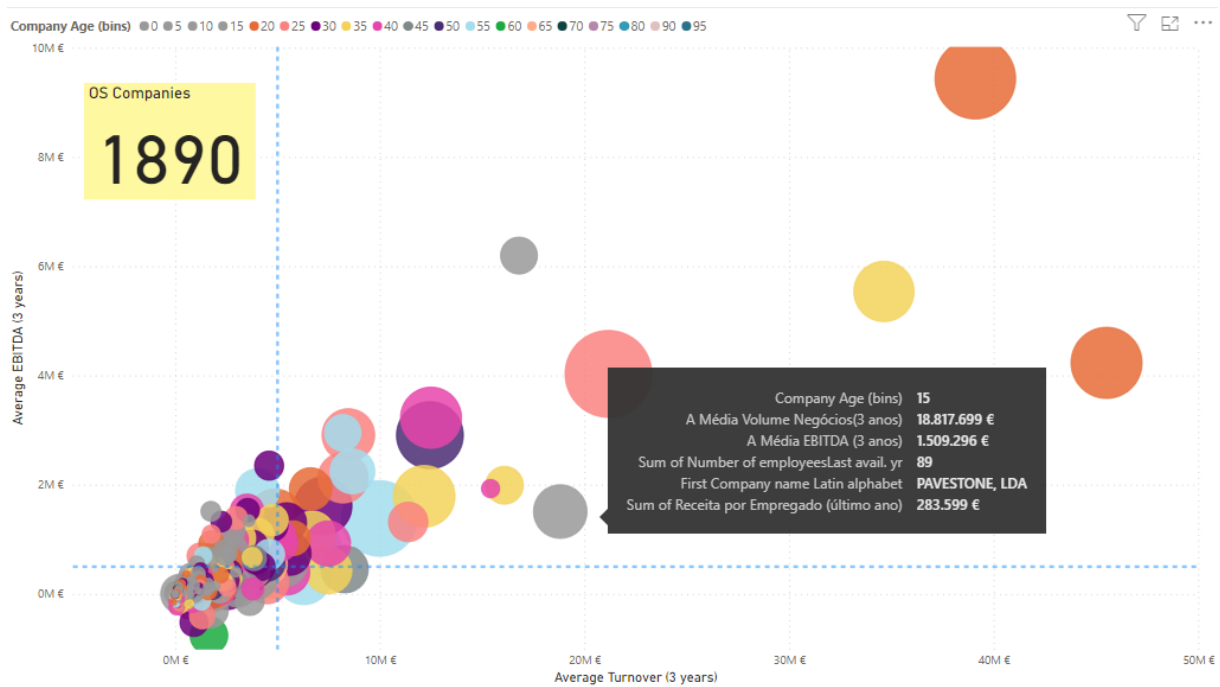


Figure 17 EBITDA vs Turnover vs # Employees for the OS ALL

The 1,890 companies and the parameters defined in the Power BI dashboard serve as the foundational dataset for identifying potential targets within the Search Fund context, a step to be explored further in this thesis. In the forthcoming research section, our focus will shift towards characterizing the needs and requirements of customers/prescribers within the OS sector. This exploration is aimed at uncovering insights and opportunities that can inform the development of future business models in the industry.

## Section D. Quantitative research

1. In which city or town do you currently live? Open text
2. What do you do for living? Open text
3. To which age group do you belong? 25-34; 35-44; 45-54; 55-64; Other
4. When you think of marble what country of origin do you think of? Italy; Spain, Turkey; Portugal; Greece; China; Other
5. Can you say why? Open text
6. Are you aware of Portuguese marble? Y/N
7. What's your experience with marble as a material? Open text
8. When was the last time you bought a marble piece / furniture? This month; Last 6; Last 12; More than 12
9. What was it? Why have you bought it? Open text
10. From who have you bought it? Store; Architects; Designers; Did it myself
11. Please rank the following reasons as to aspects you value the most when selecting a marble piece: Design; Country of Origin; Marble Type; ...
12. Who helps you to decide what to purchase? Open text
13. Please describe the marble piece that you have bought that you are most proud of and why? Open text
14. What are the main difficulties you have encountered when ordering a new custom-made marble piece/furniture? Open text
15. Could you please provide us with a name and email of a friend / colleague that is also a buyer of marble design pieces that could help us and answer this survey? Open text

*Figure 18 Architects & Designers questionnaire*

### Sample Method

The quantitative research phase was conducted by an online survey of 15 questions (Figure 18 Architects & Designers questionnaire) sent via email to 3.609 national and 1.290 international architects obtained from Orbis on 12.06.2023, by filtering the Portuguese database with CAE 741 and 711 (similar to NACE), with email registered and with data updated after 2019 and the International database with CAE's 4120, 7022, 7111 and 7410<sup>5</sup> and positive total sales revenue.

### Findings

The survey yielded a total of 167 valid responses, constituting approximately 3.4% of the total sample. These responses met the criteria of having at least 75% of the questions answered. On average, respondents took approximately 16 minutes and 56 seconds to complete the survey.

Demographically, the majority of respondents (93%) hail from Portugal, indicating a strong representation from the local context. Among the respondents, 74% identified themselves as architects, while 12% identified as designers, reflecting a predominant professional background

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<sup>5</sup> 4120 – Construction of residential and non-residential buildings; 7022 – Business and other management consultancy activities; 7111 – Architectural activities; 7410 – Specialised design activities

in the architecture field. In terms of age distribution, 72% fall within the age groups ranging from 35 to 54 years old.

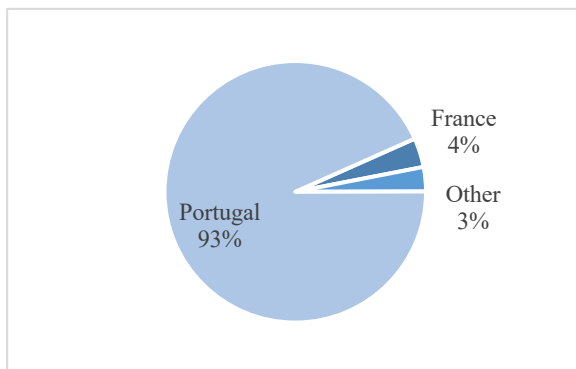


Figure 20 Q: In which "country" do you currently live?

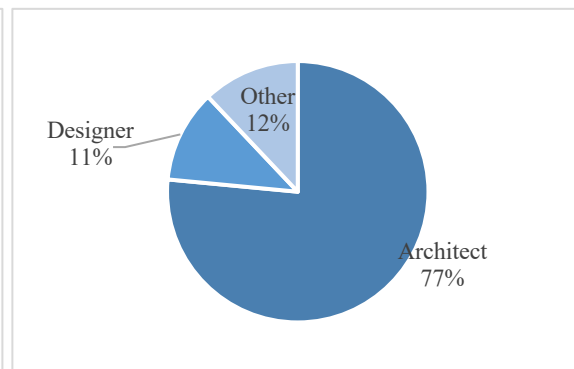


Figure 20 Q: What do you do for living?

When asked about what country they associate with marble, 70% responded Portugal and 23% Italy. 100% of the respondents outside Portugal answered Italy, none of which were Italian.

When probed about their reasons for these associations: Portuguese respondents primarily linked marble to their home country due to national pride, but also attributed it to factors such as quality, competitive pricing, and transportation cost advantages. Foreign respondents favoured Italian marble due to its enduring legacy, excellent reputation, and globally recognized quality.

Impressively, 94% of the survey participants demonstrated familiarity with Portuguese marble, emphasizing its recognition within the industry.

The survey findings reveal that a substantial portion of respondents have a well-established history of using marble in their projects. They overwhelmingly characterize marble as a "beautiful", "durable", "strong and timeless", and "sustainable" material. Their overall experience with marble is described as excellent, underlining its positive attributes.

While the majority of respondents hold a highly favourable view of marble, a minor percentage (1.2%) expressed concerns about stone maintenance, and a slightly larger fraction (5.4%) mentioned price considerations. Nevertheless, even those who noted price concerns still

regarded marble as "expensive but good," indicating an acknowledgment of its quality despite cost considerations.

The survey results reveal that a significant 68% of respondents have made stone-related purchases in the past 12 months. These purchases were primarily centered around various applications: **Kitchen, Bathroom, Flooring, or Walls**, approximately 54% of respondents acquired stone pieces for these functional areas within construction and interior design projects; **Furniture Pieces**, a notable 25% of respondents invested in stone pieces for furniture applications; **Design Pieces**, the remaining purchases involved stone pieces for various design-oriented applications.

Moreover, the survey indicates that architects and designers are actively involved in the development and procurement of stone pieces. In 55% of the cases, these professionals design pieces themselves and either directly engage with stone factories or utilize agents to have them produced. In the remaining 45% of instances, architects and designers incorporate pre-designed stone pieces into their projects, showcasing the diverse approaches taken within the industry.

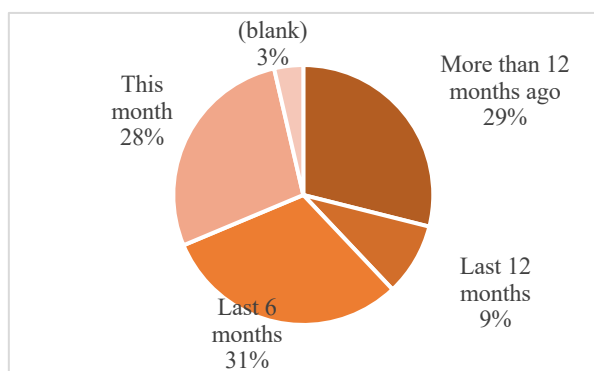


Figure 22 Q:When was the last time you bought....?

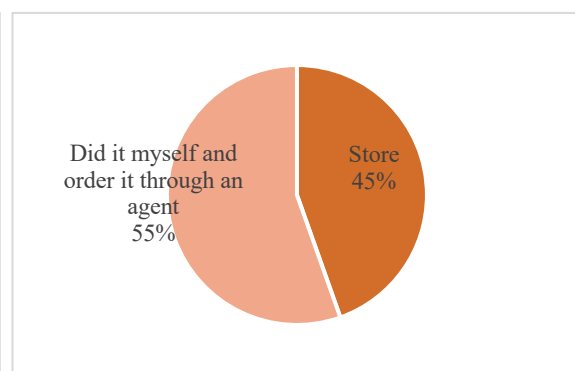


Figure 22 Q:From who have you bought it?

The decision-making process for choosing stone design/pieces within the surveyed population is notably influenced by several key factors:

- Architect's Influence: In a majority of cases (58%), the architect's input significantly guides the decision on the type of design or piece to select.
- Agent/Supplier Influence: In approximately 22% of instances, the agent or supplier plays a pivotal role in influencing the choice.
- End Customer Consultation: Surprisingly, end customer consultation is relatively rare, with only 10% of cases involving direct input from the customer.

In terms of the most influential factors guiding the choice of stone design/pieces:

- Stone Type: The type of stone itself is a primary consideration, underscoring its significance in decision-making.
- Design: Design elements strongly influence the decision, emphasizing the importance of aesthetics.
- Color: Color is another pivotal factor that plays a significant role in shaping choices.
- Quality: Quality considerations, along with the country of origin, also hold considerable sway in the decision-making process.
- Conversely, factors such as "price," "agent," and "author" are deemed to be less critical in the decision-making process, highlighting the dominance of stone type, design, and colour in guiding choices within the ornamental stone sector.

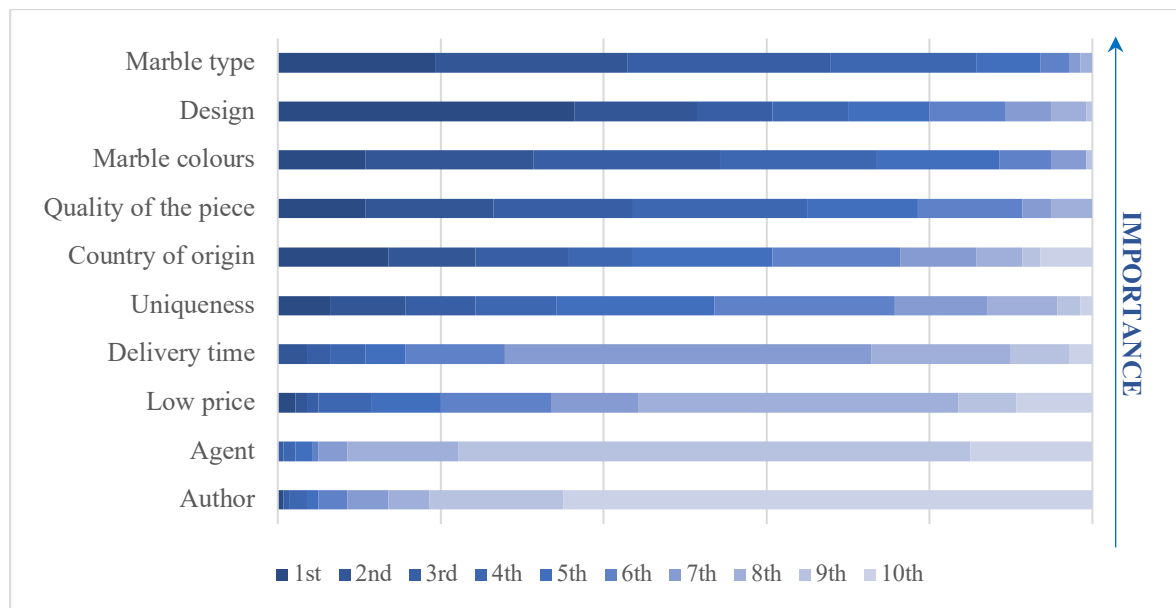


Figure 23 Q: Please rank the following reasons as to aspects you value the most when selecting a marble piece.

When asked on the features they most appreciate in the last stone piece they bought, 51% of the interviewed replied “uniqueness” and “beauty” while 28% referred cited convenience-related factors, such as practicality, affordability, familiarity, and proximity to the quarry, as influential in their choices.

These insights underscore the importance of aesthetics and uniqueness in stone piece selection, as well as the consideration of practical and convenient attributes for a portion of buyers.

A notable finding from the survey is that only 13% of respondents reported never encountering difficulties when purchasing natural stone pieces. For the majority of respondents, difficulties were encountered in several key areas: Timely Delivery, a significant number of respondents faced challenges related to the timely delivery of their orders; Price Transparency, transparency regarding the final price of the stone pieces was a common issue for many respondents; Logistics, challenges related to transport and logistics during the procurement process were reported; Quality Control/Assurance, issues regarding quality control and assurance of the purchased marble pieces were also mentioned by respondents.

These findings highlight the real-world complexities and challenges that buyers within the ornamental stone sector may encounter during the procurement process.

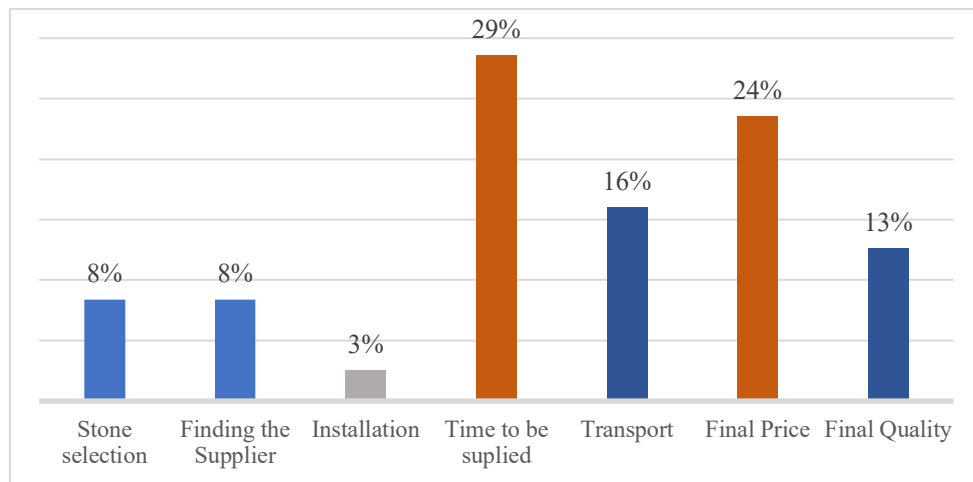


Figure 24 What are the main difficulties you have encountered when ordering a new custom-made marble piece/furniture?

Supported on this survey, we can summarize the following:

- Architects and Designers are strong influencers in the OS Industry, as prescribers and designers, but on half of their projects they buy industrial design pieces.
- Stone products are valued for their uniqueness, sustainability, and durability and they are frequently part of Architects projects.
- “Portuguese Marble and Natural Stone” is known and valued but the brand needs to be scaled up to.
- “price”, “author” and “agent” are the least valued attributes when looking for a stone product where “type”, “design” and “appearance” are kings.
- “delivery time” is not a critical decision factor but is seen as one of the biggest hurdles when ordering for stone works.

Hurdles and decision factors coincide on the need to listen to customer’s needs. A superb omnichannel customer service can solve the transparency and communications issues identified and be a big swing success factor for a company that wants to uplift its sales.



## 2. Conclusion

The Portuguese marble industry has a favourable outlook: the appetite for Natural Stone is growing internationally, the sector has done some solid steps towards modernizations and there are clear pathways established by the leading companies and sector associations on what to do next. The opportunities that lay ahead are:

- **Search for capital** to: (i) Opt for consolidation to bolster company size by gaining scale to become more competitive; (ii) Ramp up investments in existing technology and digitization, spanning both upstream and downstream operations, as well as fostering stronger customer connectivity; (iii) Allocate resources to robust R&D initiatives to introduce innovative products and expanded offerings.
- **Expand into new markets**, such as Asia, the Middle East and USA.
- Develop **new business models** harnessing ESG principles, natural stone by-products, structural natural stone, and rejuvenated quarry utilization. Cultivate strong advocacy for Portuguese natural stone brands within domestic and global spheres.

From the interviews conducted, the surveys collected, and the literature reviewed we found at least 4 possible configurations for an OS business to thrive:

1. **Volume:** Export of standardized/optimized products leveraging on BIM; a high-volume, cost-competitive venture set to rival other products such as ceramics.
2. **Customization:** Export of client-customized stone (Amazon model) – catering to small-scale customers who engage in self-design added by state-of-the-art web interface to guide them through the planning and production cycles.
3. **Co-creation:** Offer architect-co-created stone solutions offering the professional customers state of the art support and extended customer service that allows full integration with BIM software.

4. **Structural:** Take advantage of lower artistic quality blocks of stones to create a Structural Stone Business.

Considering both the opportunities and the potential business models that we studied we can conclude that a Search Fund can be the right tool to capitalize on the promising Natural Stone Sector, offering a pathway for strategic growth and value optimization. If we apply the discussed criteria in section **Error! Reference source not found.** above (latest 3 years average Turnover and average EBITDA, revenue per employee, number of employees and company maturity) and filter the power BI using the targets in Figure 25 Search Fund acquisition metrics, we find **25 potential companies** to deepen the possibility of an acquisition, see Figure 26 Table of the TOP 25 OS Companies and with 2 additional criteria, see Figure 27.

- Average Turnover of the last 3 years: > 5 million euros
- Average EBITDA of the last 3 years: > 0.5 million euros
- Number of employees: >= 30
- Company Age: >= 15 years
- Revenue per employee in the last year: > 0.08 million euros

Figure 25 Search Fund acquisition metrics

| District         | Maturity (years) | Share holders | Employees | Revenue per Employee | Margin % | EBITDA (5 years avg.) | % EBITDA (5 years) | Turnover (5 years avg.) | % Turnover (5 years) | Assets (5 years avg.) | Debt (5 years avg.) | EBITDA (3 years avg.) | % EBITDA 3 years vs. 5 | Turnover (3 years avg.) | % Turnover 3 years vs. 5 |
|------------------|------------------|---------------|-----------|----------------------|----------|-----------------------|--------------------|-------------------------|----------------------|-----------------------|---------------------|-----------------------|------------------------|-------------------------|--------------------------|
| Santarém         | 41               | 1             | 35        | 148.717 €            | 26%      | 1.299.225 €           | -16%               | 4.914.731 €             | 28%                  | 14.306.185 €          | 875.823 €           | 1.077.812 €           | -17%                   | 5.065.113 €             | 3%                       |
| Leiria           | 41               | 2             | 37        | 170.289 €            | 16%      | 709.808 €             | 245%               | 4.562.259 €             | 82%                  | 5.089.003 €           | 966.448 €           | 923.508 €             | 30%                    | 5.142.225 €             | 13%                      |
| Faro             | 16               | 2             | 64        | 105.796 €            | 12%      | 569.133 €             | 20%                | 4.734.084 €             | 93%                  | 4.108.663 €           | 602.512 €           | 549.532 €             | -3%                    | 5.344.516 €             | 13%                      |
| Vila Real        | 34               | 2             | 49        | 110.686 €            | 21%      | 1.074.917 €           | 79%                | 5.039.115 €             | 34%                  | 6.792.896 €           | 1.389.838 €         | 1.305.358 €           | 21%                    | 5.449.522 €             | 8%                       |
| Vila Real        | 30               | 2             | 59        | 112.798 €            | 12%      | 584.767 €             | 228%               | 4.916.441 €             | 90%                  | 3.716.165 €           | 780.211 €           | 739.444 €             | 26%                    | 5.574.094 €             | 13%                      |
| Leiria           | 24               | 2             | 37        | 103.824 €            | 20%      | 968.901 €             | -48%               | 4.939.077 €             | 7%                   | 9.599.038 €           | 3.672.850 €         | 1.020.960 €           | 5%                     | 5.760.505 €             | 17%                      |
| Leiria           | 23               | 1             | 56        | 130.584 €            | 31%      | 1.893.711 €           | 1%                 | 6.125.876 €             | 30%                  | 19.034.260 €          | 4.756.602 €         | 1.922.076 €           | 1%                     | 6.618.116 €             | 8%                       |
| Viana do Castelo | 35               | 1             | 64        | 121.895 €            | 16%      | 1.001.652 €           | 51%                | 6.157.271 €             | 47%                  | 8.516.102 €           | 1.029.260 €         | 1.101.971 €           | 10%                    | 6.702.805 €             | 9%                       |
| Porto            | 31               | 3             | 103       | 80.618 €             | 23%      | 1.469.787 €           | 64%                | 6.402.996 €             | 85%                  | 6.903.247 €           | 115.642 €           | 1.611.806 €           | 10%                    | 7.230.674 €             | 13%                      |
| Lisboa           | 43               | 4             | 63        | 132.645 €            | 15%      | 1.075.079 €           | -40%               | 7.371.413 €             | 19%                  | 10.420.771 €          | 3.926.423 €         | 923.003 €             | -14%                   | 7.471.076 €             | 1%                       |
| Lisboa           | 57               | 1             | 41        | 236.967 €            | 26%      | 1.890.706 €           | 1466%              | 7.159.936 €             | 60%                  | 21.911.117 €          | 11.167.279 €        | 2.950.866 €           | 56%                    | 8.187.909 €             | 14%                      |
| Viseu            | 27               | 1             | 78        | 108.578 €            | 24%      | 1.786.452 €           | 100%               | 7.583.005 €             | 35%                  | 8.419.133 €           | 123.909 €           | 2.125.577 €           | 19%                    | 8.195.870 €             | 8%                       |
| Santarém         | 29               | 0             | 86        | 111.858 €            | 35%      | 2.960.412 €           | 32%                | 8.385.003 €             | 21%                  | 22.106.560 €          | 8.061.357 €         | 2.909.789 €           | -2%                    | 8.461.775 €             | 1%                       |
| Braga            | 57               | 5             | 62        | 166.539 €            | 21%      | 1.618.168 €           | 439%               | 7.683.747 €             | 80%                  | 11.687.535 €          | 1.614.860 €         | 2.244.151 €           | 39%                    | 8.662.021 €             | 13%                      |
| Lisboa           | 29               | 4             | 48        | 260.224 €            | 12%      | 1.290.701 €           | -17%               | 10.485.749 €            | 36%                  | 10.483.155 €          | 1.271.979 €         | 1.318.784 €           | 2%                     | 11.386.089 €            | 9%                       |
| Porto            | 38               | 5             | 118       | 117.953 €            | 13%      | 1.438.629 €           | 100%               | 11.434.863 €            | 33%                  | 16.384.201 €          | 3.384.501 €         | 1.787.675 €           | 24%                    | 12.168.502 €            | 6%                       |
| Leiria           | 54               | 0             | 139       | 97.676 €             | 22%      | 2.699.946 €           | 69%                | 12.229.811 €            | 23%                  | 24.971.500 €          | 9.142.384 €         | 2.906.788 €           | 8%                     | 12.446.538 €            | 2%                       |
| Viseu            | 44               | 6             | 116       | 96.907 €             | 23%      | 2.586.739 €           | 204%               | 11.431.482 €            | 33%                  | 21.931.189 €          | 845.637 €           | 3.227.512 €           | 25%                    | 12.501.714 €            | 9%                       |
| Lisboa           | 36               | 2             | 44        | 409.028 €            | 13%      | 1.931.875 €           | 6%                 | 15.186.722 €            | 34%                  | 18.808.686 €          | 1.124.172 €         | 1.990.901 €           | 3%                     | 16.090.595 €            | 6%                       |
| Santarém         | 19               | 1             | 42        | 351.479 €            | 37%      | 5.790.731 €           | 18%                | 15.829.331 €            | 20%                  | 31.200.973 €          | 5.322.023 €         | 6.195.590 €           | 7%                     | 16.801.519 €            | 6%                       |
| Viana do Castelo | 17               | 2             | 89        | 283.599 €            | 8%       | 1.256.803 €           | 626%               | 14.879.633 €            | 307%                 | 15.566.709 €          | 2.970.968 €         | 1.509.296 €           | 20%                    | 18.817.699 €            | 26%                      |
| Viseu            | 26               | 3             | 234       | 111.298 €            | 18%      | 3.342.977 €           | 131%               | 18.219.811 €            | 102%                 | 21.871.113 €          | 7.146.225 €         | 4.029.684 €           | 21%                    | 21.171.711 €            | 16%                      |
| Lisboa           | 37               | 2             | 113       | 320.095 €            | 13%      | 4.026.026 €           | 213%               | 30.806.471 €            | 41%                  | 30.169.161 €          | 4.989.678 €         | 5.538.859 €           | 38%                    | 34.635.775 €            | 12%                      |
| Santarém         | 21               | 1             | 202       | 273.951 €            | 26%      | 7.807.022 €           | 232%               | 30.500.567 €            | 340%                 | 42.539.032 €          | 12.443.430 €        | 9.435.721 €           | 21%                    | 39.102.416 €            | 28%                      |

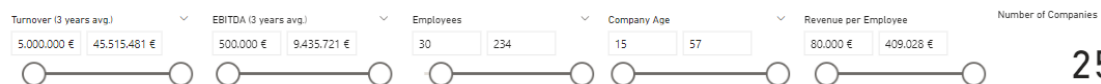


Figure 26 Table of the TOP 25 OS Companies

From these 25 potential targets, to keep the investment in a more modest interval, 2 additional restrictions were included, namely, a superior limit concerning EBITDA (<5.000.000 euros) and operating revenue (<25.000.000 euros). With these we end up with 21 potential targets.

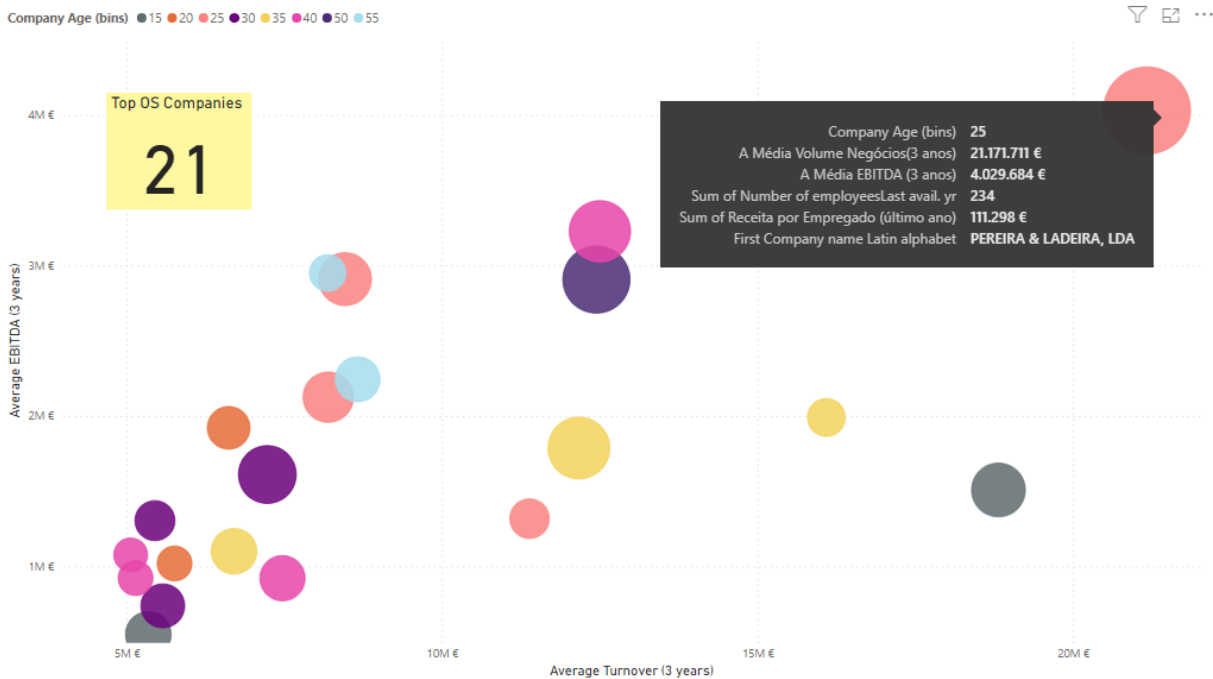


Figure 27 OS Companies Final Shortlist

If one follows the investment multiples identified in **Error! Reference source not found.**, the following indicative table (Figure 28 Search Fund investment intervals) is obtained, namely considering multiples between 1 to 1.5x if compared with sales or 3.5 to 5x in regard with EBITDA. Following the 21 short-listed companies, the average sales is 9.4 M€ and the average EBITDA is 1.8 M€, which points towards an investment close to 10 M€. This investment value is obtained with a combination of the 4 metrics, i.e., using the limits multipliers interval for sales and EBITDA one obtains 4 indicative acquisition prices and then a simple average is done since any of these criteria is considered preferred.

## Multiples and Investment

| Multiples                  | Min.     | Max.   |         |
|----------------------------|----------|--------|---------|
| Sales                      | 1        | 1,5    |         |
| EBITDA                     | 3,5      | 5      |         |
| Ratios                     | 29%      | 30%    |         |
| Investment Estimation      | N+0 Min. | Max.   | Invest. |
| Sales                      | 9,4 M€   | 9,4 M€ | 14,2 M€ |
| EBITDA                     | 1,8 M€   | 6,4 M€ | 9,1 M€  |
| Average = Investment Value | 19%      |        | 9,8 M€  |

Figure 28 Search Fund investment intervals

To convince investor we propose the memorandum presented below.

| Industry                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Investment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>• <b>OS industry in Portugal:</b> <ul style="list-style-type: none"> <li>• Enterprises: &gt;2 k, 90% micro and small companies;</li> <li>• Turnover: 1.2 bi euros and net profit: 0.1 bi euros;</li> <li>• CAGR 2012-2022: &gt;50% in sales and exports;</li> <li>• Exports: c. 0.5 bi euros (30% raw, 70% transformed).</li> </ul> </li> <li>• <b>Problems:</b> <ul style="list-style-type: none"> <li>• Low access to capital to expand production capacity;</li> <li>• Technological and product obsolescence;</li> <li>• Lack of managerial skills and stone masons;</li> <li>• Shortage of vision and unplanned successions;</li> <li>• Threat of substitute products.</li> </ul> </li> </ul>                                                                                                                                                                                                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>• <b>Solution:</b> one year SF to deepen this thesis and close an acquisition</li> <li>• <b>Search Criteria:</b> <ul style="list-style-type: none"> <li>• Turnover: 5-25 million euros;</li> <li>• Revenue pc: &gt; 80 k euros;</li> <li>• EBITDA: 0.5-5 million euros;</li> <li>• Company tenure: &gt;15 years;</li> <li>• Employees: &gt; 30.</li> </ul> </li> <li>• <b>Roadmap to revamp the OS business model:</b> <ul style="list-style-type: none"> <li>• Modernize infrastructure (machinery, IT);</li> <li>• Implement a proactive sales strategy;</li> <li>• Product development with ESG and intellectual property focus;</li> <li>• Design lab with co-creation of solutions with customers;</li> <li>• Transparent processes from quarry to end customer;</li> <li>• Customer experience and satisfaction (predictability of deliveries);</li> <li>• Sustained competitive advantages through high barriers to entry (heavy investment and quarry licenses).</li> </ul> </li> </ul> |
| Economics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Team                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <ul style="list-style-type: none"> <li>• <b>Search phase:</b> 250 k euros for two years (sunk cost)</li> <li>• <b>Investment:</b> up to 10 million euros (up to 2.4 million from investors %)</li> <li>• <b>Structure:</b> 70% debt, 25% investors and 5% searchers</li> <li>• <b>Incentives :</b> <ul style="list-style-type: none"> <li>• Vesting: 20% (3 parts: acquisition, 4 years and 20-35% IRR);</li> <li>• Performance: 4% of equity (employees);</li> <li>• Earn out period: seller works with new ExCom 1 year after acquisition.</li> </ul> </li> <li>• <b>Expected return (10-year horizon):</b> <ul style="list-style-type: none"> <li>• ROI 495%;</li> <li>• IRR: 34.2%.</li> </ul> </li> <li>• <b>Risks:</b> <ul style="list-style-type: none"> <li>• Inability to find a target or to close the acquisition;</li> <li>• Unattractive investment conditions (investors have the right of refusal);</li> <li>• Inability to sell, low liquidity shortage of market depth;</li> <li>• Performance and management;</li> <li>• Unknown risks (pandemic, war, political, taxes).</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• <b>Advisory Board:</b> <ul style="list-style-type: none"> <li>• Investor representative;</li> <li>• Experts in SF or M&amp;A;</li> <li>• OS industry <i>connaisseurs</i>.</li> </ul> </li> <li>• <b>Executive Committee:</b> <ul style="list-style-type: none"> <li>• CEO – Carlos: Chemistry, &gt;20y scientific strategy in pharma</li> <li>• CFO – Nuno: Economics, &gt;10y finance in government &amp; energy</li> <li>• CTO – Hugo: Computer Science, &gt;20y IT experience</li> <li>• COO – Filipe: Economics, &gt;24y of growth and sales worldwide.</li> </ul> </li> <li>• <b>Hirings:</b> sales consultants, designers, artists, architects (3D experts), IP experts, engineers</li> </ul>                                                                                                                                                                                                                                                                                           |

Figure 29 Investment Memorandum

A 10-year horizon financial model covering the 5 phases of the search fund model and a calendar was drawn: (i) raise the search capital – 6 months, (ii) search and acquire a promising company – 18 months, (iii) operate, grow, and value generation – 120 months, and (iv) exit – 6 months. To simulate the results of this venture, a financial model was built which considered

the assumptions in Figure 30. To root the model on real data, most of the financial indicators come from observed data in the industry, using sources such as Instituto Nacional de Estatística, Orbis or Bank of Portugal. Additionally, other ad-hoc but still realistic assumptions about macroeconomic variables were made, namely concerning growth rates, prices evolution, taxes (were considered 10x the observed proportion of taxes/sales in INE data). The assumptions used in the financial model were based on industry aggregated data, namely INE<sup>6</sup> which was also used in the Power BI which the references can be seen in

Appendix 19. One of the most important assumptions regards the pace of growth of sales which is assumed to be 1/10 of the last decade growth of exports, i.e., 5.2%, and the assumption of increasing value generation (either through efficiency gains driven by better technology use and higher prices per ton sold), namely that cost of goods sold grow at 2/3 the growth rate of sales. In a further investigation these assumptions could be calibrated with specific ratios for the 21 selected companies or the selected company to make more robust premises by retrieving from Orbis the necessary financial data to calculate each ratio.

The debt is assumed to be reimbursed uniformly, 10% of the initial value per year and the interest payment is assumed to reach 3.5% of the stock of debt in each period.

Another key component of the SF model is the acquisition and selling prices which affect the return to investors and then the indicators IRR and ROI. With this respect, an important decision for the model is the calculation of the acquisition price which is assumed to sum 9.8 million euros and the exit price, which is assumed to follow the same estimation method as the acquisition price, obtaining a value of 15.3 million euros. The return for investors is expected to achieve 34,2% of IRR and the discounted cash-flows to the present day generate a return on investment of 495%.

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<sup>6</sup> INE, Sistema de contas integradas das empresas, atividade económica (Subclasse - CAE Rev. 3)

## Financial Model

| Phases and Duration             | Months |
|---------------------------------|--------|
| 1. Raise Search Capital         | 6      |
| 2. Search and Acquire           | 18     |
| 3. Operation and Value Creation | 120    |
| 4. Exit                         | 6      |

| Assumptions                      | Source      | Value    |
|----------------------------------|-------------|----------|
| <b>Industry</b>                  |             |          |
| Exports Growth - 2012-2022       | INE         | 51,8%    |
| Sales Growth                     | Assumption  | 5,2%     |
| Average Salary                   | INE         | 1.000 €  |
| Revenue / Employee               | Orbis       | 95.215 € |
| Revenue / Employee               | INE 2021    | 87.191 € |
| Salaries Growth                  | Assumption  | 5,0%     |
| Inflation - Operational Expenses | Assumption  | 2,5%     |
| Cost of Goods Sold (COGS) Growth | Assumption  | 3,5%     |
| Social Security (%Salary)        | Assumption  | 23,75%   |
| Other Employee Costs (%Salary)   | Assumption  | 10,0%    |
| <b>Income Statment Ratios</b>    |             |          |
| Sales Composition                | INE         | 100,0%   |
| Products (transformed)           |             | 74,3%    |
| Goods (non-transformed)          |             | 15,8%    |
| Services                         |             | 9,9%     |
| COGS (%Sales)                    | INE         | 34,4%    |
| Operating Expenses/FSE (%Sales)  | INE         | 31,2%    |
| Capex (%Sales)                   | INE         | 10,0%    |
| Employee Cost (%Sales)           | INE         | 21,5%    |
| Net Income (%Sales)              | INE         | 7,5%     |
| Production (%Sales)              | INE         | 94,0%    |
| GVA (%Sales)                     | INE         | 37,0%    |
| Gross Margin (EBITDA/Oper. Rev.) | Orbis       | 13,2%    |
| <b>Balance Ratios</b>            |             |          |
| Equity/Assets                    | INE         | 46%      |
| Liabilities/Assets               | INE         | 54%      |
| Debt/Assets (Solvency Ratio)     | Orbis       | 44%      |
| <b>Financing Costs</b>           |             |          |
| WACC                             | Calculation | 7,0%     |
| Cost of Equity                   | Assumption  | 10,0%    |
| Cost of Debt                     | BdP         | 3,5%     |
| <b>Taxes</b>                     |             |          |
| Indirect Taxes                   | Assumption  | 5,0%     |
| Direct Taxes                     | Assumption  | 10,0%    |

Figure 30 Financial Model Assumptions

To show how the search fund model works, a financial model was developed to highlight the main components of this model which produces high returns to investors and an alignment of incentives of shareholders with managers (founders) and employees. However, while the model is being calibrated, the adjustment of each variable also allows a better understanding of the sensitivity of the model and show how the managers need to keep expenses as low as possible to achieve the desired goal of an internal rate of return (IRR) over 30%, essential unlock the vesting goal.

| N                                    | N+0     | N+1     | N+2     | N+3     | N+4       | N+5   | N+6   | N+7   | N+8   | N+9   | N+10  | TOTAL |
|--------------------------------------|---------|---------|---------|---------|-----------|-------|-------|-------|-------|-------|-------|-------|
| Periodo                              | 0       | 1       | 2       | 3       | 4         | 5     | 6     | 7     | 8     | 9     | 10    |       |
| Operation Phase                      | Invest. |         |         |         |           |       |       |       |       |       | Exit  |       |
| Investment Structure                 |         |         |         |         |           |       |       |       |       |       |       |       |
| Investment                           | %       | €       |         |         |           |       |       |       |       |       |       |       |
| Founders                             | 5,0%    | 0,5 M€  |         |         |           |       |       |       |       |       |       |       |
| Investors                            | 25,0%   | 2,4 M€  |         |         |           |       |       |       |       |       |       |       |
| Debt                                 | 70,0%   | 6,8 M€  |         |         |           |       |       |       |       |       |       |       |
| TOTAL                                | 100,0%  | 9,8 M€  |         |         |           |       |       |       |       |       |       |       |
| Incentives                           | N+0     | N+1     | N+2     | N+3     | N+4       | N+5   | N+6   | N+7   | N+8   | N+9   | N+10  | TOTAL |
| Vesting                              | 7%      |         |         |         |           | 1%    | 1%    | 1%    | 1%    | 1%    | 7%    | 20%   |
| Performance                          |         | 0,25%   | 0,25%   | 0,25%   | 0,25%     | 0,33% | 0,33% | 0,33% | 0,50% | 0,50% | 1%    | 4%    |
| Cap Table/Balance                    | N+0     | N+1     | N+2     | N+3     | N+4       | N+5   | N+6   | N+7   | N+8   | N+9   | N+10  | TOTAL |
| Founders                             | 12%     | 12%     | 12%     | 12%     | 12%       | 13%   | 14%   | 16%   | 17%   | 18%   | 25%   |       |
| Investors                            | 18%     | 25%     | 32%     | 39%     | 45%       | 51%   | 56%   | 61%   | 67%   | 72%   | 71%   |       |
| Employees                            | 0%      | 0%      | 1%      | 1%      | 1%        | 1%    | 2%    | 2%    | 3%    | 3%    | 4%    |       |
| Debt                                 | 70%     | 63%     | 56%     | 49%     | 42%       | 35%   | 28%   | 21%   | 14%   | 7%    | 0%    |       |
| TOTAL                                | 100%    | 100%    | 100%    | 100%    | 100%      | 100%  | 100%  | 100%  | 100%  | 100%  | 100%  |       |
| Income Statement (millions of euros) |         |         |         |         |           |       |       |       |       |       |       |       |
| Revenue                              | 11,8    | 12,4    | 13,1    | 13,7    | 14,5      | 15,2  | 16,0  | 16,8  | 17,7  | 18,6  | 19,6  |       |
| Cost of Goods Sold (COGS)            | 4,1     | 4,2     | 4,3     | 4,5     | 4,6       | 4,8   | 5,0   | 5,1   | 5,3   | 5,5   | 5,7   |       |
| Gross Profit                         | 7,8     | 8,2     | 8,7     | 9,3     | 9,8       | 10,4  | 11,0  | 11,7  | 12,4  | 13,1  | 13,9  |       |
| Operating Expenses                   | 3,7     | 3,8     | 3,9     | 4,0     | 4,1       | 4,2   | 4,3   | 4,4   | 4,5   | 4,6   | 4,7   |       |
| Indirect Taxes                       | 0,6     | 0,6     | 0,7     | 0,7     | 0,7       | 0,8   | 0,8   | 0,8   | 0,9   | 0,9   | 1,0   |       |
| Cost of Employees                    | 2,3     | 2,4     | 2,6     | 2,7     | 2,8       | 3,0   | 3,1   | 3,3   | 3,4   | 3,6   | 3,8   |       |
| EBITDA / Operating Profit            | 1,1     | 1,4     | 1,6     | 1,9     | 2,2       | 2,5   | 2,8   | 3,2   | 3,6   | 4,0   | 4,4   |       |
| Interest Expense                     | 0,2     | 0,2     | 0,2     | 0,2     | 0,1       | 0,1   | 0,1   | 0,1   | 0,0   | 0,0   | 0,0   |       |
| Direct Taxes                         | 0,1     | 0,1     | 0,2     | 0,2     | 0,2       | 0,2   | 0,3   | 0,3   | 0,4   | 0,4   | 0,4   |       |
| Depreciation & Amortization          |         | 0,1     | 0,2     | 0,4     | 0,5       | 0,7   | 0,8   | 1,0   | 1,2   | 1,4   | 1,6   |       |
| Net Income                           | 0,8     | 0,9     | 1,0     | 1,2     | 1,3       | 1,4   | 1,6   | 1,8   | 2,0   | 2,2   | 2,4   |       |
| Financial Ratios                     | N+0     | N+1     | N+2     | N+3     | N+4       | N+5   | N+6   | N+7   | N+8   | N+9   | N+10  | TOTAL |
| COGS (% Sales)                       | 34%     | 34%     | 33%     | 33%     | 32%       | 32%   | 31%   | 31%   | 30%   | 30%   | 29%   |       |
| Operating Expenses (% Sales)         | 31%     | 30%     | 30%     | 29%     | 28%       | 27%   | 27%   | 26%   | 25%   | 25%   | 24%   |       |
| Employee Costs (% Sales)             | 20%     | 20%     | 20%     | 20%     | 20%       | 19%   | 19%   | 19%   | 19%   | 19%   | 19%   |       |
| EBITDA/Operating Profit (% Sales)    | 10%     | 11%     | 12%     | 14%     | 15%       | 16%   | 18%   | 19%   | 20%   | 21%   | 22%   |       |
| Net Income (% Sales)                 | 6,7%    | 7,3%    | 7,9%    | 8,4%    | 8,9%      | 9,5%  | 10,0% | 10,6% | 11,1% | 11,6% | 12,2% |       |
| Implicit # of Employees              | 124     | 130     | 137     | 144     | 152       | 160   | 168   | 177   | 186   | 195   | 206   |       |
| Divnvestment/Exit                    | N+0     | Min.    | Max.    | Invest. | Multiples |       |       |       |       |       |       |       |
| Sales                                | 19,6 M€ | 19,6 M€ | 29,4 M€ |         | 110%      |       |       |       |       |       |       |       |
| EBITDA                               | 4,4 M€  | 15,4 M€ | 21,9 M€ |         | 491%      |       |       |       |       |       |       |       |
| Average = Divnvestment Value         | 22%     | 78%     | 75%     | 21,6 M€ |           |       |       |       |       |       |       |       |
| IRR and ROI                          | N+0     | N+1     | N+2     | N+3     | N+4       | N+5   | N+6   | N+7   | N+8   | N+9   | N+10  | TOTAL |
| IRR (investors)                      | 34,2%   |         |         |         |           |       |       |       |       |       |       |       |
| Search Capital                       | 0,25    |         |         |         |           |       |       |       |       |       |       |       |
| Investment                           | -2,44   |         |         |         |           |       |       |       |       |       |       |       |
| Net Income                           |         | 0,23    | 0,33    | 0,45    | 0,59      | 0,73  | 0,90  | 1,09  | 1,31  | 1,55  | 1,69  |       |
| Exit                                 |         |         |         |         |           |       |       |       |       |       | 15,30 |       |
| ROI (investors)                      | 495%    |         |         |         |           |       |       |       |       |       |       |       |
| Search Capital                       | 0,25    |         |         |         |           |       |       |       |       |       |       |       |
| Investment                           | 2,44    |         |         |         |           |       |       |       |       |       |       |       |
| Current Value of Investment          |         | 0,21    | 0,29    | 0,36    | 0,45      | 0,52  | 0,60  | 0,68  | 0,76  | 0,84  | 0,86  |       |
| Divnvestment/Exit                    |         |         |         |         |           |       |       |       |       |       | 7,77  |       |
| Debt                                 | N+0     | N+1     | N+2     | N+3     | N+4       | N+5   | N+6   | N+7   | N+8   | N+9   | N+10  | TOTAL |
| Debt                                 | 6,84    | 6,15    | 5,47    | 4,79    | 4,10      | 3,42  | 2,74  | 2,05  | 1,37  | 0,68  | 0,00  |       |
| Var. Debt                            | 0,00    | -0,68   | -0,68   | -0,68   | -0,68     | -0,68 | -0,68 | -0,68 | -0,68 | -0,68 | -0,68 |       |
| Stock of initial Debt                | 100%    | 90%     | 80%     | 70%     | 60%       | 50%   | 40%   | 30%   | 20%   | 10%   | 0%    |       |
| Capex and Cash-Flow                  | N+0     | N+1     | N+2     | N+3     | N+4       | N+5   | N+6   | N+7   | N+8   | N+9   | N+10  | TOTAL |
| Capex                                | 1,18    | 1,24    | 1,31    | 1,37    | 1,45      | 1,52  | 1,60  | 1,68  | 1,77  | 1,86  | 1,96  | 15,76 |
| Cash Flow                            |         | 0,34    | 0,59    | 0,86    | 1,14      | 1,44  | 1,76  | 2,10  | 2,47  | 2,85  | 3,26  | 16,83 |
| FCF (PV of CF)                       |         | 0,32    | 0,52    | 0,70    | 0,87      | 1,03  | 1,17  | 1,31  | 1,43  | 1,55  | 1,66  | 10,56 |

Figure 31 Financial Model Returns

Another important aspect revolves around the financial leverage of this investment which is 70% financed through bank debt, 25% from investors and 5% from the founders. The SF model also includes two types of incentives, the vesting of equity to the founders (20%) and shares for employees (4%). The value generated to investors and founders come from the assumption of



increased value added of each OS sold. This is the aim of this model and is seen in the model by sales value growing at a higher pace than costs (raw materials, employees, and services).

To deliver the targets expressed in the investment memorandum some tweaks should be done on the traditional business models that we saw in our research. Our proposal, for the hypothetical company that could emerge from this exercise, would be:

| Customer Value Proposition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Go-To-Market                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Customer:</b> Architects and interior designers seeking premium features for their projects.</p> <p><b>Problem:</b> Architects and interior designers struggle to materialize their projects in natural stone.</p> <p><b>Solution:</b> A reliable, price transparent platform that connects architects and interior designers with natural stones from around the world and with the best technology to transform it, ESG &amp; BIM certified.</p> <p><b>Price:</b> Free access to DRAFT estimates. Premium pricing for the projects executed.</p>                             | <p><b>Distribution Channels:</b> Website; Direct Sales to Contractors and Builders; Architects and Designers; B2B Contracts</p> <p><b>Conversion funnel:</b> Architects browse for solutions in the web &gt; Architects ask for a quote for their projects</p> <p><b>Demand Generation:</b> Content Marketing; Social Media Engagement; Associations Partnerships; Influencer Collaborations; Email Campaign/ Newsletters</p>                                                                                                                                                |
| Technology & Operations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Profit Formula                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <p><b>Value Chain:</b> R&amp;D; UX; Customer Acquisition (Marketing); Hosting</p> <p><b>Key Activities:</b> Curating and updating the collection of natural stones; Products / technologies / processes R&amp;D; Marketing and promotion to attract architects, interior designers, and stone suppliers.</p> <p><b>Vertical Integration:</b> Raw Stone, Web Platform (outsourced); Transformation, R&amp;D, marketing (in-house)</p> <p><b>Business Type:</b> Product Innovation   Customer Management</p> <p><b>Intellectual Property (IP):</b> Web algorithm; R&amp;D products</p> | <p><b>Monetization Model:</b> Cost of co-creation and project execution or Commission on successful transactions between architects/designers and 3rd parties.</p> <p><b>Market Size:</b> 528M€ (PT), growing 4% (Assimagra May23)</p> <p><b>Cost Structure:</b> Platform development and maintenance; Marketing and advertising costs; Raw Materials and Machinery; HR; R&amp;D</p> <p><b>Profit Drivers:</b> number of architects and designers registered on the platform; Average project value per customer; Customer satisfaction scores from architects/designers</p> |

*Figure 32 Business Model adapted from Lean Startup*

In the 1:1 interviews we conducted on our research we had the opportunity to meet 5 of the above listed companies. We found deeply passionate CEOs, managing, in 4 out of 5, family-run enterprises, inherited, with a clear view on the Industry 4.0 opportunities and concerned with its challenges. For many, the journey undertaken thus far has not been easy. Companies rely heavily on them, and they are unsure if they will have the energy to take them further: the technological barrier is substantial, clients are widely dispersed, and competition from substitute products is uncomfortably close. Remarkably, none of these companies has concrete succession plans. One CEO, however, exhibited a resolute intention to sell once age precludes effective management. This CEO leads a highly profitable, technologically advanced, customer

focused, impeccably structured, financially solid company and conveniently situated making it the prime contender to move for the next level of the Search process.

These 5 companies are the ones we saw better prepared, if we extend the foreseen OS challenges for the universe of the enterprises, we know that many will fail to adapt, and many would suffer a lot to survive in the coming years.

We studied the OS Sector, finding its challenges and opportunities, we've met a fair number of its key stakeholders, we found an investment instrument that could transform the way these family-run, small size companies sector operates. We build an investment memorandum to start the Search Fund, we proposed a business model to make it thrive. Finally, we list below a set of principles the hypothetical company should follow:

- Be Customer-Centric by focusing on delivering value that meets their needs.
- Bring innovative (disruptive if possible) ideas and solutions to market.
- Adopt a lean methodology, efficiency, and resource optimization.
- Be agile and adaptable, act on feedback and changing market conditions.
- Plan for growth and scalability.
- Build the right team: high expertise, creativity, motivation, and resilience.
- Building strong networks: advisors, investors, and industry peers.
- Apply the startup principles: build a strong viral brand; fast escalation of ideas, MVP testing, IP, internationalization.

### **3. Contribution to Knowledge**

This thesis enhances understanding of the Portuguese marble sector by identifying growth opportunities within the industry. The analysis of company strategies, market trends, and technological advancements offers insights that can guide industry stakeholders and potential investors in fostering sustainable growth, strategic innovation, and global market positioning.

### **4. Limitations**

This thesis on the Portuguese Ornamental Stone Sector acknowledges limitations due to a condensed timeline that encompassed literature review, extensive face-to-face interviews, group coordination, and individual full-time jobs. The compressed schedule has constrained the number of companies that we could speak to, the possibility to study competing or complementary sectors (like the ceramic, stone by-products, timber, and cement industries) and even other OS exporting countries, the depth of analysis and comprehensive data collection. These constraints are intrinsic to the project's timeline and circumstances.

### **5. Future Research**

To implement a Search Fund more companies, need to be identified, so the next research phase should be focus on a comprehensive study on the remaining TOP OS Companies gathering insights into their resilience, evolution, and plans, including HR and succession issues. Secondly, the 4 business models and the investment memorandum proposed should be tested with OS Companies, Architects, and potential Investors. Lastly, a comparative analysis of international ornamental (Italy, France, Turkey) stone sectors might yield valuable benchmarking insights, aiding in identifying Portugal's unique strengths and opportunities for global competitiveness.

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## Appendix

### Reference Documents & Events

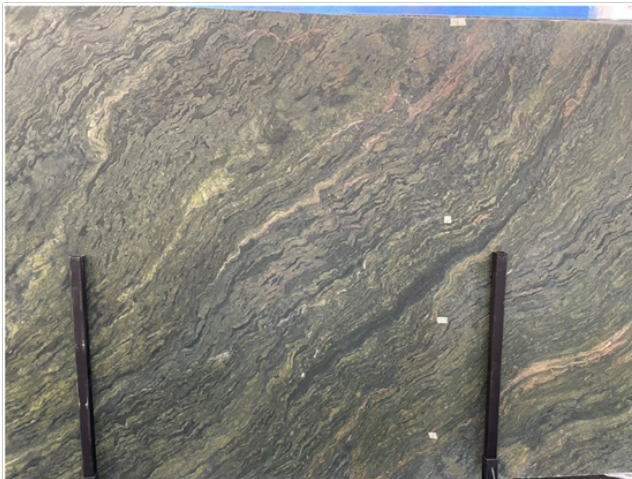


Appendix 1 Global Stone Congress Batalha 2023

| #  | Tipo               | Empresa                     | STATUS | Website                                                                        | Telefone        |
|----|--------------------|-----------------------------|--------|--------------------------------------------------------------------------------|-----------------|
| 1  | Academia           | Belas Artes                 |        |                                                                                |                 |
| 2  | Academia           | GUTA                        |        | guta@gutamg.com                                                                |                 |
| 3  | Academia           | MME                         |        |                                                                                |                 |
| 4  | Academia           | Univ LEIRIA                 | DONE   | https://www.ipleiria.pt                                                        |                 |
| 5  | Academia           | Glauco MADEIRA              |        |                                                                                |                 |
| 6  | Academia           | António Marinho TORRES      | DONE   |                                                                                |                 |
| 7  | Academia           | Euclides MAIOR              | DONE   |                                                                                |                 |
| 8  | Academia           | Teclena                     |        | https://teclena.pt                                                             |                 |
| 9  | Academia           | Planalto                    |        |                                                                                |                 |
| 10 | Academia           | PassiveHaus Portugal        | DONE   | https://www.passivehouse.es                                                    |                 |
| 11 | Associações        | AICEP                       | DONE   | https://www.portugalglobal.pt/EN/Pages/index.aspx                              |                 |
| 12 | Associações        | ANIEP                       | DONE   | http://aniep.pt/pt                                                             |                 |
| 13 | Associações        | ASSIMAGRA                   | DONE   | www.grimeirapedra.com                                                          | 244 491 803     |
| 14 | Associações        | Cluster Mineral Resources   | DONE   | https://www.clustermineralresources.pt                                         |                 |
| 15 | Associações        | STONE SITI                  | DONE   | https://www.stonecti.com/                                                      | 217 121 930     |
| 16 | Associações        | CIP                         | DONE   | https://cip.org.pt/en/                                                         |                 |
| 17 | Empresa Referência | JULAR                       | DONE   | https://www.jular.pt                                                           |                 |
| 18 | Máquinas           | CONSTRUAL                   | DONE   | https://www.construal.pt                                                       |                 |
| 19 | Máquinas           | FRAVIZEL                    | DONE   | https://www.fravizel.com                                                       |                 |
| 20 | Máquinas           | STAUBLI                     | DONE   | https://www.staubli.com/fr/en/corp.html                                        | +34 636 953 736 |
| 21 | Máquinas           | António Jacinto Figueiredo, | DONE   | https://www.afigueiredo.pt                                                     |                 |
| 22 | Pedra              | Mercado da PEDRA            |        | https://mercadoapedra.com/en/home/                                             |                 |
| 23 | Pedra              | ÁFRICA STONE                |        | http://www.africa-stone.com/                                                   |                 |
| 24 | Pedra              | AIRELIMESTONES              |        | https://www.airelimestone.com/                                                 | 244 098 438     |
| 25 | Pedra              | Amado Rebelo                | DONE   | Not Available                                                                  |                 |
| 26 | Pedra              | BSTONE                      |        | https://www.bstone.pt                                                          | 268 848 030     |
| 27 | Pedra              | CB PROD                     | DONE   | https://cbprod.pt/home                                                         | 968 701 193     |
| 28 | Pedra              | CEI                         | DONE   | http://www.ceigroup.net                                                        | 919 982 264     |
| 29 | Pedra              | DIMPOMAR                    | DONE   | https://www.dimpomar.com/pt                                                    |                 |
| 30 | Pedra              | FIDALJOR                    | DONE   | https://fidaljor.pt                                                            |                 |
| 31 | Pedra              | FILSTONE                    |        | https://www.filstone.com                                                       | 938 988 007     |
| 32 | Pedra              | FRONT WAVE                  |        | https://frontwave.pt/em                                                        |                 |
| 33 | Pedra              | GARGULA GÓTICA              | DONE   | https://gargulagotica.pt                                                       | 966 423 047     |
| 34 | Pedra              | GRANITRANS                  | DONE   | https://www.granitrans.com                                                     |                 |
| 35 | Pedra              | Grupo FERRAR                | DONE   | https://grupoferrar.pt                                                         |                 |
| 36 | Pedra              | Grupo MOCSTONE              | DONE   | https://www.mocstone.pt                                                        |                 |
| 37 | Pedra              | INOFER                      | DONE   | https://www.facebook.com/metalinofer                                           | 934 801 737     |
| 38 | Pedra              | INOVEGA                     |        | http://www.inovega.pt/pt/index.php                                             | 232 857 500     |
| 39 | Pedra              | JULIPEDRA                   |        | https://www.julipedra.com/en/home                                              | 262 929 766     |
| 40 | Pedra              | LSI STONE                   |        | https://lsi-stone.com                                                          | 244 403 673     |
| 41 | Pedra              | Manuel & Cardoso            |        | https://pedrasmc.com                                                           | 933 603 653     |
| 42 | Pedra              | MARFILPE                    |        | https://www.marfilpe.pt/em                                                     | 915 976 669     |
| 43 | Pedra              | MÁRMOFELIZARDO              |        | https://www.marmofelizardo.pt                                                  | 965 140 307     |
| 44 | Pedra              | Mármore A SOUSA             |        | https://www.facebook.com/people/Mármore-e-Granitos-A-Sousa-Lda/100045006858735 | 917 530 860     |
| 45 | Pedra              | Grupo GALRÃO                | DONE   | https://www.galrao.com                                                         |                 |
| 46 | Pedra              | Mármore REBELO              | DONE   | https://marmoresrebelo.pt                                                      | 917 552 961     |
| 47 | Pedra              | Mármore RICARDO             | DONE   | https://www.facebook.com/ricardosilvamg82                                      | 918 323 707     |
| 48 | Pedra              | Mármore ROSAL               |        | https://marmoresrosal.com                                                      | 243 406 213     |
| 49 | Pedra              | MCM                         |        | https://www.mcmstonetailors.com                                                | 917 221 136     |
| 50 | Pedra              | MOCAPOR                     |        | https://www.mocapor.com/pt                                                     | 268 881 415     |
| 51 | Pedra              | NC Granitos                 |        | https://www.ncgranitos.com                                                     | 255 880 060     |
| 52 | Pedra              | NORMA Margem                | DONE   | https://www.normamargem.pt                                                     | 919 961 325     |
| 53 | Pedra              | OLIVAH                      | DONE   | https://www.olivah.pt                                                          |                 |
| 54 | Pedra              | PARDAS GRANITES             |        | https://pardais.com                                                            | 255 611 682     |
| 55 | Pedra              | PEDRA ANTICUA               | DONE   | https://www.pedrantiqua.pt                                                     | 919 557 106     |
| 56 | Pedra              | PEDRA ÚNICA                 | DONE   | https://pedraunica.net                                                         | 965 057 056     |
| 57 | Pedra              | PEREIRA E LADEIRA           | DONE   | https://pereiraladeira.pt                                                      | 232 763 855     |
| 58 | Pedra              | SOLANOS                     | DONE   | http://www.solancs.com                                                         | 262 925 080     |
| 59 | Pedra              | STONE MASONS                | DONE   | https://www.thestonemasonrycompany.co.uk                                       | 44 77720980330  |
| 60 | Pedra              | TCC White                   | DONE   | https://www.tccwhitestone.com                                                  | 912 980 468     |
| 61 | Pedra              | TELMO DUARTE                |        | http://www.telmoduarte.com/welcome.php                                         | 927 165 094     |
| 62 | Pedra              | TONS DE PEDRA               | DONE   | https://www.tonsdepedra.com/en                                                 | 917 585 454     |
| 63 | Pedra              | URMAL                       | DONE   | https://www.urnal.pt/index.html                                                | 968 520 303     |
| 64 | Pedra              | VETOR 3                     |        | https://www.vetor3.pt                                                          | 219 674 198     |
| 65 | Pedra              | Granitos MACEIRA            |        | https://www.granitos-maceira.com                                               | 219 678 600     |
| 66 | Pedra              | MARMOVÁRZEA                 |        | Not Available                                                                  | 219 230 242     |
| 67 | Pedra              | POLIMAGRA                   |        | https://polimagra.pt                                                           | 254 584 186     |
| 68 | Software           | EASYSTONE                   | DONE   | https://www.ddgroup.com/stone-working-software/easystone                       | +39 0356 21093  |
| 69 | Substituto         | COMPAC                      |        | https://www.compac.es/                                                         | +34 962 954 053 |
| 70 | Tecnologia         | 3D WAY                      | DONE   |                                                                                |                 |
| 71 | Tecnologia         | Alexandrino Pais Leitão     | DONE   | https://www.alepta.o.com/                                                      | 262 508 907     |
| 72 | Tecnologia         | BRETON                      |        | https://breton.it/products/machines-and-lines                                  | +39 042 37691   |

Appendix 2 List of Contacts Used

## Raw Materials and Quarries



*Appendix 3 Pero Pinheiro's Quarries visited, Blocks and Slates examples*



## Examples of Design Pieces and Customized Products



*Appendix 4 Design Pieces*



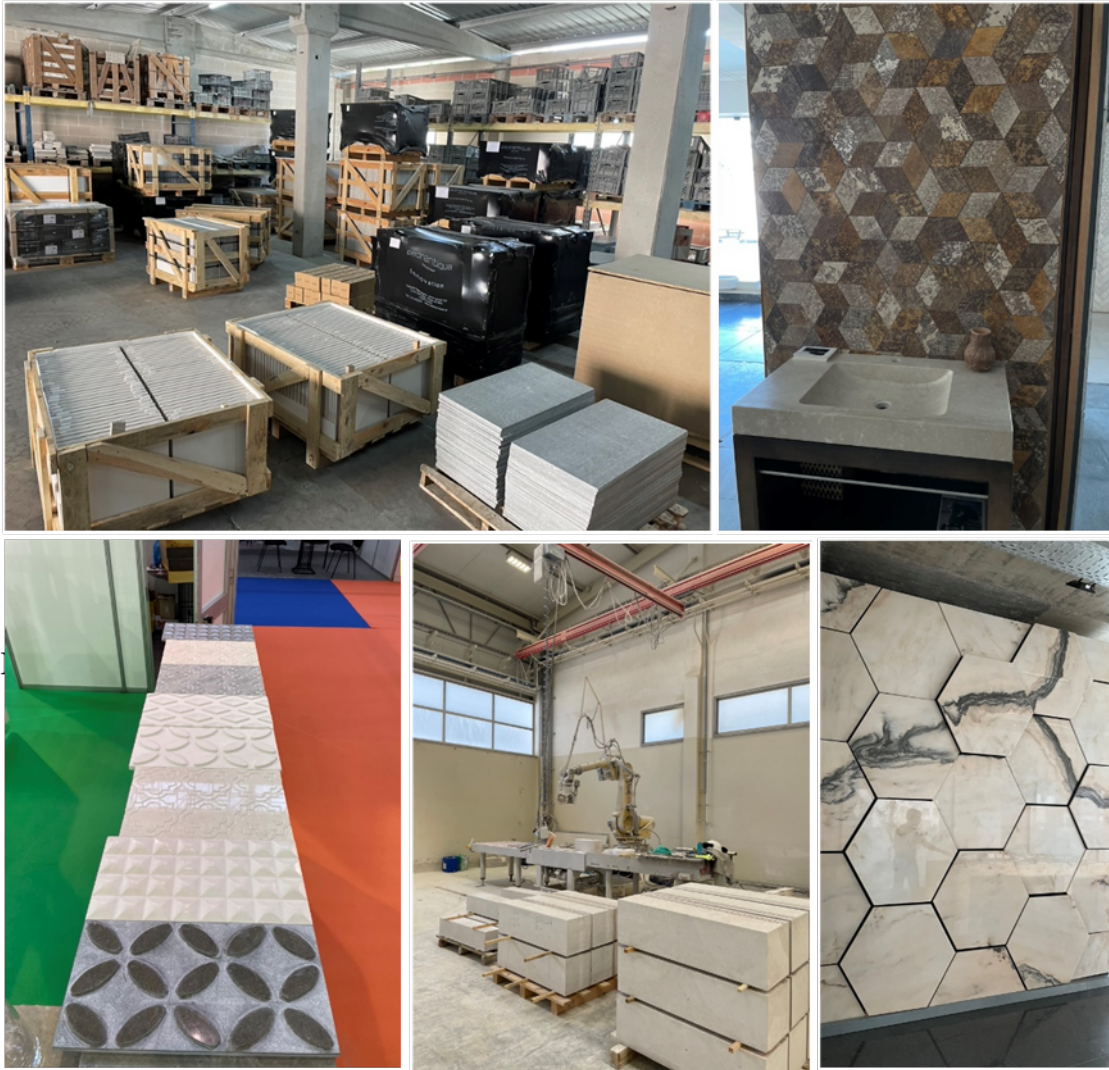
*Appendix 5 Mormon Temple Facade (Limestone)*



*Appendix 6 The First Stone Project Exhibition*



## Examples of Mass Production Materials (tiles)



*Appendix 7 Tiles mass production*

## Examples of Machinery Used



*Appendix 8 Cutting disks*



*Appendix 9 Work zone protection*



*Appendix 10 Diamond Stone Cutting Wire*



*Appendix 11 CNC Machine*



*Appendix 12 One slate block cutting machine*



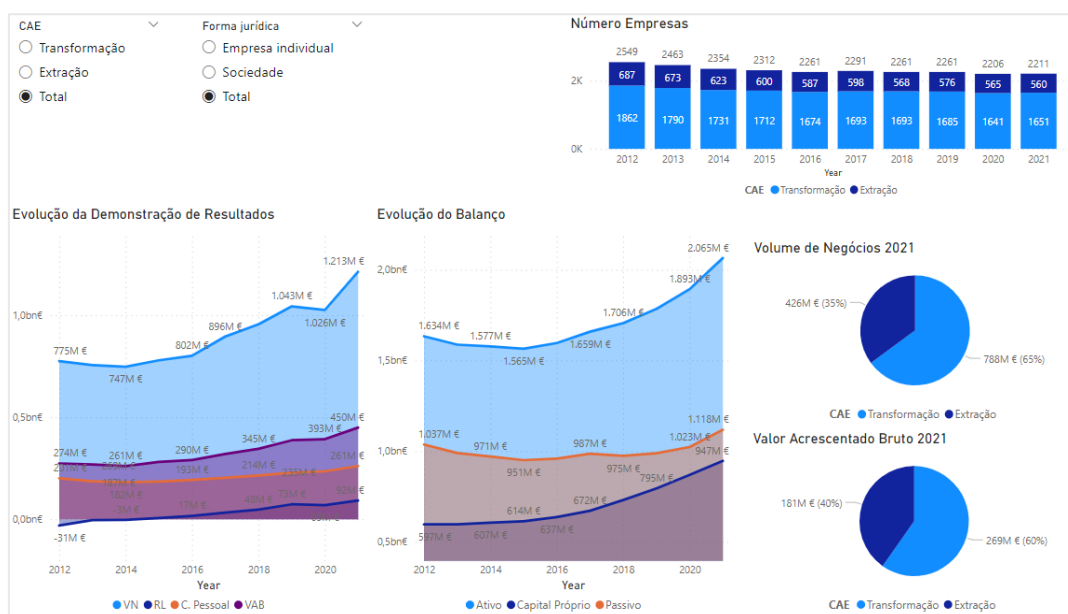
*Appendix 13 Waste Recycling*



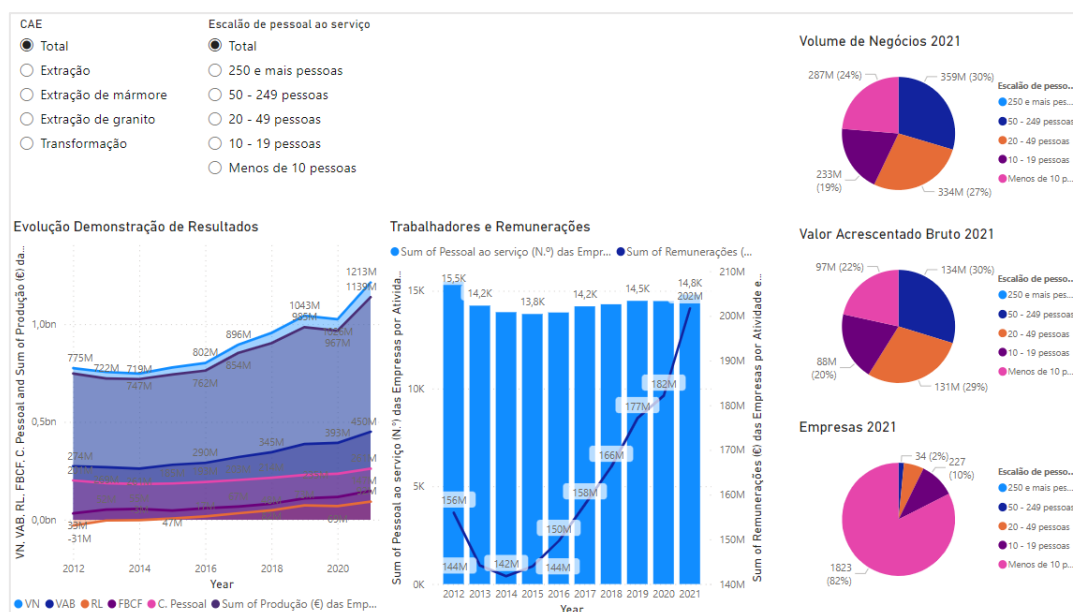
*Appendix 14 Block Cutting Machine*



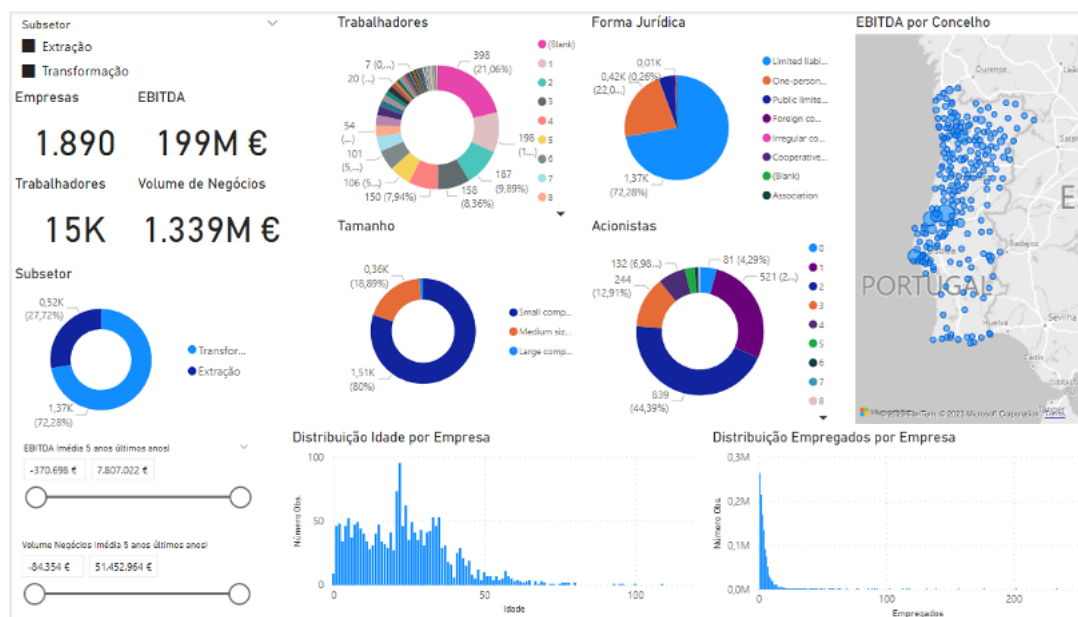
## PowerBi Main Tables



### Appendix 9 OS Companies Financial Characterisation



### Appendix 10 OS Companies Characterisation by Employees



Appendix 11 OS Companies General Characterisation



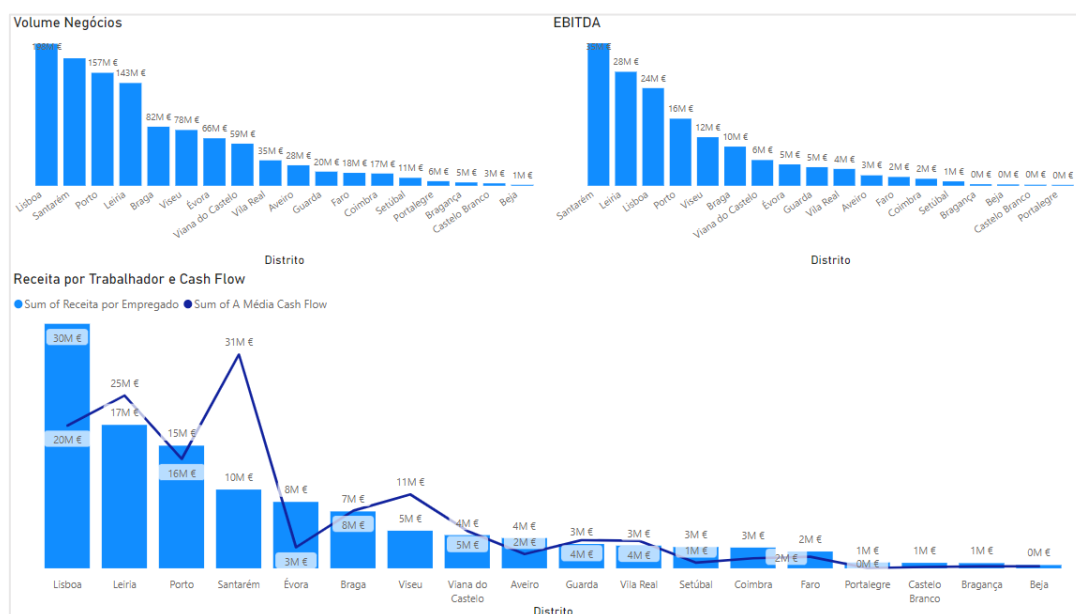
Appendix 12 OS Companies Financial Characterisation

| Subsetor                                    | Empresa                                                                 | Margem %         | EBITDA               | VN                     | VN pc                | Trabalhadores | Acionistas  |
|---------------------------------------------|-------------------------------------------------------------------------|------------------|----------------------|------------------------|----------------------|---------------|-------------|
| <input type="checkbox"/> Extração           | SILICALIA PORTUGAL - INDUSTRIA E COMERCIO DE AGLOMERADOS DE PEDRA, S.A. | 8%               | 4.347.514 €          | 51.452.964 €           | 345.716 €            | 157           | 1           |
| <input type="checkbox"/> Transformação      | AGREPOR AGREGADOS - EXTRACCAO DE INERTES, S.A.                          | 13%              | 4.026.026 €          | 30.806.471 €           | 320.095 €            | 113           | 2           |
| <input type="checkbox"/> Distrito           | FILSTONE - COMERCIO DE ROCHAS, S.A.                                     | 26%              | 7.807.022 €          | 30.500.567 €           | 273.951 €            | 202           | 1           |
| <input type="checkbox"/> Aveiro             | PEREIRA & LADEIRA, LDA                                                  | 18%              | 3.342.977 €          | 18.219.811 €           | 111.298 €            | 234           | 3           |
| <input type="checkbox"/> Beja               | TELMO DUARTE - COMERCIO DE PEDRAS NATURAIS, S.A.                        | 37%              | 5.790.731 €          | 15.829.331 €           | 351.479 €            | 42            | 1           |
| <input type="checkbox"/> Braga              | GRANITTRANS - TRANSFORMACAO DE GRANITOS, LDA                            | 13%              | 1.931.875 €          | 15.186.722 €           | 409.028 €            | 44            | 2           |
| <input type="checkbox"/> Bragança           | PAVESTONE, LDA                                                          | 8%               | 1.256.803 €          | 14.879.633 €           | 283.599 €            | 89            | 2           |
| <input type="checkbox"/> Castelo Branco     | SOLUBEMA - SOCIEDADE LUSO-BELGA DE MARMORES, S.A.                       | 13%              | 1.927.572 €          | 14.495.765 €           |                      | 19            |             |
| <input type="checkbox"/> Coimbra            | MOCA STONE, S.A.                                                        | 11%              | 1.433.811 €          | 12.786.578 €           | 1.529.318 €          | 10            | 1           |
| <input type="checkbox"/> Évora              | SOLANCIS - SOCIEDADE EXPLORADORA DE PEDREIRAS, S.A.                     | 22%              | 2.699.946 €          | 12.229.811 €           | 97.676 €             | 139           | 0           |
| <input type="checkbox"/> Faro               | FERNANDO ALMEIDA & FILHOS, LDA                                          | 13%              | 1.438.629 €          | 11.434.863 €           | 117.953 €            | 118           | 5           |
| <input type="checkbox"/> Concelho           | INCOVECA - GRANITOS, S.A.                                               | 23%              | 2.586.739 €          | 11.431.482 €           | 96.907 €             | 116           | 6           |
| <input type="checkbox"/> Abrantes           | ALEXANDRINO PAIS LEITAO, LDA                                            | 12%              | 1.290.701 €          | 10.485.749 €           | 260.224 €            | 48            | 4           |
| <input type="checkbox"/> Águeda             | CUNHA DUARTE, S.A.                                                      | 13%              | 1.336.740 €          | 10.437.738 €           | 64.155 €             | 177           | 5           |
| <input type="checkbox"/> Aguiar da Beira    | ETMA - EMPRESA TRANSFORMADORA DE MARMORES DO ALENTEJO, S.A.             | 8%               | 719.527 €            | 9.224.745 €            | 105.587 €            | 69            | 1           |
| <input type="checkbox"/> Alandroal          | RUIPEDRA - WORLD OF NATURAL STONE, S.A.                                 | 35%              | 2.960.412 €          | 8.385.003 €            | 111.858 €            | 86            | 0           |
| <input type="checkbox"/> Albergaria-a-Velha | NICOLAU DE MACEDO, S.A.                                                 | 21%              | 1.618.168 €          | 7.683.747 €            | 166.539 €            | 62            | 5           |
| <input type="checkbox"/> Albufeira          | POLIMAGRA - GRANITOS, S.A.                                              | 24%              | 1.786.452 €          | 7.583.005 €            | 108.578 €            | 78            | 1           |
| <input type="checkbox"/> Alcanena           | ANTONIO GALEGO & FILHOS - MARMORES, S.A.                                | 15%              | 1.075.079 €          | 7.371.413 €            | 132.645 €            | 63            | 4           |
| <input type="checkbox"/> Alcinçara          | CALBRITA - SOCIEDADE DE BRITAS, S.A.                                    | 26%              | 1.890.706 €          | 7.159.936 €            | 236.967 €            | 41            | 1           |
| <input type="checkbox"/> Empresa            | RG ROGRANIT GRANTAX - GRANITOS, LDA                                     | 4%               | 258.111 €            | 7.145.697 €            | 58.709 €             | 93            | 3           |
| <input type="checkbox"/> All                | IRMAOS SILVA & TEIXEIRA, LDA                                            | 6%               | 370.090 €            | 6.718.559 €            | 118.596 €            | 69            | 4           |
|                                             | CONSTRUÇOES PARDAIS - IRMAOS MONTEIROS, LDA                             | 23%              | 1.469.787 €          | 6.402.996 €            | 80.618 €             | 103           | 3           |
|                                             | CUPA PEDRAS, LDA                                                        | 16%              | 1.001.652 €          | 6.157.271 €            | 121.895 €            | 64            | 1           |
|                                             | MARFILPE - MARMORES E GRANITOS, S.A.                                    | 31%              | 1.893.711 €          | 6.125.874 €            | 130.584 €            | 56            | 1           |
|                                             | DIMPOMAR - ROCHAS PORTUGUESAS, LDA                                      | 6%               | 370.148 €            | 5.828.910 €            | 82.305 €             | 64            | 3           |
|                                             | SOCIEDADE DAS PEDREIRAS DO MARCO, LDA                                   | 13%              | 733.689 €            | 5.798.626 €            | 62.829 €             | 132           | 2           |
|                                             | TRANSGRANITOS - MARMORES E GRANITOS DO ALTO TAMEGA, LDA                 | 21%              | 1.074.917 €          | 5.039.115 €            | 110.686 €            | 49            | 2           |
|                                             | <b>Total</b>                                                            | <b>-2170546%</b> | <b>153.383.014 €</b> | <b>1.111.967.747 €</b> | <b>114.433.638 €</b> | <b>14821</b>  | <b>3881</b> |

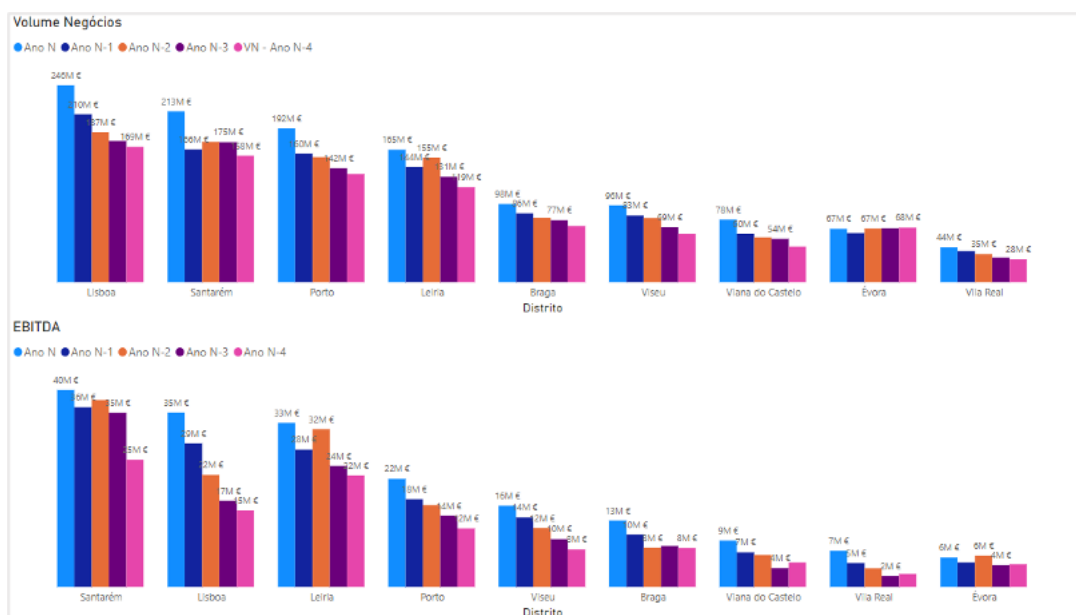
Appendix 13 Example of a PowerBI Matrix showing the main financial variables



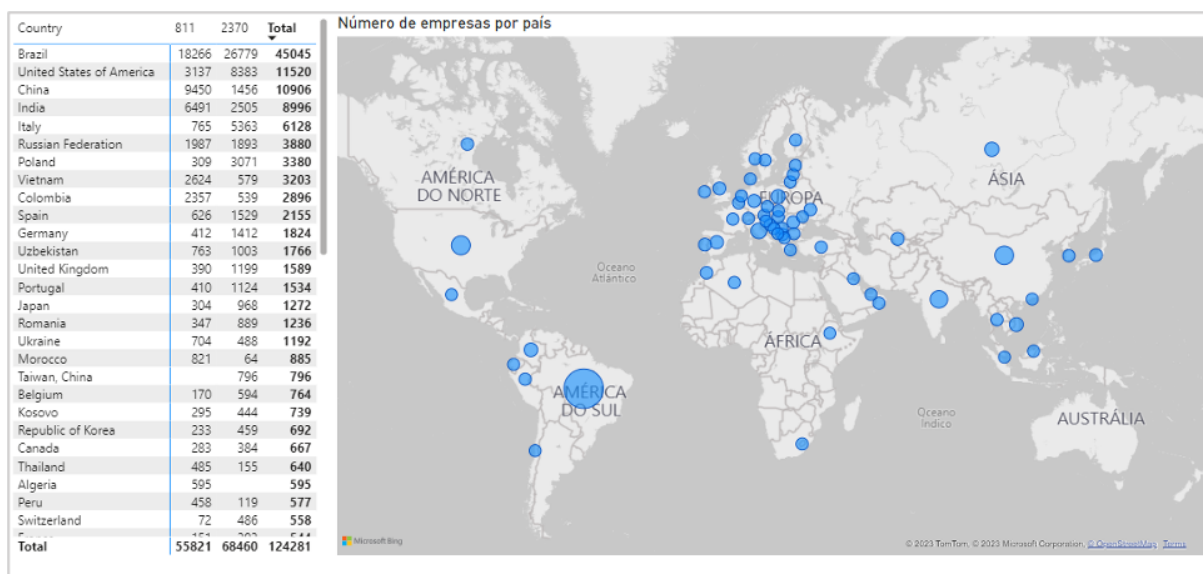
Appendix 14 Example of one OS Top 25 companies' main financial indicators



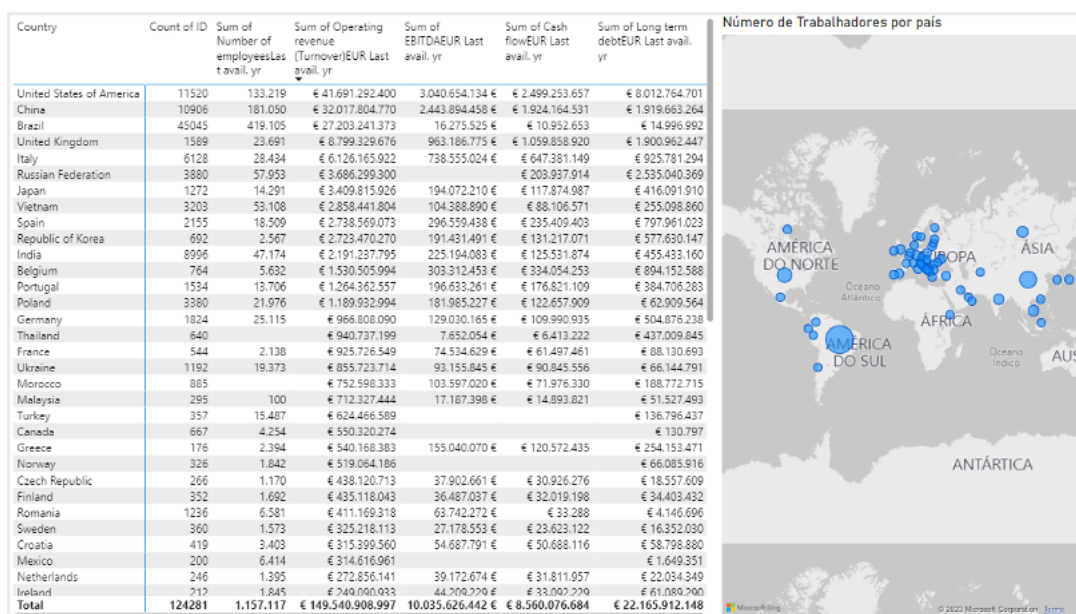
Appendix 15 Portuguese Revenue, EBITDA distribution per district



Appendix 16 Portuguese Revenue and EBITDA distribution per district per year



Appendix 17 World Distribution of Extraction and Transformation OS Companies



Appendix 18 World distribution of OS Companies

| Dataset                                                   | Type of Data            | Date of Extraction | Observations   | Last Period Available | Type of Data |
|-----------------------------------------------------------|-------------------------|--------------------|----------------|-----------------------|--------------|
| ORBIS, BUREAU VAN DIJK                                    |                         |                    |                |                       |              |
| PT OS companies from Extraction and Transformation        | Integer, Currency, Text | 31-05-2023         | 1.892          | 2022                  | Microdata    |
| International OS companies Extraction                     | Integer, Currency, Text | 18-06-2023         | 55.939         | 2022                  | Microdata    |
| International OS companies Transformation                 | Integer, Currency, Text | 18-06-2023         | 70.192         | 2022                  | Microdata    |
| Each of these 3 microdata subsets has the following data: |                         |                    |                |                       |              |
| Company name Latin alphabet                               | Text                    |                    | Original Field |                       | Microdata    |
| Inactive                                                  | Text                    |                    | Original Field |                       | Microdata    |
| Quoted                                                    | Text                    |                    | Original Field |                       | Microdata    |
| Branch                                                    | Text                    |                    | Original Field |                       | Microdata    |
| OwnData                                                   | Text                    |                    | Original Field |                       | Microdata    |
| Woco                                                      | Text                    |                    | Original Field |                       | Microdata    |
| Country ISO code                                          | Text                    |                    | Original Field |                       | Microdata    |
| NACE Rev. 2, core code (4 digits)                         | Text                    |                    | Original Field |                       | Microdata    |
| Consolidation code                                        | Text                    |                    | Original Field |                       | Microdata    |
| Last avail. year                                          | Integer                 |                    | Original Field |                       | Microdata    |
| Operating revenue (Turnover) EUR Last avail. yr           | Currency                |                    | Original Field |                       | Microdata    |
| Number of employees Last avail. yr                        | Integer                 |                    | Original Field |                       | Microdata    |
| Postcode Latin Alphabet                                   | Integer                 |                    | Original Field |                       | Microdata    |
| Latitude                                                  | Integer                 |                    | Original Field |                       | Microdata    |
| Longitude                                                 | Integer                 |                    | Original Field |                       | Microdata    |
| E-mail address                                            | Text                    |                    | Original Field |                       | Microdata    |
| Website address                                           | Text                    |                    | Original Field |                       | Microdata    |
| Products & services                                       | Text                    |                    | Original Field |                       | Microdata    |
| VAT/Tax number                                            | Integer                 |                    | Original Field |                       | Microdata    |
| LEI (Legal Entity Identifier)                             | Integer                 |                    | Original Field |                       | Microdata    |
| Total assets EUR Last avail. yr                           | Currency                |                    | Original Field |                       | Microdata    |
| Total assets EUR Year - 1                                 | Currency                |                    | Original Field |                       | Microdata    |
| Total assets EUR Year - 2                                 | Currency                |                    | Original Field |                       | Microdata    |
| Total assets EUR Year - 3                                 | Currency                |                    | Original Field |                       | Microdata    |
| Total assets EUR Year - 4                                 | Currency                |                    | Original Field |                       | Microdata    |
| Operating revenue (Turnover) EUR Last avail. yr           | Currency                |                    | Original Field |                       | Microdata    |
| Operating revenue (Turnover) EUR Year - 1                 | Currency                |                    | Original Field |                       | Microdata    |
| Operating revenue (Turnover) EUR Year - 2                 | Currency                |                    | Original Field |                       | Microdata    |
| Operating revenue (Turnover) EUR Year - 3                 | Currency                |                    | Original Field |                       | Microdata    |
| Operating revenue (Turnover) EUR Year - 4                 | Currency                |                    | Original Field |                       | Microdata    |
| EBITDA EUR Last avail. yr                                 | Currency                |                    | Original Field |                       | Microdata    |
| EBITDA EUR Year - 1                                       | Currency                |                    | Original Field |                       | Microdata    |
| EBITDA EUR Year - 2                                       | Currency                |                    | Original Field |                       | Microdata    |
| EBITDA EUR Year - 3                                       | Currency                |                    | Original Field |                       | Microdata    |



| Dataset                                     | Type of Data | Date Extraction | of Observations  | Last Period Available | Type of Data |
|---------------------------------------------|--------------|-----------------|------------------|-----------------------|--------------|
| EBITDA EUR Year - 4                         | Currency     |                 | Original Field   |                       | Microdata    |
| No of shareholders                          | Integer      |                 | Original Field   |                       | Microdata    |
| Date of incorporation                       | Date         |                 | Original Field   |                       | Microdata    |
| NUTS3                                       | Text         |                 | Original Field   |                       | Microdata    |
| Standardised legal form                     | Text         |                 | Original Field   |                       | Microdata    |
| Type of entity                              | Text         |                 | Original Field   |                       | Microdata    |
| National legal form                         | Text         |                 | Original Field   |                       | Microdata    |
| Size classification                         | Text         |                 | Original Field   |                       | Microdata    |
| Shareholder - Name                          | Text         |                 | Original Field   |                       | Microdata    |
| CSH – Name                                  | Text         |                 | Original Field   |                       | Microdata    |
| Solvency ratio (Asset based) Last avail. Yr | Currency     |                 | Original Field   |                       | Microdata    |
| Solvency ratio (Asset based) Year - 1       | Currency     |                 | Original Field   |                       | Microdata    |
| Solvency ratio (Asset based) Year - 2       | Currency     |                 | Original Field   |                       | Microdata    |
| Solvency ratio (Asset based) Year - 3       | Currency     |                 | Original Field   |                       | Microdata    |
| Solvency ratio (Asset based) Year - 4       | Currency     |                 | Original Field   |                       | Microdata    |
| Stock EUR Last avail. yr                    | Currency     |                 | Original Field   |                       | Microdata    |
| Stock EUR Year - 1                          | Currency     |                 | Original Field   |                       | Microdata    |
| Stock EUR Year - 2                          | Currency     |                 | Original Field   |                       | Microdata    |
| Stock EUR Year - 3                          | Currency     |                 | Original Field   |                       | Microdata    |
| Stock EUR Year - 4                          | Currency     |                 | Original Field   |                       | Microdata    |
| Cash flow EUR Last avail. yr                | Currency     |                 | Original Field   |                       | Microdata    |
| Cash flow EUR Year - 1                      | Currency     |                 | Original Field   |                       | Microdata    |
| Cash flow EUR Year - 2                      | Currency     |                 | Original Field   |                       | Microdata    |
| Cash flow EUR Year - 3                      | Currency     |                 | Original Field   |                       | Microdata    |
| Cash flow EUR Year - 4                      | Currency     |                 | Original Field   |                       | Microdata    |
| Cash & cash equivalent EUR Last avail. Yr   | Currency     |                 | Original Field   |                       | Microdata    |
| Cash & cash equivalent EUR Year - 1         | Currency     |                 | Original Field   |                       | Microdata    |
| Cash & cash equivalent EUR Year - 2         | Currency     |                 | Original Field   |                       | Microdata    |
| Cash & cash equivalent EUR Year - 3         | Currency     |                 | Original Field   |                       | Microdata    |
| Cash & cash equivalent EUR Year - 4         | Currency     |                 | Original Field   |                       | Microdata    |
| Subsidiary - Name                           | Text         |                 | Original Field   |                       | Microdata    |
| Headquarters Name                           | Text         |                 | Original Field   |                       | Microdata    |
| Branch - Name                               | Text         |                 | Original Field   |                       | Microdata    |
| No of branches                              | Text         |                 | Original Field   |                       | Microdata    |
| BvD sectors                                 | Text         |                 | Original Field   |                       | Microdata    |
| Long term debt EUR Last avail. yr           | Currency     |                 | Original Field   |                       | Microdata    |
| Long term debt EUR Year - 1                 | Currency     |                 | Original Field   |                       | Microdata    |
| Long term debt EUR Year - 2                 | Currency     |                 | Original Field   |                       | Microdata    |
| Long term debt EUR Year - 3                 | Currency     |                 | Original Field   |                       | Microdata    |
| Long term debt EUR Year - 4                 | Currency     |                 | Original Field   |                       | Microdata    |
| Freguesia                                   | Text         |                 | Calculated Field |                       | Microdata    |

| Dataset                             | Type of Data | Date Extraction | of Observations   | Last Period Available | Type of Data |
|-------------------------------------|--------------|-----------------|-------------------|-----------------------|--------------|
| Concelho                            | Text         |                 | Calculated Field  |                       | Microdata    |
| Distrito                            | Text         |                 | Calculated Field  |                       | Microdata    |
| NACE Description PT                 | Text         |                 | Calculated Field  |                       | Microdata    |
| A Média EBITDA (5 anos)             | Currency     |                 | Calculated Field  |                       | Microdata    |
| A Média Volume Negócios (5 anos)    | Currency     |                 | Calculated Field  |                       | Microdata    |
| A Margem Operação (5 anos)          | Currency     |                 | Calculated Field  |                       | Microdata    |
| A Média Ativos (5 anos)             | Currency     |                 | Calculated Field  |                       | Microdata    |
| A Média Dívida (5 anos)             | Currency     |                 | Calculated Field  |                       | Microdata    |
| A Média Inventários (5 anos)        | Currency     |                 | Calculated Field  |                       | Microdata    |
| A Média Caixa e Equivalentes        | Currency     |                 | Calculated Field  |                       | Microdata    |
| A Média Cash Flow                   | Currency     |                 | Calculated Field  |                       | Microdata    |
| A Média Rácio de Solvência          | Currency     |                 | Calculated Field  |                       | Microdata    |
| Receita por Empregado (último ano)  | Currency     |                 | Calculated Field  |                       | Microdata    |
| A Var. % EBITDA (5 anos)            | Percentage   |                 | Calculated Field  |                       | Microdata    |
| A Var. % Volume Negócios (5 anos)   | Percentage   |                 | Calculated Field  |                       | Microdata    |
| A Média EBITDA (3 anos)             | Currency     |                 | Calculated Field  |                       | Microdata    |
| A Média Volume Negócios (3 anos)    | Currency     |                 | Calculated Field  |                       | Microdata    |
| A Var. EBITDA 3 anos vs. 5          | Currency     |                 | Calculated Field  |                       | Microdata    |
| A Var. Volume Negócios 3 anos vs. 5 | Currency     |                 | Calculated Field  |                       | Microdata    |
| INE                                 |              |                 |                   |                       |              |
| Exports                             |              |                 |                   |                       |              |
| Exports by type of product          | Currency     | 13-08-2023      | All industry data | 2022                  | Aggregated   |
| Number of Employees                 |              |                 |                   |                       |              |
| Enterprises                         | Integer      | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Cost of goods sold                  | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Cost of raw materials incorporated  | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Supplies and external services      | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Cost of employees                   | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Other employee costs                | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Taxes                               | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Corporate Income Tax (CIT)          | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Gross Operating Surplus             | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Gross Fixed Capital Formation       | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Employees                           | Integer      | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Salaries                            | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Net Profit                          | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Sales of services                   | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Internal Sales                      | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Employees Supplements               | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Subsidies                           | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Production                          | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| GVA                                 | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |

| Dataset                             | Type of Data | Date Extraction | of Observations   | Last Period Available | Type of Data |
|-------------------------------------|--------------|-----------------|-------------------|-----------------------|--------------|
| Employees                           | Integer      | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Sales of goods                      | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Sales of products and raw materials | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Stocks                              | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Turnover                            | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Legal Form                          |              |                 |                   |                       |              |
| Enterprises                         | Integer      | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Sales of goods                      | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Sales of products and raw materials | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Stocks                              | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Internal Sales                      | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Turnover                            | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| GVA                                 | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Employees                           | Integer      | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Other employee costs                | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Taxes                               | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Corporate Income Tax (CIT)          | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Sales of services                   | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Liabilities                         | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Paid Employees                      | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Cost of employees                   | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Net Profit                          | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Employees Supplements               | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Subsidies                           | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Production                          | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Cost of goods sold                  | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Cost of raw materials incorporated  | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Supplies and external services      | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Cost of employees                   | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Gross Operating Surplus             | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Gross Fixed Capital Formation       | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Assets                              | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Current Assets                      | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |
| Equity                              | Currency     | 08-06-2023      | All industry data | 2008-2021             | Aggregated   |

*Appendix 19 List of Variables Extracted and Manipulated in PowerBI*

## CONCLUSIONS ON ID

CONCLUSIONS ON PORTUGAL  
POSITIONNING FOR THE NEW STONE  
REVOLUTION FROM A DESIGN POINT OF  
VIEW:

**Resources are there and Portugal for the first time on his history is the front row of an industrial revolution, more widely from a tech point of view but also for the Stone industry.**

**Portugal can make a difference targeting the high end, complex and beautiful design made on order,** not necessarily massive but full of added value creating an iconic ESG glamorous Portuguese Stone Design Creative Manufacturing process.

**A search fund can identify a unique company to accelerate the process of transition creating value through industrial design, technology, innovation and the smart use of a digital Start Up like network orchestration digital strategy.**

*Appendix 20 Conclusion on Industrial Design in the OS sector in Portugal & link with SF.*

## ID TO MVP WE HAVE TESTED!



**Industrial designs as MVP tested by the perfect fit team during our work project**

*Appendix 21 MVP test performed during our study*