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

## The Search Fund Model, Business Transfers and High Growth Firms

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## Abstract

This collaborative thesis examines the feasibility of a Search Fund in Portugal's natural stone industry. The individual contribution on the literature review covers the SF concept, describes its phases, steps and metrics that should be taken into consideration when applying this financing model. A Power BI with microdata of sector's companies is developed highlighting relevant financial variables which is complemented with 37 interviews and 167 questionnaires. The group research validated the possible use of a Search Fund, and 21 potential target companies were short-listed. An investment memorandum is crafted to attract funding, while a detailed business model outlines modernization and growth strategies.

**Keywords**: Natural Stone; Ornamental Stone; Portugal; SME; Search Fund; Business Opportunities; Business Models; Succession; Acquisitions; High Growth Firm.

**JEL Code:** G34, L26, L60, L70, O30

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| | |
|---|---|
| **ATC** | Average Total Cost |
| **BI** | Business Intelligence |
| **BIM** | Building Information Modelling |
| **BMC** | Business Model Canvas |
| **CAE** | Classificação das Atividades Económicas |
| **CAGR** | Compound Annual Growth Rate |
| **Capex** | Capital Expenditure |
| **CNC** | Computer Numerical Control |
| **CRM** | Customer Relation Manager |
| **EA** | Entrepreneurship Through Acquisition |
| **EBITDA** | Earnings Before Interest, Taxes, Depreciation and Amortization |
| **ESG** | Environmental, Society and Governance |
| **ETA** | Entrepreneurship Through Acquisition |
| **I4.0** | Industry 4.0 |
| **IOI** | Indication of Interest |
| **IP** | Intellectual Property |
| **IRR** | Internal Rate of Return |
| **HGF** | High Growth Firm |
| **KPI** | Key Performance Indicator |
| **LOI** | Letter of Intent |
| **NACE** | Nomenclature of Economic Activities |
| **NS** | Natural Stone |
| **OECD** | Organization for Economic Cooperation and Development |
| **OS** | Ornamental Stone |
| **PPM** | Private Placement Memorandum |
| **ROA** | Return on Assets |
| **ROI** | Return on Investment |
| **ROS** | Return on Sales |
| **SDG** | Sustainable Development Goals |
| **SF** | Search Fund |
| **SWOT** | Strengths, Weaknesses, Opportunities and Threats |
| **WACC** | Weighted Average Cost of Capital |

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## 1. 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 2021) 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, which is translated into the 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 comprises four distinct sections: Introduction, Literature Review, Research, and Conclusions. The Literature Review is made of four distinct individual contributions by the four team members involved in the original project, divided in the following subsections: (i) Industry 4.0, (ii) Industrial Design, (iii) Stone Technology and (iv) Search Fund Model. The remaining sections were collaborative efforts. The first three sections can be explored in the thesis published under the same title but with complementary subtitles authored by Carlos Frederico Carvalho, Filipe Souto Carvalho and Hugo Duarte da Fonseca. The subsection (iv) is an individual contribution for the literature review where the SF model is explained highlighting its importance as an alternative entrepreneurial instrument. This trending investment methodology comprises an alignment of incentives between investors, managers and employees (co-investment, vesting and performance prizes). However, the search and acquisition phases where the negotiation of the acquisition between debt holders, banks, investors, sellers take place are challenging and for that purpose, the Section A revisits the selection criteria and ways to measure the value of potential targets as well as the triggers for selling a lifetime business, the characteristics that determine high growth performance, namely what are features of family businesses that undermine growth, the founders traits that might promote a better performance and strategies for growth.

In the research section, a Power BI with microdata from the PT NS industries' companies is developed to assess the sector across the main decision-making variables which is complemented with information retrieved from the 37 interviews and 167 questionnaires.

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.

## 2. Literature Review

### Section A. The SF Model, Business Transfers and High-Growth Business Models

A search fund (SF) is an investment vehicle. It's a pool of capital to support searchers/entrepreneurs financing the costs of searching for a privately held company and negotiate its acquisition. This type of entrepreneurship is often referred as entrepreneurship through acquisition (EA or ETA) and its purpose is to find a business on behalf of investors, acquire, operate, grow, and sell it after 3-10 years. Potential investors finance the search phase over 12-24 months in exchange for preferential investment conditions if the acquisition takes place[1]. This investment method targets businesses that are large enough for needing financing from investors or debt but are still small for private equity funds. The SF model allows searchers to become responsible for the acquired company managing it during the investment period and, at the same time owners of the company with a share of 20-30% by the end of the vesting period. The main advantages of this type of investment are the alignment of incentives between stakeholders (investors and managers) and the lower risk attributed to operating an existing business as shown in (Kolarova et al. 2022a) which confirm a lower failure rate for search funds, only 4 % of the acquisitions ended with total loss which compares with a rate of over 80% for start-ups, see also (Deibel 2018).

While the search fund model is made of five essential steps as in *Figure 2*, this thesis will deepen its analysis in the second stage, the search. During this phase the tasks include building a funnel identifying which companies are at each step, data analysis of unit economics data, interview of stakeholders from the targeted industry (owners, suppliers, customers), investigation of main business drivers, performing a financial and legal due diligence, writing letters of intent and a contract for acquisition. During this critical phase, the main driver of

[1] All conditions of the search phase are defined in a Private Placement Memorandum (PPM) and Pitch Deck (PD).

value creation are the founders of the search fund, all potential gains are dependent on them, and to increase the odds of success they should receive mentorship from individuals with business acumen, targeted industry experts and experienced specialists in the SF model.


*Figure 1 Search Funds' phases.*

The search phase is essential for applying this type of financing model, it starts with the need of matching two wills, the willingness to acquire and the need of selling a business. The decision of selling can be triggered by several reasons, namely: health problems, owner's death, shareholder disputes or conflicts between stakeholders, divorce, lack of skills to fund growth, undercapitalization and financial constraints, inflexibility, increased competition, fatigue, or burnout, as referred in (Chalfin 2020). Specifically, for the Portuguese economy, (Marques 2018) identify the main causes for lack of competitiveness in family-scale businesses highlighting the importance of having succession plans to guarantee a smooth transition, the professionalization of SME and their internationalization. In fact, owners often postpone the decision of selling the business creating a self-fulfilling cycle where they end up with a zombie company determining its failure or selling it for a fraction of its peak value. The lack of planning is seen in the absence of succession plans and in the failure rate of family businesses, (Almeida 2011) show that Portuguese family businesses have a rate of survival of 50% during the 2$^{nd}$ generation and only 20% in the 3$^{rd}$ generation.

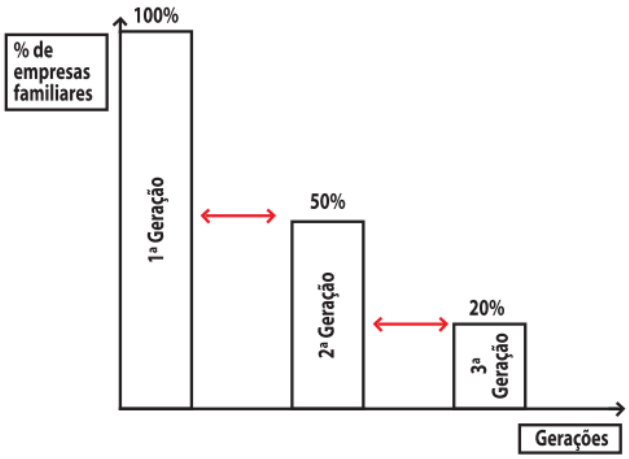


*Figure 2 Survival rates of Portuguese family businesses*

In Europe, the number of SMEs changing hands reaches 450,000 every year with more than 2 million employees affected. One third of these cases is not successful meaning job and value destruction, as referred in SME Strategy of (European Commission 2020). Giving the importance of business transfers, European Commission (EC) has dedicated attention to this topic and developed several projects and initiatives directed at improving business transfers (acquisitions or successions) either in the form of share deal or asset deal.

### A.1 Search Funds in PT and worldwide

Although entrepreneurship through acquisitions (ETA) is widely used in other countries, Portugal has only few examples of search funds operating, namely Planalto, Zinc and Viriato. From these three, the first two already concluded the acquisition and their testimonial can be heard in (Buy and Build Podcast, 2023 and The Search Fund Podcast, 2022). João Stoffel from Planalto highlights 4 challenges: (i) the difficulty of selling the country, (ii) the need of managerial skills immediately after the acquisition takes place, (iii) the resistance of investors to a non-orthodox type of investment, and (iv) the storytelling to sell yourself and the persistency needed to convince investors. At the same time, he underlines need of connecting and building a relation with owners and having a plan B to use in case the preferred option fails. The SF model can be synthesized as a game of convincing a lot of people (owners, investors,

banks) where the main asset is the searcher abilities not withstanding an immense number of variables that can go wrong. On the other hand, Tiago Paixão from Zinc which bought Teclena and Juncor, underlines the fantastic businesspeople he met during his search journey, humble people that without any university degree built huge conglomerates. He also explains the career choices which were driven by an intellectual curiosity attitude, how he ends up in ETA and explains the importance of knowing well the sector to establish a conversation with stakeholders and to have a successful acquisition. During the SF journey, the complementary skills can be found in the ecosystem, either through mentorship program or directed consulting services. Finally, an important point, referred by both Portuguese searchers is the competition across search funds in the same economy, potential targets start to be excessively addressed by searchers which increases the negotiating power of owners and aversion to prospective buyers.
In Nova School of Business and Economics, two master thesis on this topic were recently defended, (Dremelj 2021) and (Keil 2021). Both recognize that little academic research has been done about SF. The first thesis developed an econometric model based on a panel data about SF with information about interviews and questionnaires to searchers and investors, 41 interviews in total and 57 questionnaire answers, finding a positive relation between the distribution of SF with income per capita and number of companies per capita. The second master thesis aimed at extending IESE 2020 SF study comparing traditional search funds with self-funded search funds where an online survey with 47 SF founders was made to find that self-funded SF are preferable to traditional ones since they allow preferable deal terms, better economics, and enhanced flexibility to acquire and operate the business.
Other recent research published include three case studies in Poland - with the SF model as an example for the lack of succession, central Europe - define propositions divided in 7 categories and 18 sub-categories and tested in 8 interviews with German-speaking searchers, and United Kingdom – discuss the role of the access to knowledge in explaining the rapid growth of

entrepreneurial acquisitions when compared to traditional M&A operations, respectively (Biegajło 2022; Freiling and Oestreich 2022; Mawson and Brown 2017).

Internationally, there are a lot of successful examples of SF and several reports are published yearly, namely from Stanford and IESE Business Schools and from Search Investment Group (Kelly and Heston 2022a; Kolarova et al. 2022a; Search Investment Group 2023a). These three regularly updated seminal surveys provide important statistics about the search fund activity: rates of success, global distribution, principal's background details (salary, age, education, ethnicity, gender, professional), industry focused or generalist search, returns (IRR and ROI), acquisition value (multiples of sales or EBITDA), duration of the deal, search fund details (number of principals, amount of capital raised, number of months fundraising, % of full-time searchers, number of hours per week searching, distribution of EBITDA targets, cost of living of searchers, solo or partnered, initial contact methods, time to close a deal, legal and financial due diligences, deal expenses, acquisition financing debt type, loan to value, seller notes details, principal's contribution to equity, investor's equity terms and preferred returns on equity).

Although, acquisitions in the manufacture industry are rare, 21% of searchers targeted companies from this industry since 2016, according to (Kelly and Heston 2022a) but only 3 companies have been acquired worldwide while in (Kolarova et al. 2022b), 45% target manufacturing industry in 2020-2021 searches.

### A.2 Search and acquisition phases: selection criteria and due diligence process

To make the acquisition happen, one of the first tasks that the search phase literature suggests is to prepare an Investment Memorandum or Private Placement Memorandum (PPM) with the value proposition and the characterization of the targeted industry to send to prospective investors. The PPM and slide deck could follow the suggestions of (Herzog et al. 2023; Simon 2021), including in its structure information about the reasoning of a SF, the background of the

principals (professional, academic and personal), budget, investment considerations and brief description of the five stages of the search fund model, offering terms, the value proposition for investors (risks and expected return), a market overview of the country (politics, SMEs characterization and challenges), industry and the search strategy. This document should also include a section with indicators about country foreign investment attractiveness, namely, macroeconomic indicators (GDP, GDP per capita and unemployment), capital market, taxation, investor protection and corporate governance (legal & property rights), human and social environment (specific skills availability, labour regulations) and entrepreneurial opportunities (R&D&I, easiness to start, run and close a business).

When choosing the target, one should start by applying some basic filters such as: type of business, location and size and afterwards answer some questions should be answered to check if the company matches the criteria. To validate the pool of targets, (Ruback and Yudkoff 2017; Simon 2021) books suggest some questions for searchers, covering, within others: lifestyle required, appeal of location, consistency of profits, reputation of the brand, maturity of the sector (exponential, cyclical or consistent), competitive advantages, market competition, clients budget importance, suppliers fragmentation, investment multiples for EBITDA and/or sales, fit of searchers skills with industry, willingness of the owner to sell the company.

Each industry competitiveness is determined by the 5 forces, according to (Porter 2008): (i) barriers to entry (ii) threat of substitutes, (iii) supplier power, (iv) customer power and (v) industry rivalry. Recently, two additional forces are considered, (vi) complementary products and (vii) government. Other indicators of potential profits should also be compiled such as industry concentration, probability of the business to be disrupted, industry growth, GDP growth, cyclicality of the business, the impact of government (important for regulated industries, supported industries, taxes and customers). More specifically, after finding a targeted group of companies, a thorough analysis should be made in what respects the size and

typology of revenue whether it is contractual or non-contractual recurring, repeat, actuarial or transactional. The due diligence should cover all company history, how did it grow, identifying sustainable competitive advantages, complexities, risks (strategic, M&A, financial, organizational, external), dependence concentration (customers, suppliers, products, employees) and maintenance or expansion capital expenditure (Capex) that will drive company's results. After identifying a group of targeted companies, the approach to owners to know whether the willingness and commitment to sell of the owner will be determinant.

There are several ways for making a first contact with company owners, according (Ruback and Yudkoff 2017) usually a cold email generates around 1% response rate whereas a personalized approach can lead to much higher response rates but is also more costly. This trade-off between reaching a meaningful number of owners vs. the type of approach (cold email or call, personalized or generic) is a balance that needs to be addressed. Alternatively, one can use intermediates that are specialized in buying and selling companies. It's essential to have predetermined goals with metrics associated summarized in key statistics, e.g., emails to target per week, business contacts, meetings per week, follow-ups, indications of interest (IOI), letters of intent (LOI), and prepare a monthly or quarterly reporting with the last updates of the search. Having all these processes happening at the same time, CRM tools help with a pipeline to follow how many companies are at each stage.

Following the interest of business owners in negotiating a potential acquisition the next step of the validation is a due diligence process where several ratios and sources are benchmarked. A proper estimation of the value of the company is a critical step in the SF model since a big share of the return on this operation lies on the difference between the purchasing cost and selling price. To quantify the value of a company, one could use several methodologies, such as: comparable sales, internal sales, revenue or sales multiple, cash flow multiple, discounted cash flow, replacement cost, book value, liquidation, and reality check. The negotiation with

business owners should provide a clear picture of the company, identifying all pros and cons for each option. This validation can be supported with several ratios, as suggested by (Chalfin 2020) including: profitability (ROA, ROE, ROS), working capital, revenues (concentration or recurrent), costs (sales per employee, resources utilization), products and/or services (distribution of sales, CAC) and other balance sheet lines (intellectual property, goodwill, or liabilities). Complementarily, (SMEVentures 2023) provide a checklist for the due diligence process which can be used to support this task.

Within these indicators of performance, the most used in M&A operations are the multiples of sales or EBITDA. (Search Investment Group 2023b) from a sample of 109 acquired businesses reach the following EBITDA multiples: 26% <3x, 35% 3-3.9x, 22% 4-4.9x, 8% 5-5.9x and 9% >=6x. Multiples are shown to vary significantly since 2010-2021, EBITDA multiples varied 4.2-6.4x and sales multiple varied 0.8-1.6x, Figure 3 shows the distribution of acquisition multiples by value of acquisition and from there one conclusion can be derived, acquisition multiples increase with the acquisition price meaning that for more valued companies, its robustness is paid with a higher multiple. This distinction is clear, in acquisitions over 2 million dollars where 38% have an EBITDA multiple over 5x while for companies acquired for less than 500 k dollars only 13% have a multiple over 5x.

On other hand, (Kelly and Heston 2022b) with data from acquisitions in 2020 and 2021, purchase price to EBITDA and to sales multiples were 7.3x and 2.1x, respectively. While (Kolarova et al. 2022b), based on 94 acquisitions, estimate a purchase price to EBITDA of 5.8x and a purchase price to revenue of 1.4x.

| Median | All Acquisitions | Pre-2010 | 2010-2011 | 2012-2013 | 2014-2015 | 2016-2017 | 2018-2019 | 2020-2021 |
|---|---|---|---|---|---|---|---|---|
| Length of Search (months) | 21 | 8 | 22 | 29 | 22 | 16 | 22 | 23 |
| Purchase Price ($M) | 11.0 | 3.0 | 7.1 | 5.9 | 13.6 | 12.3 | 12.8 | 11.7 |
| Company Revenues at Purchase ($M) | 7.9 | 8.0 | 7.2 | 7.9 | 9.8 | 10.8 | 9.9 | 7.7 |
| Company EBITDA at Purchase ($M) | 2.0 | 0.6 | 1.5 | 1.3 | 2.8 | 3.0 | 2.3 | 1.8 |
| EBITDA Margin (%) | 23 | 11 | 23 | 9 | 24 | 27 | 28 | 23 |
| EBITDA Growth Rate at Purchase (%) | 10 | 7 | 6 | 0 | 5 | 16 | 7 | 12 |
| Revenue Growth Rate at Purchase (%) | 10 | 7 | 6 | 0 | 9 | 10 | 12 | 12 |
| Purchase Price / EBITDA | 5.8x | 3.0x | 5.1x | 6.4x | 5.8x | 4.2x | 5.7x | 6.4x |
| Purchase Price / Sales | 1.4x | 0.6x | 1.2x | 0.8x | 1.5x | 1.2x | 1.6x | 1.5x |
| Company Employees at Purchase | 58 | 70 | 141 | 33 | 68 | 90 | 58 | 45 |

*Figure 3 IESE International Search Funds – 2022*

### A.3 Operation phase: strategies for growth

While in the search phase one of the crucial steps is having a clear statement about what is the ideal target, the post-acquisition phase, where the searchers become managers require a perception about the business model and strategies for increasing the value and growth of the venture, in (Deibel 2018), four ways are described to build value. One of them and the most relevant which combine value creation and growth is the platform-type business, perceived as less risky since the enterprise already has product-market fit and then can be used for business development purposes, testing new geographies and diversifying product portfolio. It is also used by private equity firms as the entrance point in certain industry which is then used to acquire other businesses.

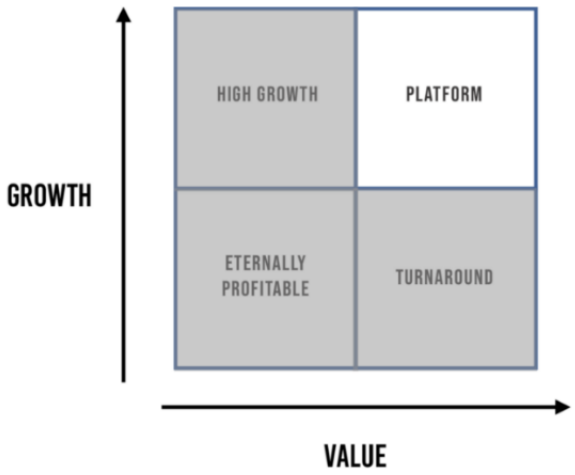


*Figure 4 Types of growth and value creation*

In the same direction, (Jansen et al. 2023) studies strategies for high growth firms (HGF) and presents four scaling approaches: (i) organic (internal development), (ii) acquisitive, (iii) ecosystem (alliances and partnerships) and (iv) platforms (intermediary to facilitate transactions and network effects).

In the search fund model since the acquisition is often based in high leverage, growth is an important piece of the puzzle, and it is one of the ways to measure the success the investment. But what is it? Growth is measured in time units and change of the variable of interest, i.e., two companies can grow the same percentage but the one that achieves it in the smaller timeframe has better performance. Considering that achieving persistent high growth is an extremely challenging task, it is important to understand its main drivers. The (European Scaleup Monitor 2023), using OECD concept of HGF[2] analyze growth rates of employment in of more than a million EU27 companies between 2018-2021. The results of the study show that only 12% are scalers (10% average growth), 4% are HGF (20% average growth), 1% consistent HGF (20%

[2] OECD/Eurostat definition of high growth firm (HGF): enterprise with annualized growth rate of at least 20% (of employment) per year over a 3-year period and a minimum of 10 employees at the beginning of the observation period. Other concepts make use of turnover as measure for growth.

consistent growth) and 0.3% consistent hyper growers (40% consistent growth). An alternative classification of growth is usually made comparing growth consistency and age of the enterprise, dividing enterprises in a 2x2 matrix: gazelles, mature HGF, scaleups and superstars. For (Pearce and Pearce 2020) high growth and value creation can be enhanced through different combinations of 12 attributes, namely: technology (R&D, internet, omnichannel, algorithms), market aggressiveness (investment, differentiation, scalability, and monetization), and functional excellence (supply-chain partnerships, cross and up-selling, operational efficiency, and retail presence). Alternatively, depending on the attributes of entrepreneurial ventures, (Morris et al. 2018) define 4 types: survival, lifestyle, managed growth, and aggressive growth. The survival type of entrepreneurship is associated with family businesses which most are necessity based and are copycat types of entrepreneurships, a copy of a low-cost structure business, a replica of a business model already existing in the region. This type of entrepreneurship increases competition in the industry but drives down everyone else profits. These ventures end up growing organically with own resources/ bootstrapping because they lack vision and access to resources (financial and/or skills). For (Wright and Stigliani 2013), although companies need to be entrepreneurial over the long-term to ensure survival, family firms include other non-economic goals resulting in lower growth rates.

From a macroeconomic point of view, high growth firms are essential for the economies since they are responsible for job creation, e.g., between 2009 and 2012 in U.S., 35% of all gross job gains was made by only 2% of all firms (Clayton and Sadeghi 2013). In (Monteiro 2019), common growth strategies include improving product quality and customer satisfaction and not necessarily reducing costs, ensuring a personalized contact with customers to properly identify customer needs and market orientation with focus on a consumer niche. On the other hand, (Desantola and Gulati 2017) define growth as a difficult balance between exploration (or change-future narrative) and exploitation (or endurance-present narrative). These changes are

observed in three main components: (i) organizational design, (ii) team composition and (iii) organizational culture. In the same direction, (Pugliese, Bortoluzzi, and Balzano 2022) survey with 316 empirical studies identifying 66 growth drivers divided in 6 categories. Within the most relevant are the skills and attributes of the founders, firm-specific resources and capabilities and marketing and strategy related drivers. The motivation and attitude toward growth are imprinted in entrepreneurs' traits which, in the most successful, including: ambition, competitiveness, focus, energetic mindset, demanding, fact-oriented, resilient, sharp vision, intelligence, risk-taking, galvanizing people, and these characteristics are then combined with start up's most common four-factor production function: ideas, time, passion, and perseverance. For building a successful venture, (Warrillow 2010) suggests focusing in a certain area with products of exceptional quality to be known as an expert and decline all work falling outside our expertise but keep a diversification of customers (<15% of total revenue each) and offering a clear value proposition about what we are selling. As the business grows, a roadmap should be drafted with three horizons (short, medium, and long run) to plan actions and milestones. To prepare the business to thrive without the current owner, the strategy should also include putting together a management team with a long-term incentive plan to reward results and loyalty (cash instead of stock options) and an incentive structure for sales teams to motivate competition between team members. Persistent high growth is rare phenomenon and in most companies is short-lived and according to (Dillen et al. 2014) this phenomenon is related to 5 possible causes: (i) lifecycle theory of firm, (ii) minimum efficient size, (iii) sustained competitive advantages, (iv) resources constraint (management availability) and (iv) firm growth rates are independent random variables (Gibrat's law).

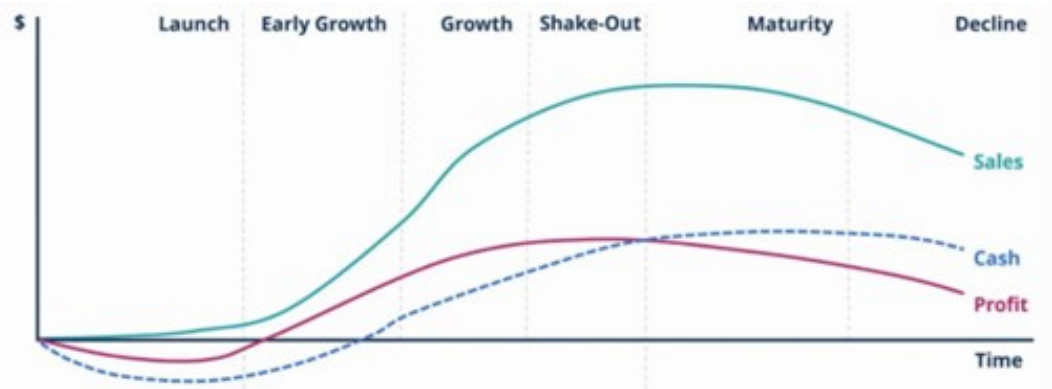


*Figure 5 Industries lifecycles*

For (Bianchini, Bottazzi, and Tamagni 2017), high growth firms follow 4 channels to achieve an outstanding performance: innovation, efficiency-productivity, profitability, and financial situation (leverage and debt serving costs). Persistent high growth firms are found to be younger, have more leverage and debt servicing costs than the others. The combination of efficiency and leverage promote high growth.

To successfully drive the growth avenue is essential to consolidate routines to develop the capabilities to anticipate and mitigate potential adversities. For achieving this resilience and secure existence and prosperity, (Haase and Eberl 2019) highlight 3 routines that should be regularly revisited: (i) strategic reflection, (ii) financial assessment (cash conversion cycle) and (iii) product development. The last one is crucial since there is no survival without sales, no sales without product and no product without a robust product development process. The Figure 6 shows product development patterns and highlight the importance of reinventing regularly production technologies to keep an innovation virtuous cycle and ensure company survival.

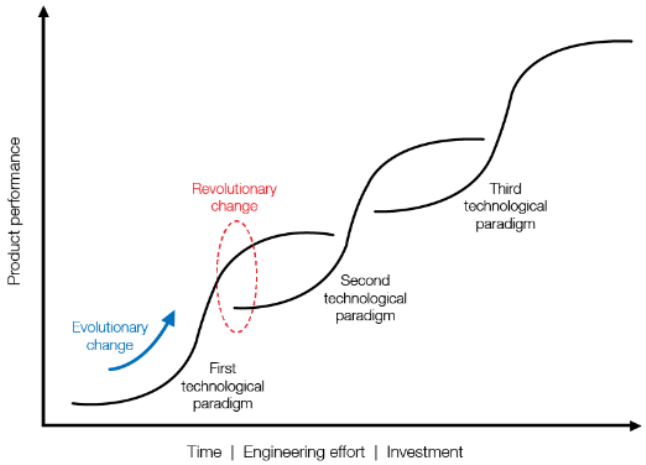


*Figure 6 Product Development Cycles*

### A.4 Refreshing Traditional Business Models

Revamping an industry business model is often needed to keep businesses innovating and competitive. The pace of this transformation is of utmost importance to achieve a sustained competitive advantage over the main competitors. To analyse the status quo of an industry several ways can be used, e.g., the renown SWOT analysis, the 24 steps canvas of (Aulet 2013) or the entrepreneurship business model canvas (BMC) from (Osterwalder 2013). Recently, several trends have gained traction and are increasingly becoming parts of business models, specifically, open innovation with collaborative models, circularity of resources or ESG/SDG are three examples. (ElMaraghy 2019) says that I4.0 is changing some of the channels of the business model canvas, particularly, what respects to customer relationships and value delivery channels. In the future, businesses' stakeholders will be in constant interaction implying a more collaborative behaviour. This openness brings the additional challenges of maintaining competitive advantages and data security. The change of business models is also recognised in (Garmann-Johnsen, Olsen, and Eikebrokk 2021) which address co-creation of digital assets as a way for SMEs to overcome size constraints building a network within each industry. This endogenous cooperation within each industry might produce results in the capacity of

businesses participating in innovation programs, organizational learning and monitor performance. The authors suggest enhancing the impact of cooperation in SME networks with a common approach to branding, marketing, and sales. These authors also reflect on BMC and split the key partners component of the model in two, (i) ecosystem and (ii) cocreation. For (Varela, Putnik, and Romero 2023) collaborative management and manufacturing are combined through the set of skills of workers and managers to maximize the usage of new technologies from I4.0 (with 19 dimensions related to collaboration). For this purpose, implementing collaboration include human-human, human-machine, and machine-machine relations. On the collaborative movement, the wording includes references as: co-doing, cooperating, co-working, co-thinking, co-deciding, co-learning, co-creating, co-designing, co-maintaining, within others, which are linked to the I4.0 technologies through human centred practices. Additionally, the authors establish a framework for the collaborative management and manufacturing set of competences segregating between soft and hard skills for each of the three components: models, tools, and business teams.

To maximize the I4.0 opportunities, (Spaltini et al. 2022) highlight the importance of considering the 6Ps migration model which draws on 6 dimensions, namely: (i) Products (digital smart products and services), (ii) Process (digital factories and production processes), (iii) Platform (digital manufacturing platforms), (iv) People (digital skills and professions), (v) Partnership (digital ecosystems and innovation hubs) and (vi) Performance (digital business models). The authors join these dimensions with areas to address in a matrix of 6x6, a methodology to assess the maturity of each business model. On the other hand, (Ibarra, Ganzarain, and Igartua 2018) summarize 3 different approaches to the challenges affecting business models, (i) service-oriented (network), (ii) network-oriented (interoperability) or (iii) user-driven (partnerships). Additionally, the authors present 4 ways to lead digital transformation in manufacturing companies, (i) internal and external process optimization, (ii)

customer interface improvement, (iii) new ecosystems and value networks and (iv) new business models: smart products and services.

The response of Europe to the twin transition challenges is linked to the ability mobilize SMEs toward climate neutrality, digitalization, and resource efficiency goals. In pursuit of these needs and since SMEs are responsible for 2/3 of jobs, the European Commission streamlined and put forward a strategy to address SME main challenges with measures supporting the transitioning from resource intensive models (energy and other raw materials) toward more parsimonious and sustainable models, (European Commission 2020). The strategy goes around 3 pillars: (i) transition to sustainability and digitalization, (ii) regulatory costs and (iii) access to financing[3]. In fact, the main difficulties for growing and new investment are constrained budgets and limited resources (skilled workers and financial) in comparison to conglomerates affecting the ability to compete and comply with administrative and legal procedures, other context costs and regulatory burdens. The access to finance is linked to the size of the business and is also hampered by several aspects, such as, lacking proven financial track record, absence of collateral and underestimated value of intangible assets[4]. This points toward the need of diversifying funding sources, including venture capital, networks of companies and investors and other associations with tailor-made solutions for SMEs. Finally, these difficulties show how important it is of achieving certain size that allows navigating in downward slope of average total cost (ATC), view figure below.

[3] "One third of bankruptcies arise from late payment accounts showing more risks of liquidity than viability."

[4] "Only 9% of SMEs protect their IP and R&D investments."

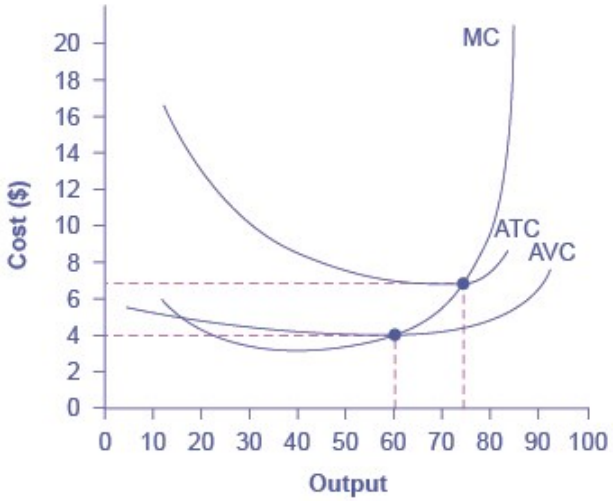


*Figure 7* Microeconomics theory costs chart

For achieving lower points of the average total cost curve, scaling of SMEs is needed, either through consortium with other companies, organic growth or mergers and acquisitions. In fact, global markets are an important source of growth, however, according to the same strategy document, only 600,000 of the 25 million SMEs in Europe (2,4%) export goods outside the EU and only 17% of all manufacturing sector SMEs export within the single market.

All these references agree that I4.0 is changing traditional business models, and the manufacture Portuguese industry is no different from theoretical research, particularly, natural stone companies have demanding challenges ahead. The next research chapter links management research with the results from the interviews and questionnaires and aims to answer how OS business models should be rearranged to thrive.

# 3. Research

## 3.1 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, a stepwise approach is proposed 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?

## 3.2 Methodology / Research design

The 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:

I. **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. The 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.

II. **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.

III. **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© 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.

### 3.3 Research results

**Section B. Qualitative research**

The Qualitative Questionnaire used in this project to interview the companies' stakeholders is the following.

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 8 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 9.

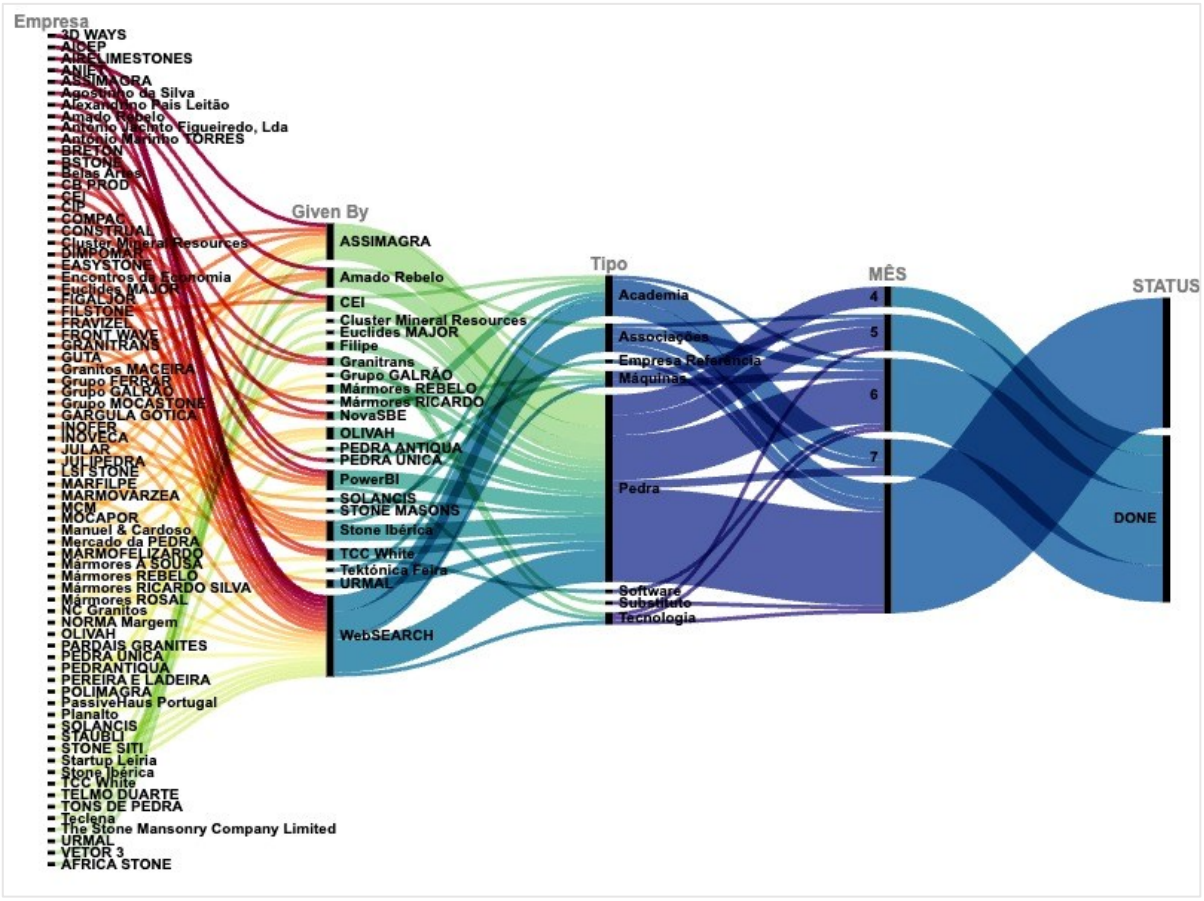


*Figure 9 Alluvial Diagram of the Interviewed Companies*

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 10. 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 | |
| EEE | 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 10 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 |
| **Subtotal** | **21** | **16** | | | | |
| 5 | 6 | | | | | |
| 6 | 5 | | | | | |
| 7 | 5 | | | | | |
| **Total** | **37** | | | | | |

*Figure 11 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.

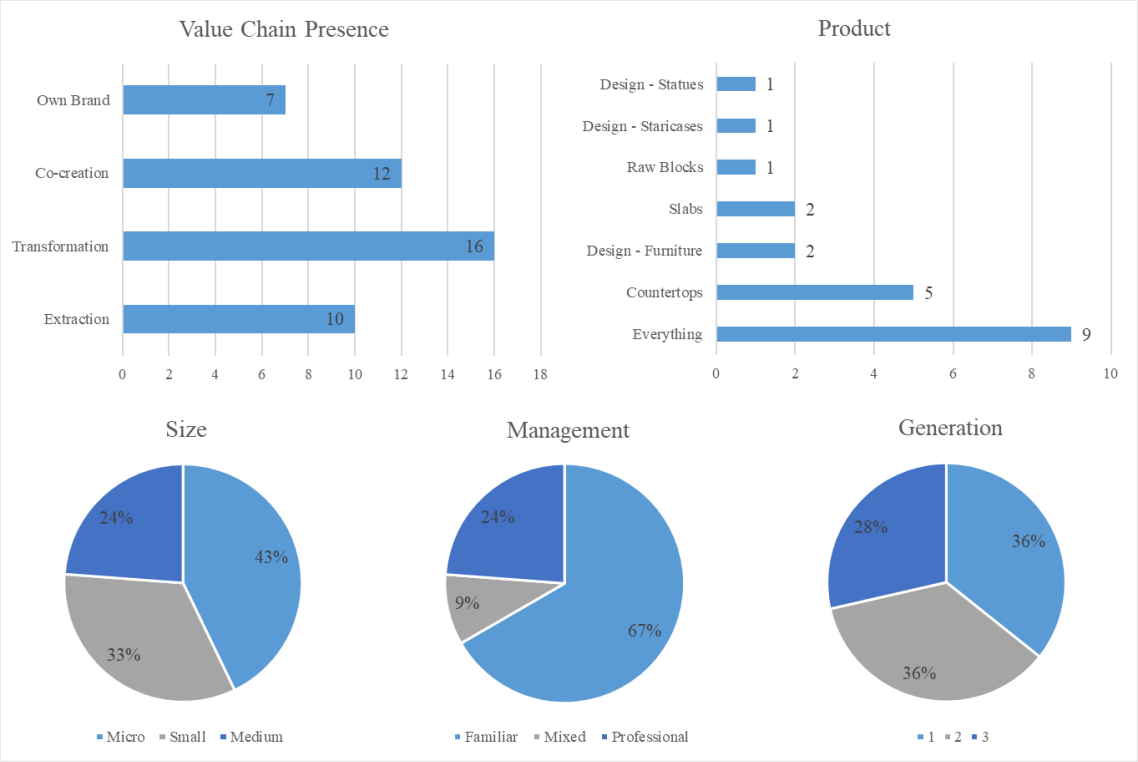


*Figure 12* Summary of company's main characteristics.

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

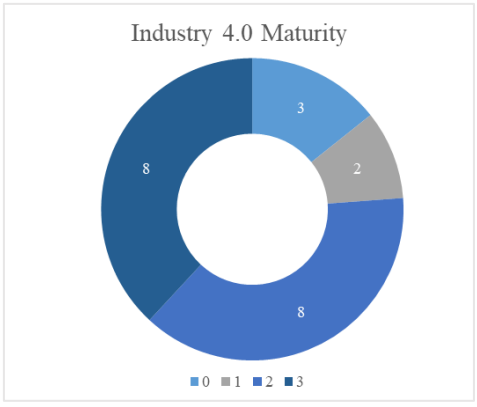


*Figure 13* Interviewed Companies I4.0 maturity (own classification)

**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 14.

*Figure 14* Products viewed during visits, photos Nuno Castanheira

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

The 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.

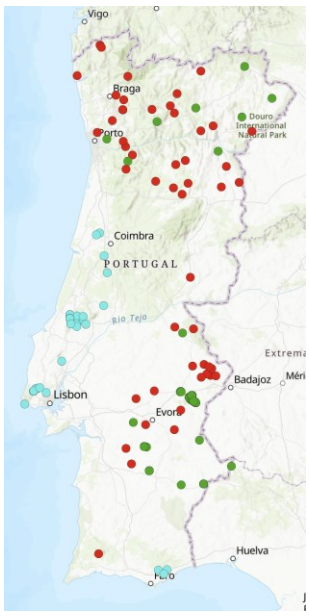


*Figure 15 Portuguese Natural Stone Quarries (LNEG 2023)*

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. º 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 & Diversion, 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 16 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$^{th}$ place. If one ranks these companies by EBITDA, Portugal takes the relevant 8$^{th}$ place, by operational revenue 13$^{th}$, while by number of employees 15$^{th}$.

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.

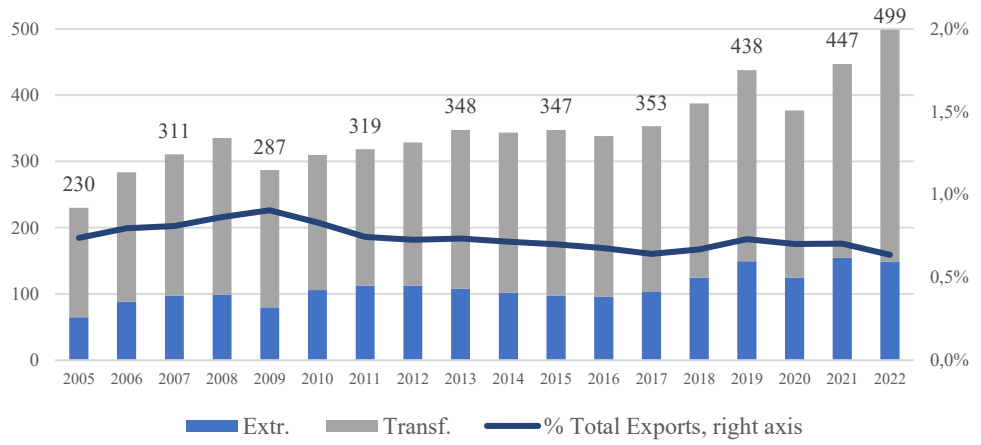


*Figure 17 OS Industry PT Exports*

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

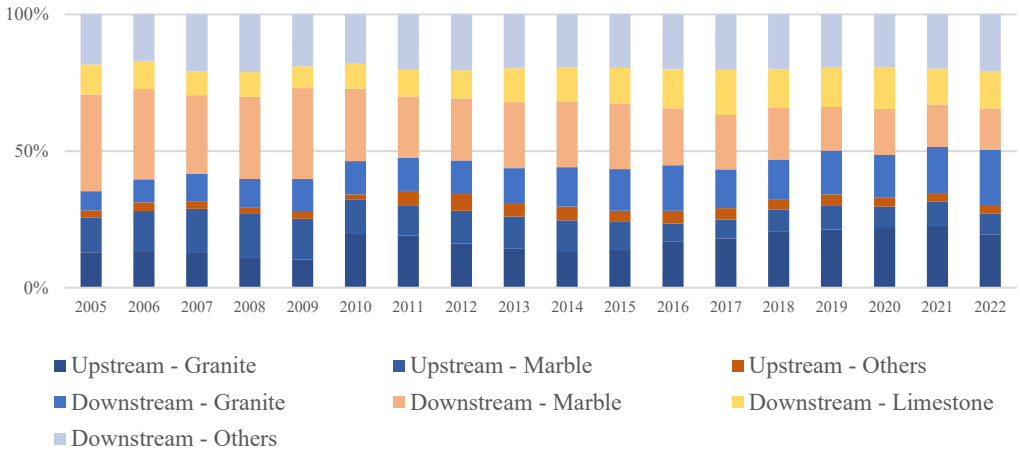


*Figure 18 Products Exported*

| | Exports 2022 (millions of euros) | 2022-2012 % 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% |
| **Total** | **499** | **52%** | **100%** |

*Figure 19 Evolution of PT exports by type of product*

As referred above in Section A, 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[5] 0811[6] and 2370[7] 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 conclusions in an appealing visual format. This analysis was the starting point for giving an intelligible format to numbers and allow a clear photograph

[5] Statistical Classification of Economic Activities in the European Community

[6] Upstream/Extraction of raw stone blocks

[7] Downstream/Transformation of stone blocks into slabs

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 ¼ in the extraction and ¾ 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 1,890 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:

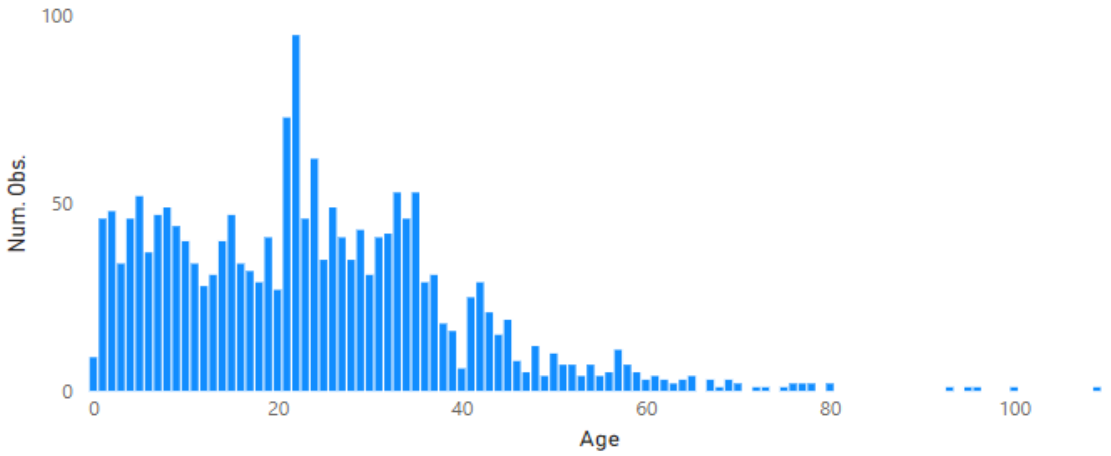


*Figure 20 Distribution of Companies per Tenure*

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 1,890 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.

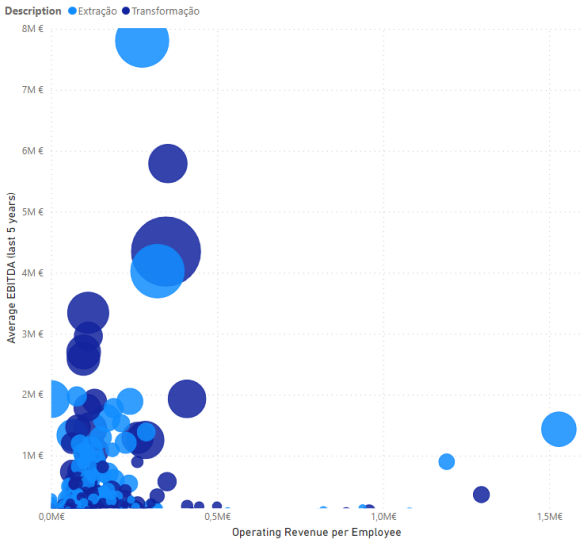


*Figure 21 EBITDA vs Operating Revenue per Employee*

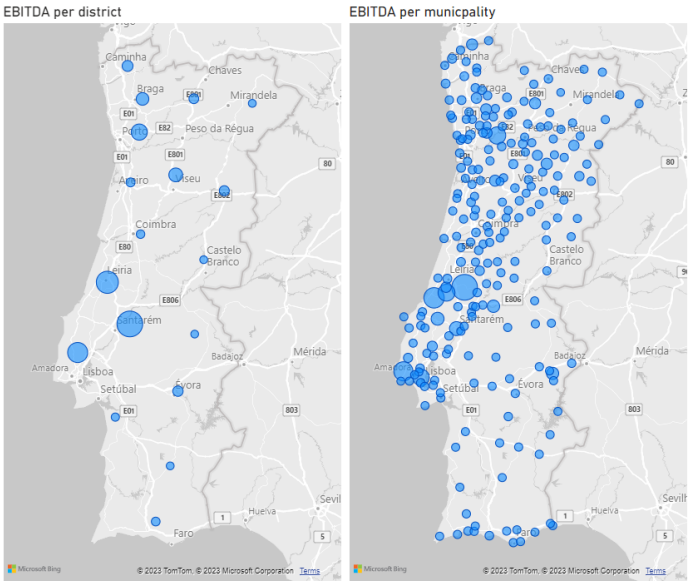


*Figure 22 EBITDA per District & Municipality*

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 23, showing a bird's eye view of the 1,890 companies and their positioning vs. the measure's averages represented by the blue dotted lines.

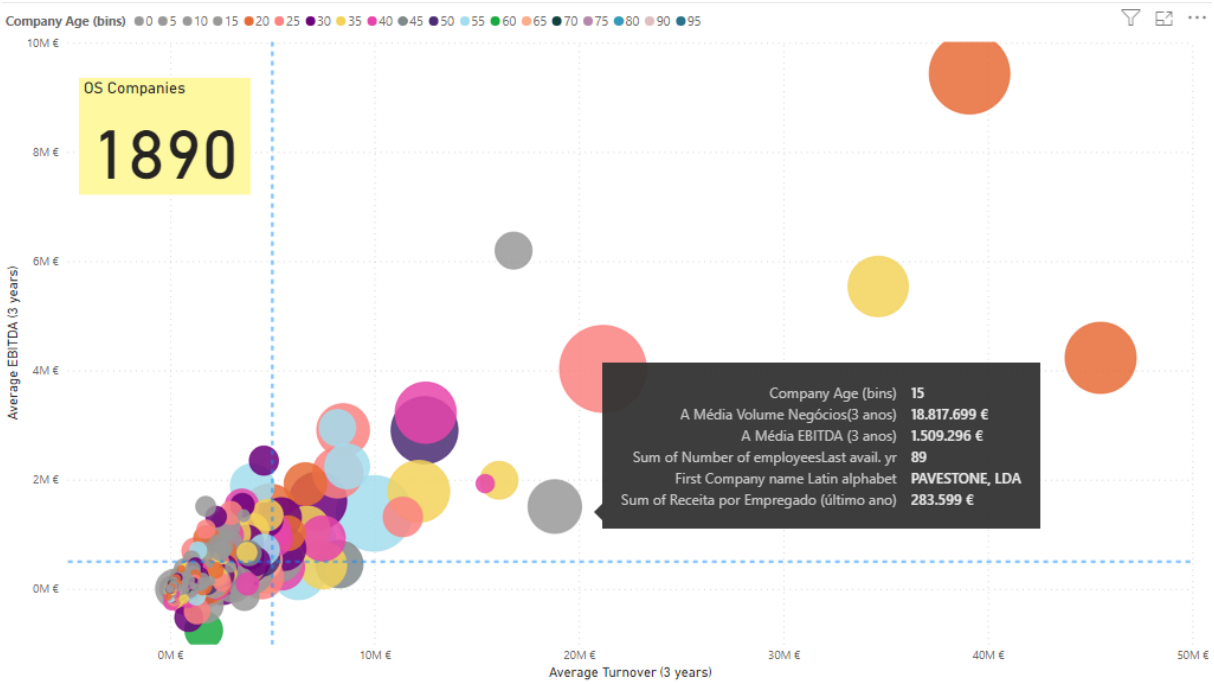


*Figure 23 EBITDA vs Turnover vs # Employees for the OS ALL*

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, the 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 24 Architects & Designers questionnaire*

### Sample Method

The quantitative research phase was conducted by an online survey of 15 questions (see Figure 24) 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[8] 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

[8] 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.

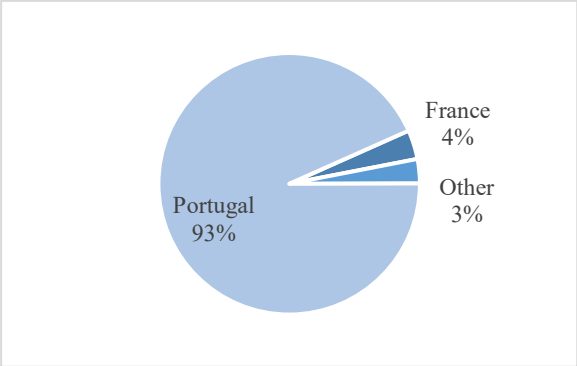


*Figure 26 Q:In which "country" do you currently live?*

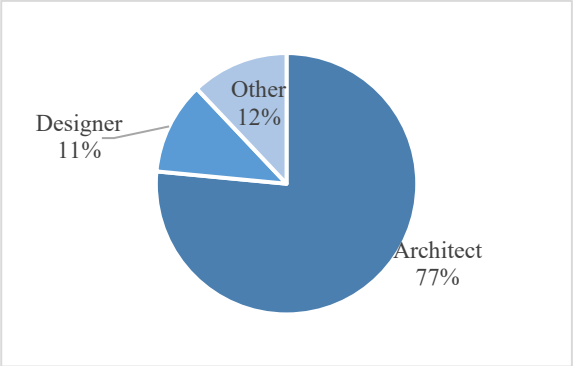


*Figure 26 Q:What do you do for living?*

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.

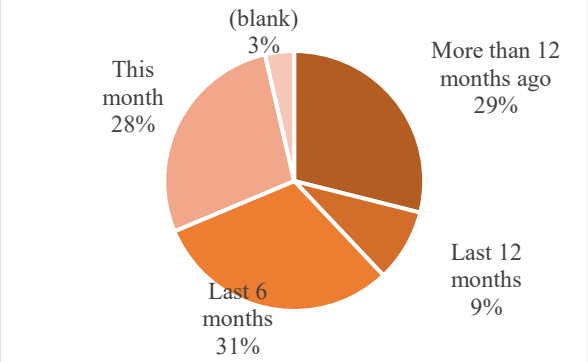


*Figure 28 Q:When was the last time you bought….?*

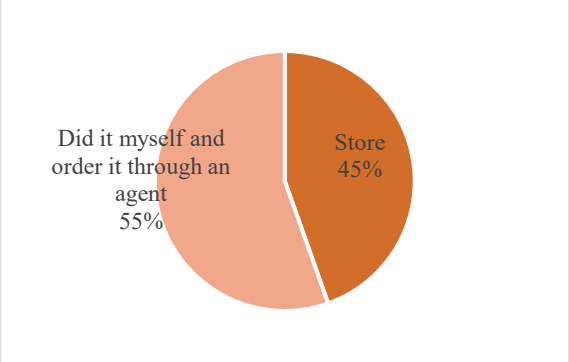


*Figure 28 Q:From who have you bought it?*

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.

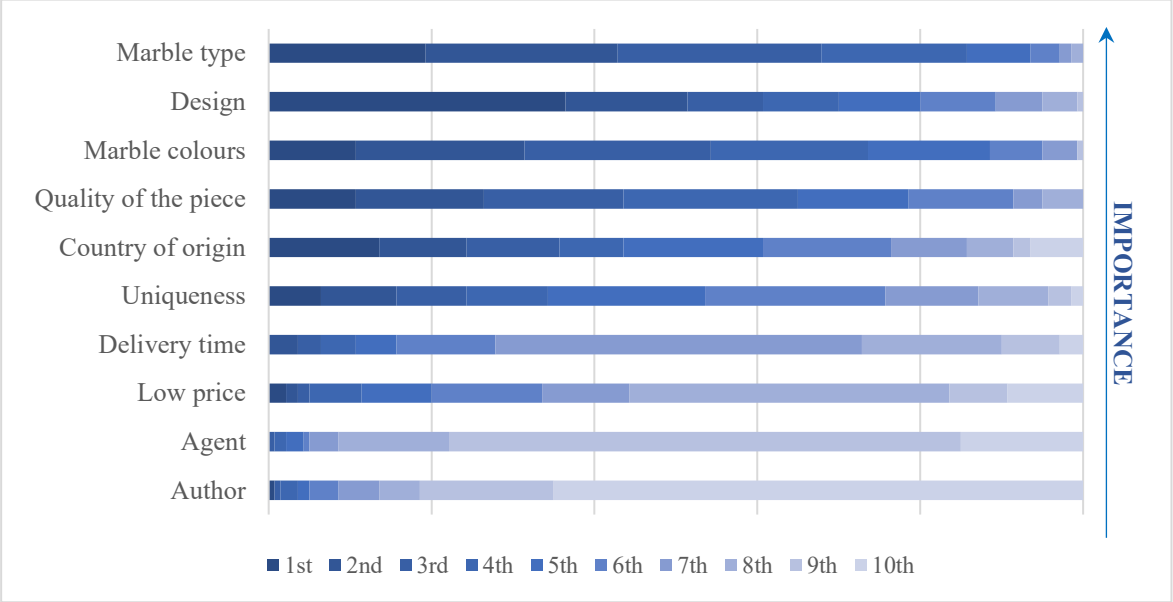


*Figure 29 Q:Please rank the following reasons as to aspects you value the most when selecting a marble piece.*

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% refered 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.

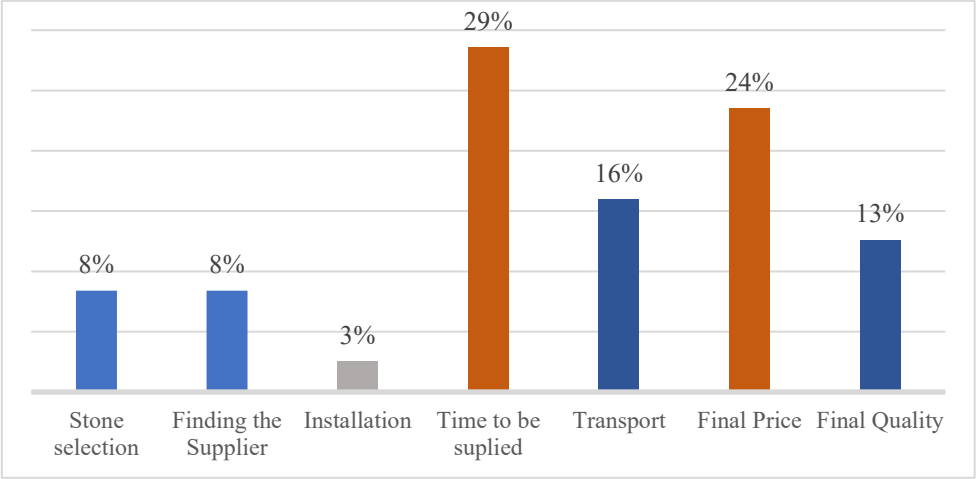


*Figure 30 What are the main difficulties you have encountered when ordering a new custom-made marble piece/furniture?*

Supported on this survey, the following conclusion can be summarized:

- 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.

## 4. Conclusion

The Portuguese natural stone 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 at least 4 possible configurations were found 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 studied one 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 the discussed criteria in section A.2 are applied (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 31, **25 potential companies** are found to deepen the possibility of an acquisition, see Figure 32 and with 2 additional criteria, see Figure 33.

- 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 31 Search Fund acquisition metrics*

| District | Maturity (years) | Shareholders | 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% |

Turnover (3 years avg.): 5.000.000 € – 45.515.481 €
EBITDA (3 years avg.): 500.000 € – 9.435.721 €
Employees: 30 – 234
Company Age: 15 – 57
Revenue per Employee: 80.000 € – 409.028 €
Number of Companies: 25

*Figure 32 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 additional criteria, 21 potential targets remain.

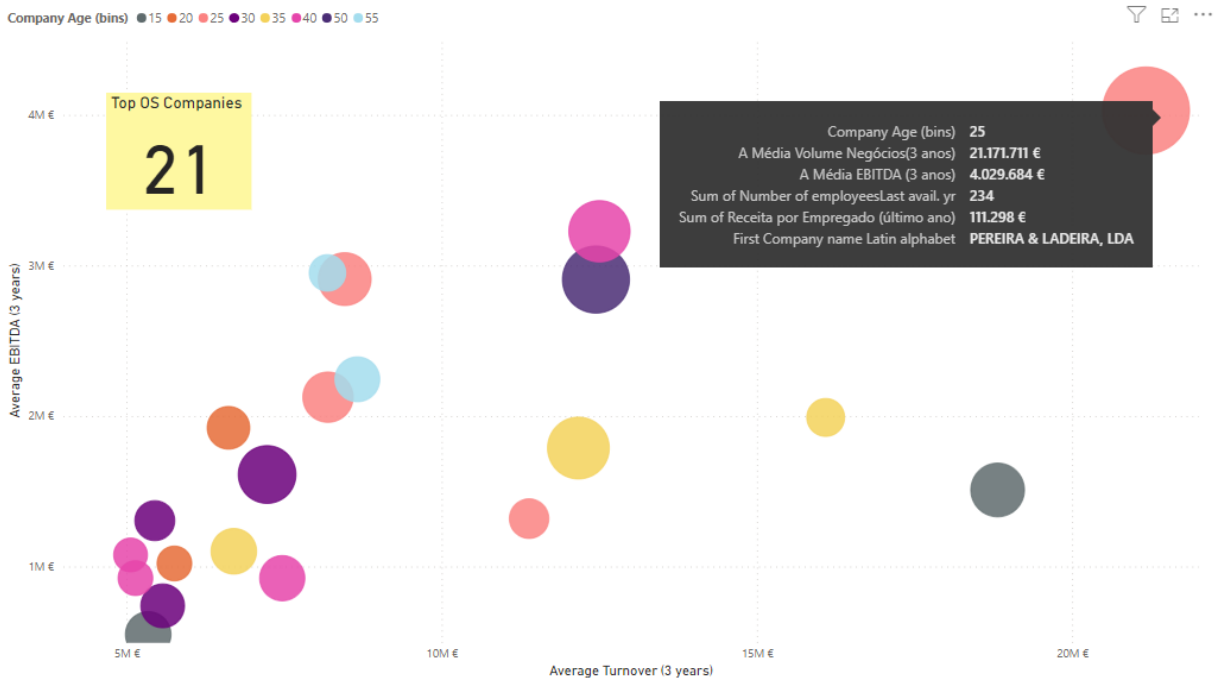


*Figure 33 OS Companies Final Shortlist*

If one follows the investment multiples identified in A.2, the following indicative table (Figure 34) 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 34 Search Fund investment intervals*

To convince investor an investment memorandum is drafted and presented below.

**Industry**

- **OS industry in Portugal:**
  - Enterprises: >2 k, 90% micro and small companies;
  - Turnover: 1.2 bi euros and net profit: 0.1 bi euros;
  - CAGR 2012-2022: >50% in sales and exports;
  - Exports: c. 0.5 bi euros (30% raw, 70% transformed).
- **Problems:**
  - Low access to capital to expand production capacity;
  - Technological and product obsolescence;
  - Lack of managerial skills and stone masons;
  - Shortage of vision and unplanned successions;
  - Threat of substitute products.

**Economics**

- **Search phase:** 250 k euros for two years (sunk cost)
- **Investment:** up to 10 million euros (up to 2.4 million from investors %)
- **Structure:** 70% debt, 25% investors and 5% searchers
- **Incentives :**
  - Vesting: 20% (3 parts: acquisition, 4 years and 20-35% IRR);
  - Performance: 4% of equity (employees);
  - Earn out period: seller works with new ExCom 1 year after acquisition.
- **Expected return (10-year horizon):**
  - ROI 495%;
  - IRR: 34.2%.
- **Risks:**
  - Inability to find a target or to close the acquisition;
  - Unattractive investment conditions (investors have the right of refusal);
  - Inability to sell, low liquidity shortage of market depth;
  - Performance and management;
  - Unknown risks (pandemic, war, political, taxes).

**Investment**

- **Solution:** one year SF to deepen this thesis and close an acquisition
- **Search Criteria:**
  - Turnover: 5-25 million euros:
  - Revenue pc: > 80 k euros;
  - EBITDA: 0.5-5 million euros;
  - Company tenure: >15 years;
  - Employees: > 30.
- **Roadmap to revamp the OS business model:**
  - Modernize infrastructure (machinery, IT);
  - Implement a proactive sales strategy;
  - Product development with ESG and intellectual property focus;
  - Design lab with co-creation of solutions with customers;
  - Transparent processes from quarry to end customer;
  - Customer experience and satisfaction (predictability of deliveries);
  - Sustained competitive advantages through high barriers to entry (heavy investment and quarry licenses).

**Team**

- **Advisory Board:**
  - Investor representative;
  - Experts in SF or M&A;
  - OS industry *connaisseurs*.
- **Executive Committee:**
  - CEO – Carlos: Chemistry, >20y scientific strategy in pharma
  - CFO – Nuno: Economics, >10y finance in government & energy
  - CTO – Hugo: Computer Science, >20y IT experience
  - COO – Filipe: Economics, >24y of growth and sales worldwide.
- **Hirings:** sales consultants, designers, artists, architects (3D experts), IP experts, engineers

*Figure 35 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 36. 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[9] 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%.

[9] 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 |
|---|---|---|
| Industry | | |
| 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% |
| | | |
| Income Statment Ratios | | |
| 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% |
| | | |
| Balance Ratios | | |
| Equity/Assets | INE | 46% |
| Liabilities/Assets | INE | 54% |
| Debt/Assets (Solvency Ratio) | Orbis | 44% |
| | | |
| Financing Costs | | |
| WACC | Calculation | 7,0% |
| Cost of Equity | Assumption | 10,0% |
| Cost of Debt | BdP | 3,5% |
| | | |
| Taxes | | |
| Indirect Taxes | Assumption | 5,0% |
| Direct Taxes | Assumption | 10,0% |

*Figure 36 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Período | 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) | N+0 | N+1 | N+2 | N+3 | N+4 | N+5 | N+6 | N+7 | N+8 | N+9 | N+10 | TOTAL |
| 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 | |
| | | | | | | | | | | | | |
| Dinvestment/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 = Dinvestment 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 | |
| Divestment/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 37 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 research suggests. The proposal, for the hypothetical company that could emerge from this exercise, would be:

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

*Figure 38 Business Model adapted from Lean Startup*

In the 1:1 interviews, 5 of the above listed companies were met. All of them are managed by deeply passionate and enthusiastic CEOs. In 4 out 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 shortlisted companies coincide with the better prepared to tackle the upcoming challenges. If these foreseen challenges are extended to the universe of the OS enterprises, likely many will fail to adapt, and many would suffer a lot to survive in the coming years.

The OS Sector was studied, finding its challenges and opportunities, a fair number of its key stakeholders were met, an investment instrument that could transform the way these family-run, small size companies sector operates was found and shown to be applicable. An investment memorandum to start the Search Fund and a business model is proposed to make it thrive. Finally, below are listed 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.

## 5. Final Remarks

### 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.

### 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.

### 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

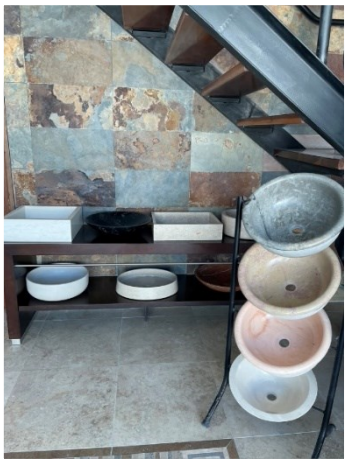

*Appendix 1 Global Stone Congress Batalha 2023*

| # | 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 MAJOR | 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 | ANIET | | http://aniet.pt/pt | |
| 13 | Associações | ASSIMAGRA | DONE | www.primeirapedra.com | 244 491 803 |
| 14 | Associações | Cluster Mineral Resources | DONE | https://www.clustermineralresources.pt | |
| 15 | Associações | STONE SITI | | https://www.stoneciti.com/ | 217 121 930 |
| 16 | Associações | CIP | DONE | https://cip.org.pt/en/ | |
| 17 | Empresa Referência | JULAR | | 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.ajfigueiredo.pt | |
| 22 | Pedra | Mercado da PEDRA | | https://mercadodapedra.com/en/home/ | |
| 23 | Pedra | ÁFRICA STONE | | http://www.africa-stone.com/ | |
| 24 | Pedra | AIRELIMESTONES | | https://www.airelimestones.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://figaljor.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 MOCASTONE | DONE | https://www.mocastone.pt | |
| 37 | Pedra | INOFER | DONE | https://www.facebook.com/metalinofer | 934 801 737 |
| 38 | Pedra | INOVECA | | http://www.incoveca.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 | Mármores A SOUSA | | https://www.facebook.com/people/Mármores-e-Granitos-A-Sousa-Lda/100045006858735 | 917 530 860 |
| 45 | Pedra | Grupo GALRÃO | DONE | https://www.galrao.com | |
| 46 | Pedra | Mármores REBELO | DONE | https://marmoresrebelo.pai.pt | 917 552 961 |
| 47 | Pedra | Mármores RICARDO | DONE | https://www.facebook.com/ricardosilvamg82 | 918 323 707 |
| 48 | Pedra | Mármores 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 | 919 361 325 |
| 53 | Pedra | OLIVAH | DONE | https://www.olivah.pt | |
| 54 | Pedra | PARDAIS GRANITES | | https://pardais.com | 255 611 682 |
| 55 | Pedra | PEDRA ANTIQUA | 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 | SOLANCIS | DONE | http://www.solancis.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/em | 917 585 454 |
| 63 | Pedra | URMAL | DONE | https://www.urmal.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.ddxgroup.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.apleitao.com/ | 262 508 907 |
| 72 | Tecnologia | BRETON | | https://breton.it/products/machines-and-lines | +39 042 37691 |

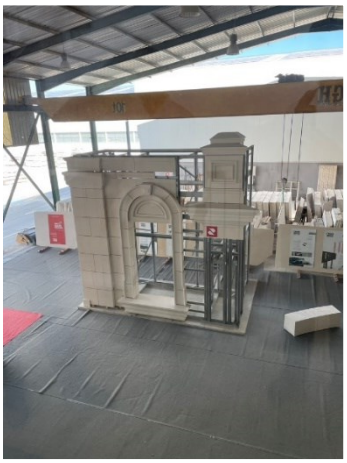
*Appendix 2 List of Contacts Used*

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

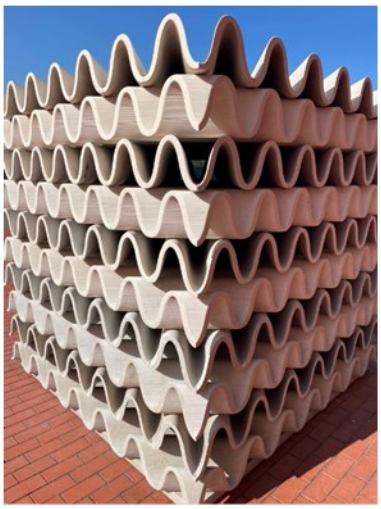
Examples of Design Pieces and Customized Products




*Appendix 4 Design Pieces*

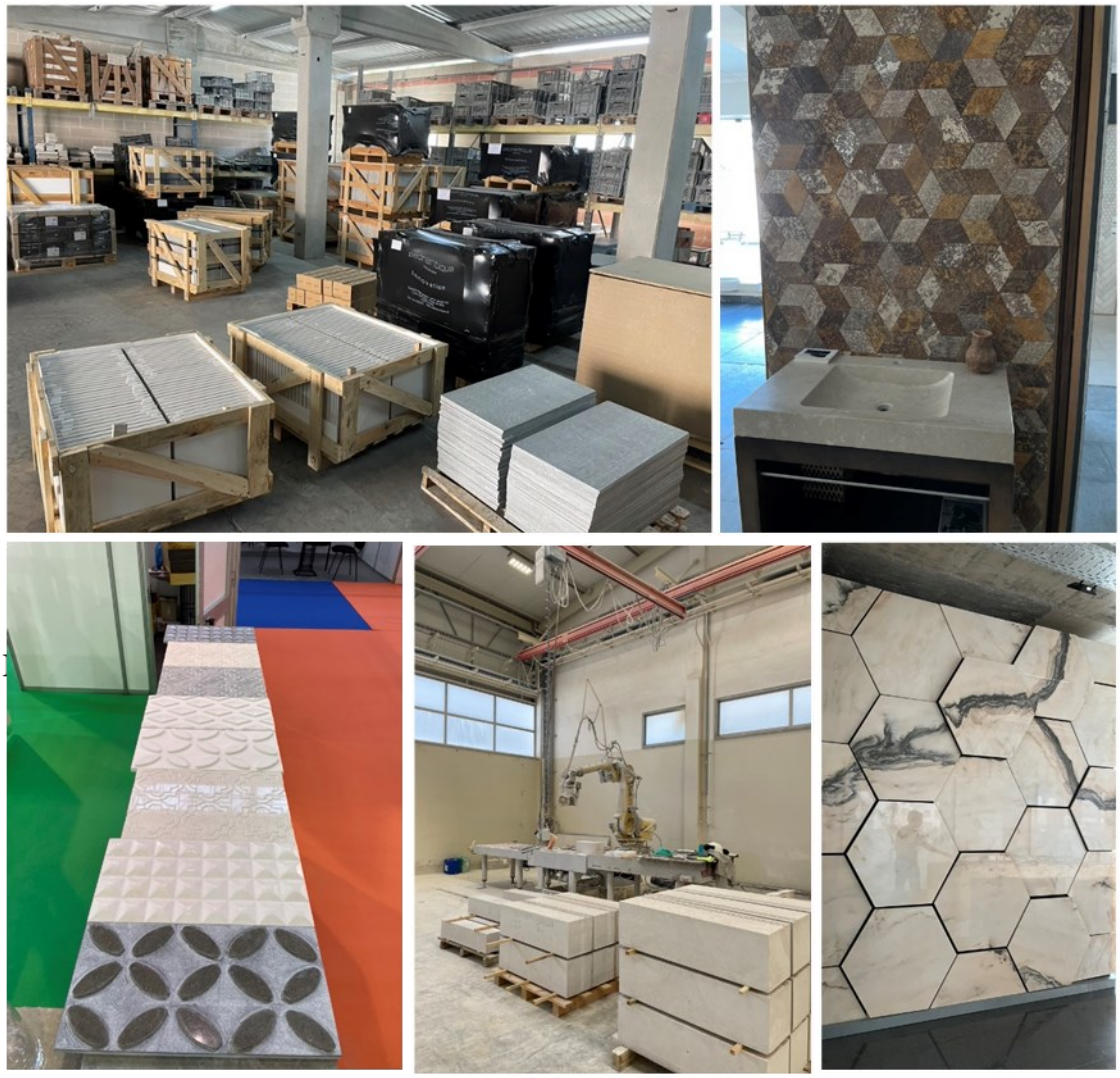



*Appendix 5 Mormon Temple Facade (Limestone)*



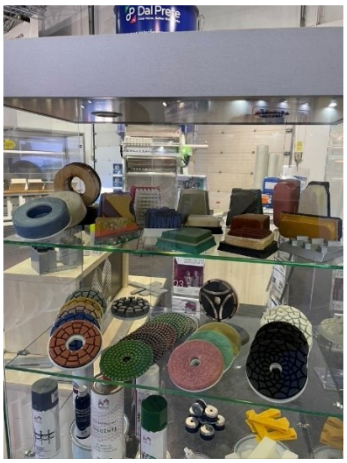
*Appendix 6 The First Stone Project Exhibition*

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*

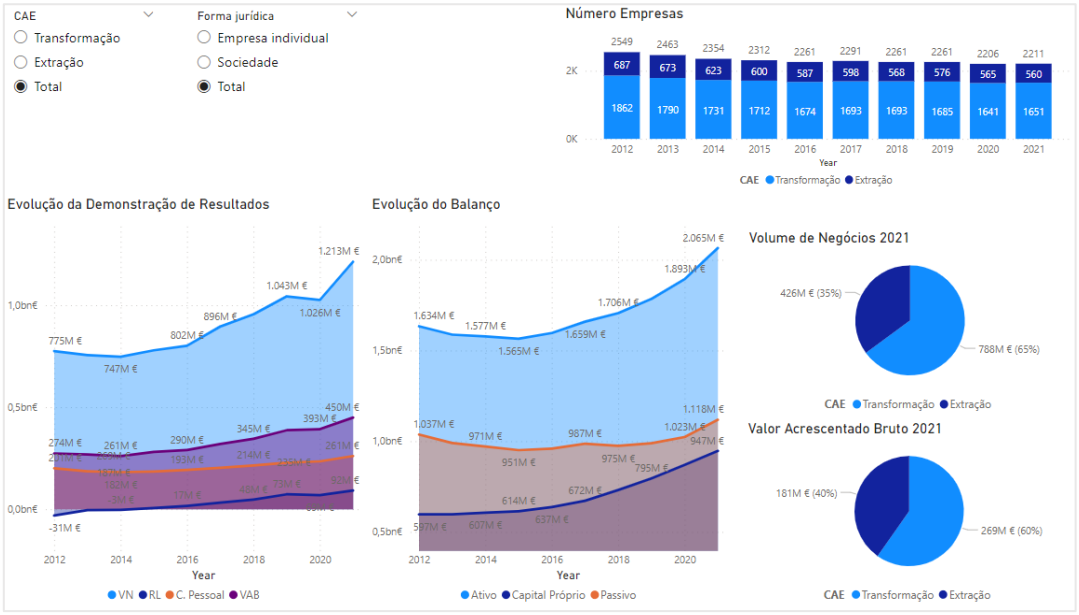

*Appendix 11 CNC Machine*

*Appendix 12 One slate block cutting machine*

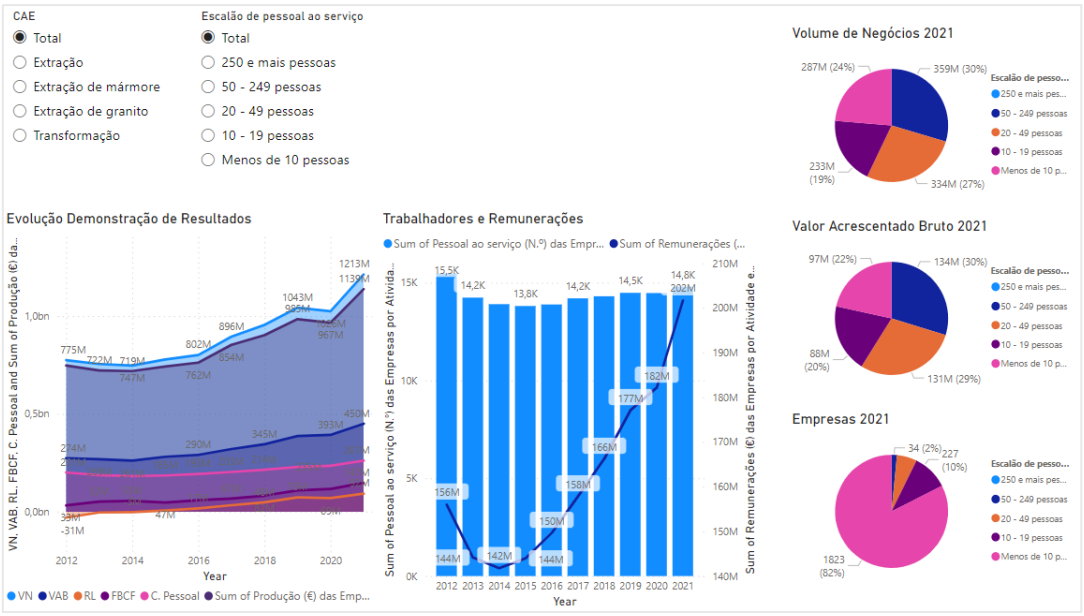
*Appendix 13 Waste Recycling*

*Appendix 14 Block Cutting Machine*

Power BI Main Tables

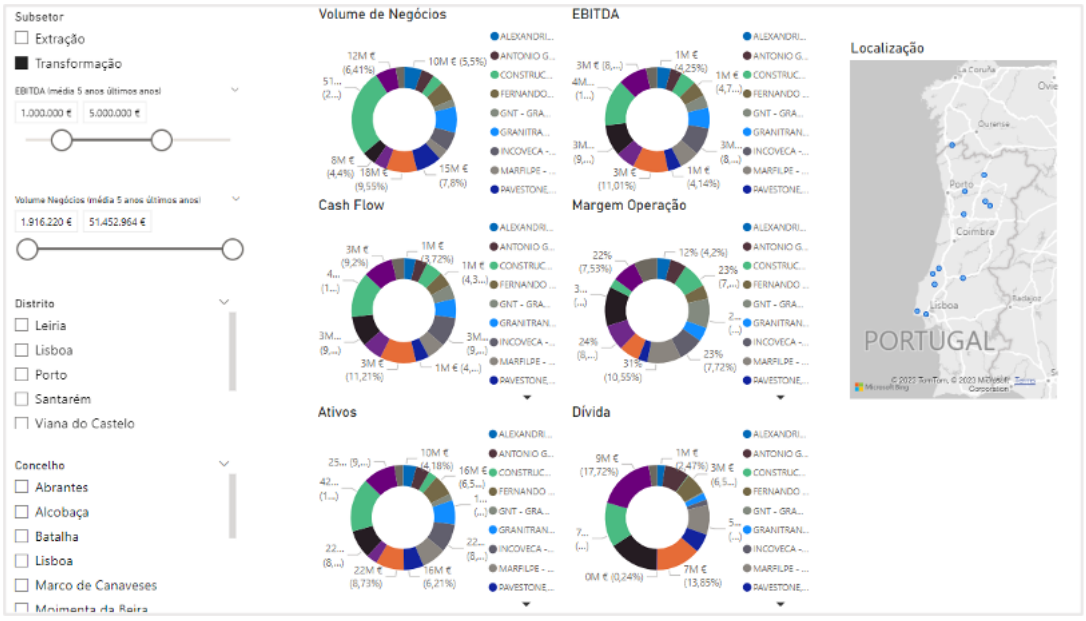



*Appendix 9 OS Companies Financial Characterisation*

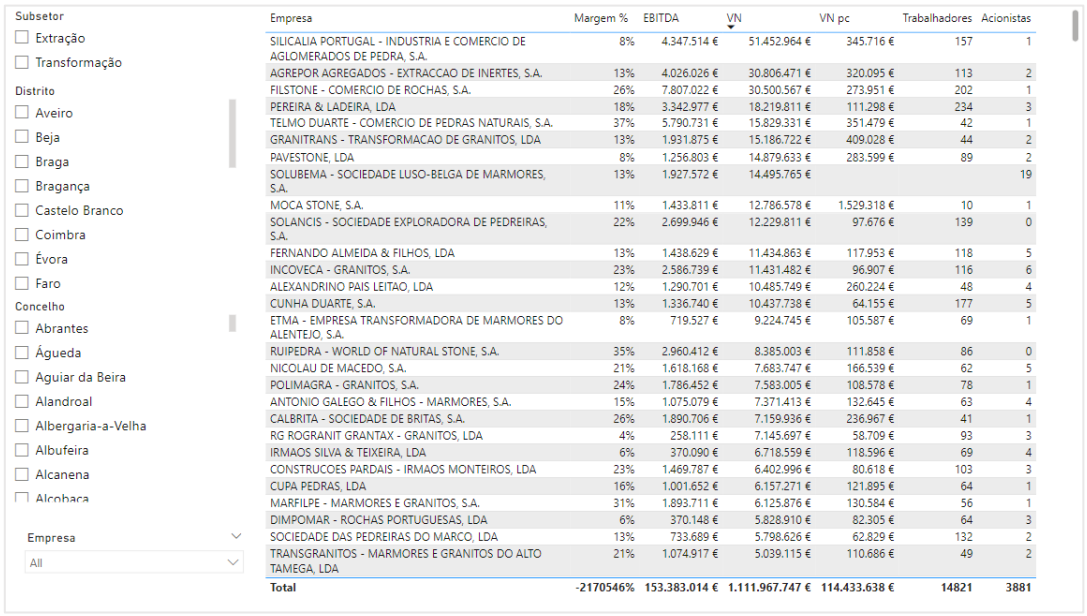



*Appendix 10 OS Companies Characterisation by Employees*


*Appendix 11 OS Companies General Characterisation*

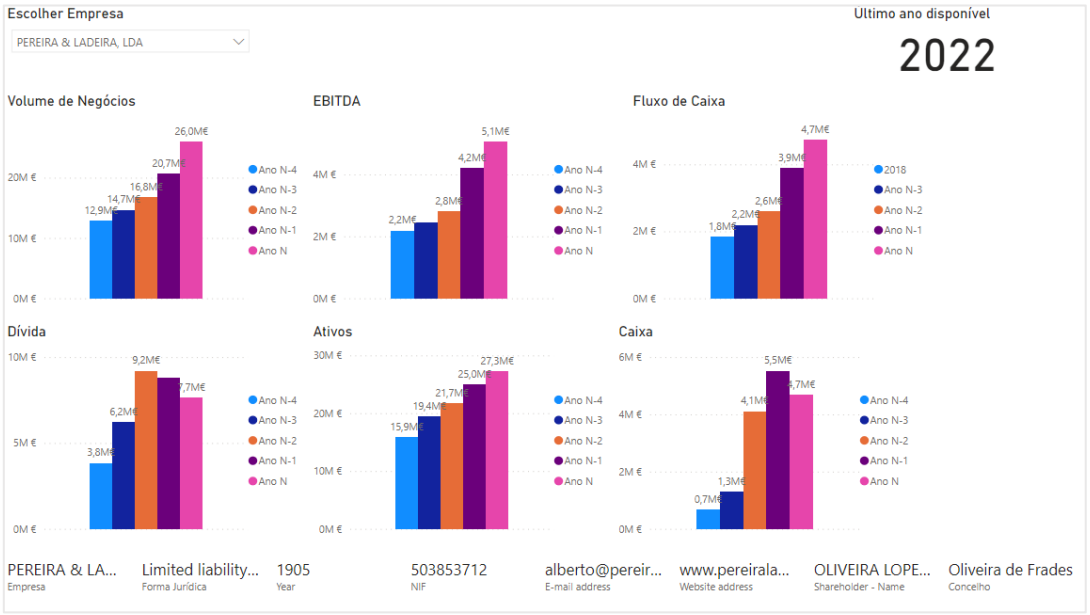



*Appendix 12 OS Companies Financial Characterisation*

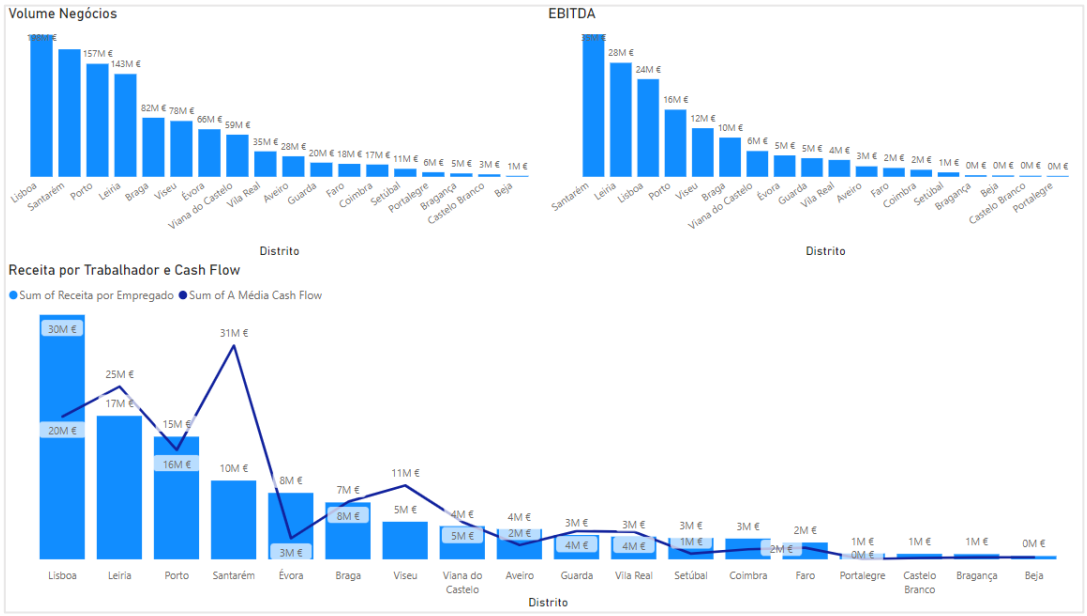



| Empresa | Margem % | EBITDA | VN | VN pc | Trabalhadores | Acionistas |
|---|---|---|---|---|---|---|
| SILICALIA PORTUGAL - INDUSTRIA E COMERCIO DE AGLOMERADOS DE PEDRA, S.A. | 8% | 4.347.514 € | 51.452.964 € | 345.716 € | 157 | 1 |
| AGREPOR AGREGADOS - EXTRACCAO DE INERTES, S.A. | 13% | 4.026.026 € | 30.806.471 € | 320.095 € | 113 | 2 |
| FILSTONE - COMERCIO DE ROCHAS, S.A. | 26% | 7.807.022 € | 30.500.567 € | 273.951 € | 202 | 1 |
| PEREIRA & LADEIRA, LDA | 18% | 3.342.977 € | 18.219.811 € | 111.298 € | 234 | 3 |
| TELMO DUARTE - COMERCIO DE PEDRAS NATURAIS, S.A. | 37% | 5.790.731 € | 15.829.331 € | 351.479 € | 42 | 1 |
| GRANITRANS - TRANSFORMACAO DE GRANITOS, LDA | 13% | 1.931.875 € | 15.186.722 € | 409.028 € | 44 | 2 |
| PAVESTONE, LDA | 8% | 1.256.803 € | 14.879.633 € | 283.599 € | 89 | 2 |
| SOLUBEMA - SOCIEDADE LUSO-BELGA DE MARMORES, S.A. | 13% | 1.927.572 € | 14.495.765 € | | | 19 |
| MOCA STONE, S.A. | 11% | 1.433.811 € | 12.786.578 € | 1.529.318 € | 10 | 1 |
| SOLANCIS - SOCIEDADE EXPLORADORA DE PEDREIRAS, S.A. | 22% | 2.699.946 € | 12.229.811 € | 97.676 € | 139 | 0 |
| FERNANDO ALMEIDA & FILHOS, LDA | 13% | 1.438.629 € | 11.434.863 € | 117.953 € | 118 | 5 |
| INCOVECA - GRANITOS, S.A. | 23% | 2.586.739 € | 11.431.482 € | 96.907 € | 116 | 6 |
| ALEXANDRINO PAIS LEITAO, LDA | 12% | 1.290.701 € | 10.485.749 € | 260.224 € | 48 | 4 |
| CUNHA DUARTE, S.A. | 13% | 1.336.740 € | 10.437.738 € | 64.155 € | 177 | 5 |
| ETMA - EMPRESA TRANSFORMADORA DE MARMORES DO ALENTEJO, S.A. | 8% | 719.527 € | 9.224.745 € | 105.587 € | 69 | 1 |
| RUIPEDRA - WORLD OF NATURAL STONE, S.A. | 35% | 2.960.412 € | 8.385.003 € | 111.858 € | 86 | 0 |
| NICOLAU DE MACEDO, S.A. | 21% | 1.618.168 € | 7.683.747 € | 166.539 € | 62 | 5 |
| POLIMAGRA - GRANITOS, S.A. | 24% | 1.786.452 € | 7.583.005 € | 108.578 € | 78 | 1 |
| ANTONIO GALEGO & FILHOS - MARMORES, S.A. | 15% | 1.075.079 € | 7.371.413 € | 132.645 € | 63 | 4 |
| CALBRITA - SOCIEDADE DE BRITAS, S.A. | 26% | 1.890.706 € | 7.159.936 € | 236.967 € | 41 | 1 |
| RG ROGRANIT GRANTAX - GRANITOS, LDA | 4% | 258.111 € | 7.145.697 € | 58.709 € | 93 | 3 |
| IRMAOS SILVA & TEIXEIRA, LDA | 6% | 370.090 € | 6.718.559 € | 118.596 € | 69 | 4 |
| CONSTRUCOES 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 € | 6.125.876 € | 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 |
| **Total** | **-2170546%** | **153.383.014 €** | **1.111.967.747 €** | **114.433.638 €** | **14821** | **3881** |

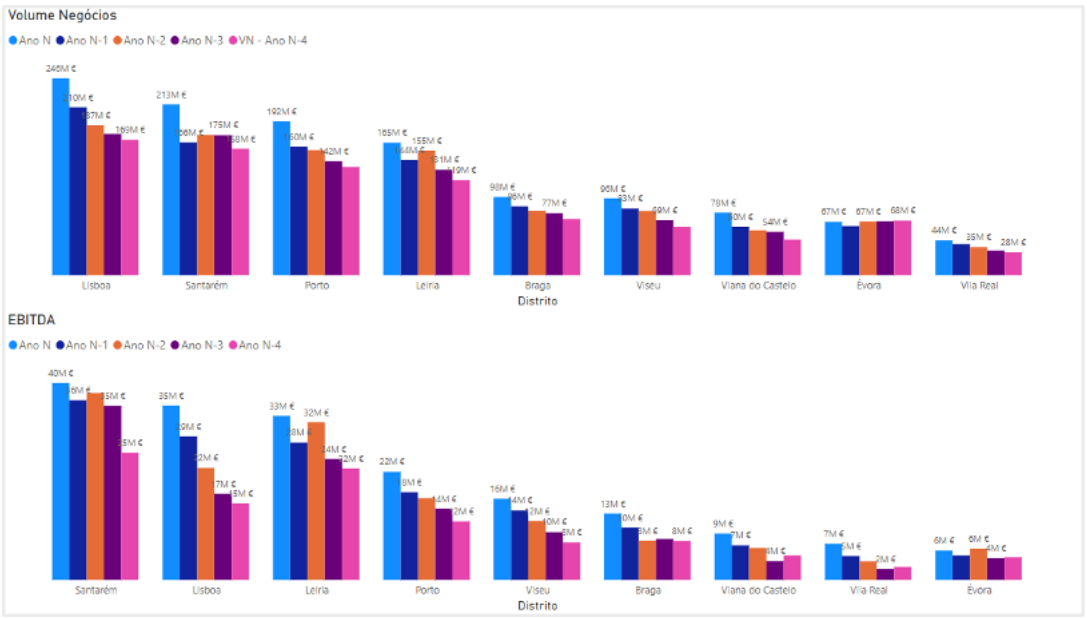
*Appendix 13 Example of a Power BI Matrix showing the main financial variables*




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

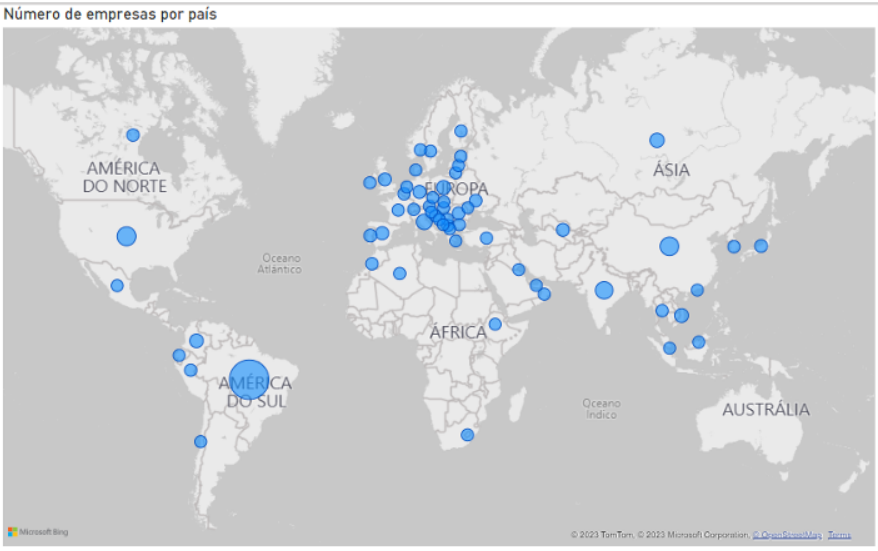



*Appendix 15 Portuguese Revenue, EBITDA distribution per district*




*Appendix 16 Portuguese Revenue and EBITDA distribution per district per year*

| Country | 811 | 2370 | Total |
|---|---|---|---|
| Brazil | 18266 | 26779 | 45045 |
| United States of America | 3137 | 8383 | 11520 |
| China | 9450 | 1456 | 10906 |
| India | 6491 | 2505 | 8996 |
| Italy | 765 | 5363 | 6128 |
| Russian Federation | 1987 | 1893 | 3880 |
| Poland | 309 | 3071 | 3380 |
| Vietnam | 2624 | 579 | 3203 |
| Colombia | 2357 | 539 | 2896 |
| Spain | 626 | 1529 | 2155 |
| Germany | 412 | 1412 | 1824 |
| Uzbekistan | 763 | 1003 | 1766 |
| United Kingdom | 390 | 1199 | 1589 |
| Portugal | 410 | 1124 | 1534 |
| Japan | 304 | 968 | 1272 |
| Romania | 347 | 889 | 1236 |
| Ukraine | 704 | 488 | 1192 |
| Morocco | 821 | 64 | 885 |
| Taiwan, China | | 796 | 796 |
| Belgium | 170 | 594 | 764 |
| Kosovo | 295 | 444 | 739 |
| Republic of Korea | 233 | 459 | 692 |
| Canada | 283 | 384 | 667 |
| Thailand | 485 | 155 | 640 |
| Algeria | 595 | | 595 |
| Peru | 458 | 119 | 577 |
| Switzerland | 72 | 486 | 558 |
| Total | 55821 | 68460 | 124281 |




*Appendix 17 World Distribution of Extraction and Transformation OS Companies*

| Country | Count of ID | Sum of Number of employeesLast avail. yr | Sum of Operating revenue (Turnover)EUR Last avail. yr | Sum of EBITDAEUR Last avail. yr | Sum of Cash flowEUR Last avail. yr | Sum of Long term debtEUR Last avail. yr |
|---|---|---|---|---|---|---|
| United States of America | 11520 | 133.219 | € 41.691.292.400 | 3.040.654.134 € | € 2.499.253.657 | € 8.012.764.701 |
| China | 10906 | 181.050 | € 32.017.804.770 | 2.443.894.458 € | € 1.924.164.531 | € 1.919.663.264 |
| Brazil | 45045 | 419.105 | € 27.203.241.373 | 16.275.525 € | € 10.952.653 | € 14.996.992 |
| United Kingdom | 1589 | 23.691 | € 8.799.329.676 | 963.186.775 € | € 1.059.858.920 | € 1.900.962.447 |
| Italy | 6128 | 28.434 | € 6.126.165.922 | 738.555.024 € | € 647.381.149 | € 925.781.294 |
| Russian Federation | 3880 | 57.953 | € 3.686.299.300 | | € 203.937.914 | € 2.535.040.369 |
| Japan | 1272 | 14.291 | € 3.409.815.926 | 194.072.210 € | € 117.874.987 | € 416.091.910 |
| Vietnam | 3203 | 53.108 | € 2.858.441.804 | 104.388.890 € | € 88.106.571 | € 255.098.860 |
| Spain | 2155 | 18.509 | € 2.738.569.073 | 296.559.438 € | € 235.409.403 | € 797.961.023 |
| Republic of Korea | 692 | 2.567 | € 2.723.470.270 | 191.431.491 € | € 131.217.071 | € 577.630.147 |
| India | 8996 | 47.174 | € 2.191.237.795 | 225.194.083 € | € 125.531.874 | € 455.433.160 |
| Belgium | 764 | 5.632 | € 1.530.505.994 | 303.312.453 € | € 334.054.253 | € 894.152.588 |
| Portugal | 1534 | 13.706 | € 1.264.362.557 | 196.633.261 € | € 176.821.109 | € 384.706.283 |
| Poland | 3380 | 21.976 | € 1.189.932.994 | 181.985.227 € | € 122.657.909 | € 62.909.564 |
| Germany | 1824 | 25.115 | € 966.808.090 | 129.030.165 € | € 109.990.935 | € 504.876.238 |
| Thailand | 640 | | € 940.737.199 | 7.652.054 € | € 6.413.222 | € 437.009.845 |
| France | 544 | 2.138 | € 925.726.549 | 74.534.629 € | € 61.497.461 | € 88.130.693 |
| Ukraine | 1192 | 19.373 | € 855.723.714 | 93.155.845 € | € 90.845.556 | € 66.144.791 |
| Morocco | 885 | | € 752.598.333 | 103.597.020 € | € 71.976.330 | € 188.772.715 |
| Malaysia | 295 | 100 | € 712.327.444 | 17.187.398 € | € 14.893.821 | € 51.527.493 |
| Turkey | 357 | 15.487 | € 624.466.589 | | | € 136.796.437 |
| Canada | 667 | 4.254 | € 550.320.274 | | | € 130.797 |
| Greece | 176 | 2.394 | € 540.168.383 | 155.040.070 € | € 120.572.435 | € 254.153.471 |
| Norway | 326 | 1.842 | € 519.064.186 | | | € 66.085.916 |
| Czech Republic | 266 | 1.170 | € 438.120.713 | 37.902.661 € | € 30.926.276 | € 18.557.609 |
| Finland | 352 | 1.692 | € 435.118.043 | 36.487.037 € | € 32.019.198 | € 34.403.432 |
| Romania | 1236 | 6.581 | € 411.169.318 | 63.742.272 € | € 33.288 | € 4.146.696 |
| Sweden | 360 | 1.573 | € 325.218.113 | 27.178.553 € | € 23.623.122 | € 16.352.030 |
| Croatia | 419 | 3.403 | € 315.399.560 | 54.687.791 € | € 50.688.116 | € 58.798.880 |
| Mexico | 200 | 6.414 | € 314.616.961 | | | € 1.649.351 |
| Netherlands | 246 | 1.395 | € 272.856.141 | 39.172.674 € | € 31.811.957 | € 22.034.349 |
| Ireland | 212 | 1.845 | € 249.090.933 | 44.209.229 € | € 33.092.209 | € 61.089.290 |
| Total | 124281 | 1.157.117 | € 149.540.908.997 | 10.035.626.442 € | € 8.560.076.684 | € 22.165.912.148 |


*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 of Extraction | 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 of Extraction | 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 of Extraction | 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 Power BI*