U LISBOA | UNIVERSIDADE DE LISBOA

FACULDADE DE ARQUITETURA

The Strategic Design in the Service Sector:

Impact on the Micro and SMEs Service Companies

DOUTORAMENTO EM DESIGN

Teresa Isabel Santa Maria Magalhães de Serpa

Orientador: **Doutor Fernando José Carneiro Moreira da Silva**

Professor Catedrático • Faculdade de Arquitetura da Universidade de Lisboa

TESE ESPECIALMENTE ELABORADA PARA A OBTENÇÃO DO GRAU DE DOUTOR

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2018

FCT Fundação para a Ciência e a Tecnologia

CiAUD Centro de Investigação em Arquitetura, Urbanismo e Design

The Strategic Design in the Service Sector
Impact on the Micro and SMEs Service Companies

Thesis Contents
1st Volume and 2nd Volume

Dedication

To my Parents. Always.

Credits

3D Models - Architect Francisco Zambujo

3D Renders - Professor Cristina Caramelo Gomes

Editorial & Graphic Design - Designer Carolina Cravinho

Contents
1st Part

Acknowledgements

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I must emphasize the contribution, mostly during 2009 and 2010, of José Manuel dos Santos, an excellent professional who allowed my PGDEI[3] team to work on the case of the Diverge company, specifically on the corporate design process.

1 GID - Department of Investigation in Design (Gabinete de Investigação em Design).

2 FA | ULisboa - Architecture Faculty of Lisbon University (Faculdade de Arquitetura da Universidade de Lisboa).

3 PGDEI - One year Graduation course, after University degree, in Strategic Design and Innovation (Pós-Graduação em Design Estratégico e Inovação).

The given support, time, all his sympathy and friendship allowed us to achieve great results and released the seeds of my interest in the design/design integration levels/time interconnections, and consequently of the PhD research project.

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4 FCT - Science and Technology Foundation (*Fundação para a Ciência e Tecnologia*).

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I can only say:

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I want to honour Margarida, my Grandmother, and to remember all my friends who disappeared during this period.

From the embryonic stage of this research project, to the final discussion "semicolon" it was a long journey with many "commas" dividing the different moments and stages.

This text and research was "co-designed" with you all.

Now it is time for the "suspension points" of new beginnings...

Epigraph

*"(...) le hasard ne favorise que les esprits préparés."**

Louis Pasteur (Université de Lille, France, 1854)

* Fortune only favors the prepared mind (Author's free translation)

Abstract and Keywords

Abstract

The primary purpose of this research was to design a model aimed at Portuguese service SMEs (Small and Medium-sized Enterprises) pursuing Sustainable Growth and Longevity (SGL) centred in design knowledge and potential, and based on contemporary Portuguese issues.

The theoretical model was designed to create, integrate, and synthesise knowledge from several areas through design, allowing its use by businesses and companies. The model focusses on intrinsic matters (entrepreneur/team), internal subjects (company/business), external issues, and company design, through Strategic Design, Service Design and Design Thinking.

Portuguese service SMEs were studied. The triangulation with theoretical knowledge was incorporated into the research and the model. Version 1.1 was evaluated by Experts' interviews, and their relevant inputs were included in version 1.2. The conclusions were obtained through answering the Research Questions, verification of the Hypothesis and the Objectives achievement.

Knowledge and use of the model may raise companies' performance, specifically Portuguese service SMEs pursuing SGL.

The model demonstrates that it is possible to co-design companies and their SGL. Through design, namely Strategic Design, Service Design, and Design Thinking, and through raising the levels of design intervention within companies, it is possible to design better companies and businesses, increasing their benefits to society and the economy.

Keywords

Strategic Design
Service Design
Design Thinking
Design Benefits
Service Sector Micro and SMEs

Sumário e Palavras-Chave

Sumário

O principal objectivo desta investigação consistiu em projectar um modelo para as PME (Pequenas e Médias Empresas) portuguesas de serviços que visem um Crescimento Sustentável e uma Longevidade assinalável (CSL), baseado na Teoria do Design e em problemas da economia portuguesa.

O modelo teórico foi concebido para, através do Design, criar, integrar e relacionar conhecimentos de diversas áreas, permitindo a sua utilização por negócios e empresas. Problemas intrínsecos (empreendedor/equipa), internos (negócio/empresa) ou questões extrínsecas à empresa ou relativas ao seu desenvolvimento, podem ter resposta, nomeadamente, através do Design Estratégico, Design de Serviços e Design Thinking.

O estudo das PME portuguesas de serviços relacionado com conhecimentos teóricos do Design, da área empresarial e de negócios, foram incluídos na investigação e no modelo. A versão 1.1 foi avaliada a partir de entrevistas a especialistas e os seus contributos foram incluídos na versão 1.2. As conclusões foram obtidas a partir da resposta às questões da investigação, da verificação da hipótese e do cumprimento dos objectivos.

Elevando os níveis de intervenção do Design nas empresas, nomeadamente através do Design Estratégico, do Design de Serviços, e do Design Thinking, o conhecimento e uso do modelo podem promover a co-criação e o desenvolvimento de negócios e empresas melhores e mais eficientes, nomeadamente as que visam o CSL, consequentemente, promovendo melhorias a nível da sociedade e da economia.

Palavras-chave

Design Estratégico
Design de Serviços
Design Thinking
Benefícios do Design
Micro, Pequenas e Médias Empresas de Serviços

The Strategic Design in the Service Sector: Impact on the Micro and SMEs Service Companies

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Acronyms and Abbreviations

AERLIS
Business Association of the Lisbon Region
(*Associação Empresarial da Região de Lisboa*)

AICEP
Portuguese Agency for Investment and Foreign Trade
(*Agência para o Investimento e Comércio Externo de Portugal*)

AND
National Association of Designers (*Associação Nacional de Designers*)

ANJE
National Association of Young Entrepreneurs
(*Associação National de Jovens Empresários*)

APD
Portuguese Association of Designers (*Associação Portuguesa de Designers*)

APME
Portuguese Association of Women Entrepreneurs
(*Associação Portuguesa de Mulheres Empresárias*)

BEUR
Billion Euros

BPI
Portuguese Investment Bank (*Banco Português de Investimento*)

BRIC
Brazil, Russia, India, China

CAE, Rev.3
Portuguese Classification of Economic Activities - Revision 3, Decree Law of January 2007 (*Classificação Portuguesa das Actividades Económicas Revisão 3, Decreto Lei de janeiro de 2007*)

CGD
State-owned Banking Corporation (*Caixa Geral de Depósitos*), the largest bank in Portugal

CIA
Central Intelligence Agency

CIP
Business Confederation of Portugal (*Confederação Empresarial de Portugal*)

CITA, Rev.4
International Classification, by Industry, of All Branches of Economic Activity, Revision 4 (*Classificação Internacional Tipo, por Indústria, de todos os Ramos de Actividade Económica, Revisão 4*)

COSME
EU programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (SMEs)

CPD
Portuguese Design Centre (*Centro Português de Design*)

CPP/2010
Portuguese Classification of Professions of 2010, published in II Series of the Diário da República no. 106, of June 01, 2010 (*Classificação Portuguesa das Profissões de 2010, publicada na II Série do Diário da República nº 106, de 01 de Junho de 2010*)

CVP
Portuguese Red Cross (*Cruz Vermelha Portuguesa*)

DGAE
General Directorate of Economic Activities
(*Direcção Geral das Actividades Económicas*)

EC
European Commission (*Comissão Europeia*)

ECB
European Central Bank

EFSP
Economic and Financial Assistance Program

EU
European Union (*UE - União Europeia*)

Eurostat
European Statistical System
ESM
European Stability Mechanism

ESPON
European Observation Network, Territorial Development, and Cohesion

FB
Family Businesses

FCT
Science and Technology Foundation (*Fundação para a Ciência e Tecnologia*)

FFE
Training and/or Specific Training (*Formação ou Formação Específica*)

FPP
Training and Professional Practice (*Formação e Prática Profissional*)

FTE
Full-Time Equivalent Employment

GAA
Questionnaire Initial Answer Group, 52 responses

GAF
Questionnaire First Selection Group, 28 companies

GAS
Questionnaire Special Selection Group, 19 companies

GDP
Gross Domestic Product

GEA
Questionnaire Eligible Answer Group, 50 responses

GEP/MTSS
Office of Strategy and Planning of the Ministry of Labour and Social Solidarity *(Gabinete de Estratégia e Planeamento do Ministério do Trabalho e da Solidariedade Social)*

GPEARI/MCTES
Office of Planning, Strategy, Evaluation, and International Relations
(*Gabinete de Planeamento, Estratégia, Avaliação e Relações Internacionais*)

GVA
Gross Value Added

HDI
Human Development Index

HIK
High-Intensity Knowledge

IAPMEI
Agency for Competitiveness and Innovation
(*Agência para a Competitividade e Inovação*)

ICT
Information and Communications Technology

IEFP
Institute of Employment and Training (*Instituto do Emprego e Formação Profissional*)

IES
Simplified Business Information (*Informação Empresarial Simplificada*)

IFDEP
Institute of Development for the Development of Entrepreneurship in Portugal
(*Instituto de Fomento para o Desenvolvimento do Empreendedorismo em Portugal*)

IISD
International Institute for Sustainable Development

IMF
International Monetary Fund

INE
National Institute of Statistics (*Instituto Nacional de Estatística*)

INPI
National Institute of Industrial Property
(*Instituto Nacional da Propriedade Industrial*)

IT
Information Technology

KEUR
Thousand euros

KIS
Knowledge-Intensive Services

MEUR
Million euros

MTSS
Ministry of Labour and Social Solidarity
(Ministério do Trabalho e da Solidariedade Social)

NACE Rev. 2
General nomenclature of economic activities of the European Communities rev. 2
(*Nomenclatura Geral das Actividades Económicas das Comunidades Europeias Rev. 2*)

NUTS
Nomenclature of Territorial Units for Statistical Purposes
(Nomenclatura das Unidades Territoriais para Fins Estatísticos)

OE
Economists Order *(Ordem dos Economistas)*

OECD
Organization for Economic Co-operation and Development
(OCDE - Organização para a Cooperação e Desenvolvimento Económico)

OEFP
Employment and Vocational Training Observatory
(*Observatório do Emprego e Formação Profissional)*

PEST
Political, Economic, Social and Technological

PGDEI
One year Graduation course, after University degree, in Strategic Design and Innovation (*Pós-Graduação em Design Estratégico e Inovação*)

PICTIVE
Plastic Interface for Collaborative Technology Initiative through Video Exploration.

PORDATA
Contemporary Portugal Database *(Base de Dados de Portugal Contemporâneo)*

PP
Professional Practice (Prática Profissional)

PWN
European Professional Women's Network

R&D
Research and Development (*I&D* - Investigação e Desenvolvimento)

SICAE
Information System of the Portuguese Classification of Economic Activities (*Sistema de Informação da Classificação Portuguesa de Atividades Económicas*)

SME
Small and Medium-sized Enterprise *(PME - Pequena e Média Empresa)*

SUB-SECTOR Y
Provisional name given to the research field, before it has been fully defined and narrowed

SWOT (ANALYSIS)
Strengths, Weaknesses, Opportunities, and Threats

ULisboa
University of Lisbon (Universidade de Lisboa)

UN
United Nations *(ONU - Organização das Nações Unidas)*

WB
World Bank

WEF
World Economic Forum

WTF
World Trade Forum

Glossary [7]

ABA (or A-B-A)

This design research technique involves having participant(s) engage in a baseline experience state, followed by a new state, and then they revert to the original baseline state (Design Research Techniques, 2017)

ABAB (or A-B-A-B)

This design research technique has the same first three stages as ABA. However, it has an extra stage which is the repetition of the second one, a new fourth state (Design Research Techniques, 2017)

"BRAIN DRAIN"

"The emigration of highly trained or qualified people from a particular country" (Oxford Dictionary, 2017)

COMPANY

"A commercial business" (Oxford Dictionary, 2017)

CONCEPTUAL MODELS

"(...) are qualitative models that help highlight important connections in real world systems and processes. They are used as a first step in the development of more complex models" (Carleton College, 2017)

DESIGN FOR ALL

Closely related to Inclusive Design, Design for All started by looking at barrier-free accessibility for people with disabilities but has become a strategy for mainstream, inclusive solutions. As highlighted by the European Commission, it is about ensuring that environments, products, services, and interfaces work for people of all ages and abilities in different situations and under various circumstances. This term is used in continental Europe and Scandinavia. There are other terms that are sometimes used with varying relevance to Inclusive Design. A few include Co-Design, People-Centred Design, User-Focussed Design and Transgenerational Design (Core Publish, 2017)

ECONOMY

"The state of a country or region in terms of the production and consumption of goods and services and the supply of money"
"A particular system or stage of an economy" (Oxford Dictionary, 2017)

7 The Glossary presentation at the beginning of the document was a user-friendly decision considering the readers who do not have English as a first language. English has various spellings, and British English was used for writing and proofreading (e.g. analyse, behaviour, centre vs. US analyze, behavior, center). Some of the definitions are just presented for operative reasons or linguistic clarification.
The Bibliographic References of the Glossary are presented in the General Bibliographic References.

ECOSYSTEM
"A biological community of interacting organisms and their physical environment"
"A complex network or interconnected system" (Oxford Dictionary, 2017)

ENTREPRENEUR
"Person who sets up a business or businesses, taking on financial risks in the hope of profit"
"Origin: Early 19th century (denoting the director of a musical institution)"
(Oxford Dictionary, 2017)

EXPERT
"A person who is very knowledgeable about or skilful in a particular area"
"Having or involving a great deal of knowledge or skill in a particular area"
(Oxford Dictionary, 2017)

EXPORTS
"Goods and services that are made in one country and transmitted to foreigners. It doesn't matter what the good or service is. It doesn't matter how it is sent. It can be shipped, sent by email, or hand-carried in personal luggage on a plane. If it is produced domestically and sold to someone from a foreign country, it is an export. For example, tourism products and services are considered exports"
(The Balance, 2016)

EXTERNAL
"Coming or derived from a source outside the subject affected"
(Oxford Dictionary, 2017)

EXTRINSIC
"Not part of the essential nature of someone or something; coming or operating from outside" (Oxford Dictionary, 2017)

FAMILY BUSINESSES - FB (also FAMILY FIRM)
"A business that is owned or run by members of a single family"
(Oxford Dictionary, 2017)

FULL-TIME EQUIVALENT EMPLOYMENT - FTE
"The number of full-time equivalent jobs, defined as total hours worked divided by average annual hours worked in full-time jobs" (OECD, 2017)

GAMIFICATION
"The application of typical elements of game playing (e.g. point scoring, competition with others, rules of play) to other areas of activity, typically as an online marketing technique to encourage engagement with a product or service"
"Gamification is exciting because it promises to make the hard stuff in life fun"
(Oxford Dictionary, 2017)

GAZELLE / HIGH GROWTH COMPANIES

"All enterprises up to five years old with average annualized growth greater than twenty percent per annum over a three-year period, and with ten or more employees at the beginning of the observation period" (The Balance, 2016)

GROSS DOMESTIC PRODUCT - GDP (*PIB - Produto Interno Bruto*)

"Gross domestic product is an aggregate measure of production equal to the sum of the gross values added of all resident institutional units engaged in production (plus any taxes, and minus any subsidies, on products not included in the value of their outputs). The sum of the final uses of goods and services (all uses except intermediate consumption) measured in purchasers' prices, less the value of imports of goods and services, or the sum of primary incomes distributed by resident producer units" (OECD, 2017)

GROSS VALUE ADDED - GVA (*VAB - Valor Acrescentado Bruto*)

"Gross value added is the value of output less the value of intermediate consumption; it is a measure of the contribution to GDP made by an individual producer, industry or sector; gross value added is the source from which the primary incomes of the SNA are generated and is therefore carried forward into the primary distribution of income account" (OECD, 2017)

KNOWLEDGE ECONOMY

"An economy in which growth is dependent on the quantity, quality, and accessibility of the information available, rather than the means of production" (Oxford Dictionary, 2017)

INCLUSIVE DESIGN

Defined in 2000 by the UK Government as "products, services and environments that include the needs of the widest number of consumers". It has a history stretching back to the social ideals in Europe that materialised after World War II. These include healthcare and housing for everyone. Inclusive Design is used within Europe and goes beyond older and disabled people to focus on other excluded groups to deliver mainstream solutions (Core Publish, 2017)

INNOVATION

The process of translating an idea or invention into a good or service that creates value or for which customers will pay.

To be called an innovation, an idea must be replicable at an economical cost and must satisfy a specific need. Innovation involves deliberate application of information, imagination and initiative in deriving greater or different values from resources, and includes all processes by which new ideas are generated and converted into useful products. In business, innovation often results when ideas are applied by the company in order to further satisfy the needs and expectations of the customers (...) Innovations are divided into two broad

categories: Evolutionary innovations (continuous or dynamic evolutionary innovation) that are brought about by many incremental advances in technology or processes, and Revolutionary innovations (also called discontinuous innovations) which are often disruptive and new (Business Dictionary, 2017)

INTERACTIVE MODELS

"(...) Interactive demonstrations are physical models of systems that can be easily observed and manipulated and which have characteristics similar to key features of more complex systems in the real world. These models can help bridge the gap between conceptual models and models of more complex real world systems" (Carleton College, 2017)

INTERNAL

"Existing or occurring within an organization" (Oxford Dictionary, 2017)

INTRINSIC

"Belonging naturally; essential" (Oxford Dictionary, 2017)

LARGE COMPANY

"Company category defined by ≥ 250 staff head-counts, ≥ €50 m turnover or ≥ €43 m balance sheet total" (EU, 2017)

KPI

Key Performance Indicator

LEAP

"Jump across"
"Move quickly and suddenly"
"Accept (an opportunity) eagerly" (Oxford Dictionary, 2017)

MARKETING

"The management process through which goods and services move from concept to the customer. It includes the coordination of four elements called the 4 P's of marketing: (1) identification, selection, and development of a product, (2) determination of its price, (3) selection of a distribution channel to reach the customer's place, and (4) development and implementation of a promotional strategy" (Business Dictionary, 2017)

MATHEMATICAL AND STATISTICAL MODELS

"(...) involve solving relevant equation(s) of a system or characterizing a system based upon its statisical parameters (...) include Analytical models and Numerical Models. Statistical models are useful in helping identify patterns and underlying relationships between data sets" (Carleton College, 2017)

MEDIUM-SIZED COMPANY

"Company category defined by < 250 staff head-counts, ≤ €50 m turnover or ≤ €43 m balance sheet total" (EU, 2017)

MICRO COMPANY

"Company category defined by < 10 staff head-counts, ≤ €2 m turnover or ≤ €2 m balance sheet total" (EU, 2017)

MIND-SET

"The established set of attitudes held by someone" (Oxford Dictionary, 2017)

MODEL

"(...) human construct to help us better understand real world systems. It describes (or specifies) four types of structure (systemic, geometric, temporal, and interaction). (...) Model Types: Conceptual, Interactive, Mathematical and Statistical and Visualization models" (Carleton College, 2017)

OPERATIONAL DEFINITION

"(...) An operational definition is generally designed to model a theoretical definition. The most operational definition is a process for identification of an object by distinguishing it from its background of empirical experience (...)"
"(...) This is especially so in the social and medical sciences, where operational definitions of key terms are used to preserve the unambiguous empirical testability of hypothesis and theory (...)"
"(...) phenomena using operationally defined terms and tables of operationally defined measurements (...)"
"If it walks like a duck and quacks like a duck, it must be some kind of duck"
(Wikipedia, 2017)

PICTIVE

(Plastic Interface for Collaborative Technology Initiative through Video Exploration)
It is a design research technique, which allows users to participate in developing graphical user interfaces, often through simple paper materials, and was originally developed in the 90s at Bellcore (Design Research Techniques, 2017)

PROXIMITY SERVICES

According to the WTO definition (2017), there are four different types of service trade and supply: Mode 1 — Cross border trade; Mode 2 — Consumption abroad; Mode 3 — Commercial presence and Mode 4 — Presence of natural persons. Proximity services is a operational terminology, which means all the services that need the presence of the provider or the consumer in the trade or supply. In this case they include the Mode 2, 3 and 4.

REMOTE SERVICES

Remote services is a practical terminology, as an opposition to the proximity services that mean the Cross border trade (WTO, 2017). These services do not need the presence of the provider or the consumer in the trade or supply.

SELF-EMPLOYMENT

"Self-employment is defined as the employment of employers, workers who work for themselves, members of producers' co-operatives, and unpaid family workers."
"Self-employment may be seen either as a survival strategy for those who cannot find any other means of earning an income or as evidence of entrepreneurial spirit and a desire to be one's own boss" (OECD, 2017)

SGL

Sustainable Growth and Longevity

SME / MICRO, SMALL AND MEDIUM-SIZED ENTERPRISES

"The category of micro, small and medium-sized enterprises (SMEs) is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding 50 MEUR, and/or an annual balance sheet total not exceeding 43 MEUR" (EU, 2017)

SMALL COMPANY

"Company category defined by < 50 staff head-counts, ≤ €10 m turnover or ≤ €10 m balance sheet total" (EU, 2017)

SOCIAL MEDIA

"Websites and applications that enable users to create and share content or to participate in social networking" (Oxford Dictionary, 2017)

STAKEHOLDER

"A person with an interest or concern in something, especially a business"
"Denoting a type of organization or system in which all the members or participants are seen as having an interest in its success: 'a stakeholder economy'" (Oxford Dictionary, 2017)

START-UP

"A start-up is a young company that is just beginning to develop. Start-ups are usually small and initially financed and operated by a handful of founders or one individual. These companies offer a product or service that is not currently being offered elsewhere in the market, or that the founders believe is being offered in an inferior manner" (Investopedia, 2017)

SURVEY

"Surveys are Methods of data collection and they can be of four different types: (i) personal interview; (ii) mail questionnaire; (iii) panel; (iv) telephone; and (v) observations. Among these, personal interview and mail questionnaire are considered to be the most popular methods among the investigators"
(Mathiyazhagan and Nandan, 2010)

SUSTAINABLE DEVELOPMENT

"Sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of needs, in particular, the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs" (IISD, 2017)

SYNTHESISE (SYNTHESISE, SYNTHETISE OR SYNTHETIZE)

"Combine (a number of things) into a coherent whole" (Oxford Dictionary, 2017)

TRIPLE BOTTOM LINE

"The triple bottom line (TBL) thus consists of three Ps: Profit, People and Planet. It aims to measure the financial, social and environmental performance of the corporation over a period of time" (EU, 2017)

TRIPLE HELIX

"The Triple Helix thesis is that the potential for innovation and economic development in a Knowledge Society lies in a more prominent role for the university and in the hybridization of elements from university, industry, and government to generate new institutional and social formats for the production, transfer, and application of knowledge. This vision encompasses not only the creative destruction that appears as a natural innovation dynamics (Schumpeter, 1942), but also the creative renewal that arises within each of the three institutional spheres of university, industry, and government, as well as at their intersections" (The Economist, 2017)

UNICORN

"A start-up company valued at more than a billion dollars, typically in the software or technology sector: 'a currency-exchange unicorn'"
"([as modifier] 'many unicorn start-ups have little revenue to speak of')"
(Oxford Dictionary, 2017)

UNIVERSAL DESIGN

"This term originated in the USA and is now adopted by Japan and the Pacific Rim. It started with a strong focus on disability and the built environment. Driven by the large number of disabled Vietnam War veterans, it was modelled on the Civil Rights Movement that promised "full and equal enjoyment ... of goods and services". It has been a driving force in establishing American legislation regarding older and disabled people" (Core Publish, 2017)

VALUE CREATION

"The performance of actions that increase the worth of goods, services or even a business. Many business operators now focus on value creation both in the context of creating better value for customers purchasing its products and services, as well as for shareholders in the business who want to see their stake appreciate in value" (Business Dictionary, 2017)

VISUALIZATION MODEL

"(...) can be a direct link between data and some graphic or image output or can be linked in series with some other type of model so to convert its output into a visually useful format" (Carleton College, 2017)

WICKED PROBLEM

"Popularised in the 1973 article "Dilemmas in a General Theory of Planning" by Horst Rittel and Melvin Webber, the term wicked problem refers to a complex problem for which there is no simple method of solution.
Wicked problems are ones for which there is no clear stopping rule - you cannot say for sure that you are done with the problem. Working on it more might well bring forth a better solution. There is no single right answer and every attempt can matter because it affects the things people depend upon" (FT, 2017)

WIKI

"A website or database developed collaboratively by a community of users, allowing any user to add and edit content"
"(Origin 1990s: from 'Wiki Wiki Web', the name of the first website of this kind, from Hawaiian wiki wiki, very quick)" (Oxford Dictionary, 2017)

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1st Chapter
Introduction

This chapter briefly presents the context in which this research evolved. It also presents some characteristics of the research project like its direct connection to the national, European, and international issues and concerns through time. The project relates facts from the past to the future; integrates economic, political, social, and cultural knowledge; and explores issues and consequences from micro to the macro scale.

Micro-scale influences can be seen in the needs and current and future use of the research results by micro and SMEs, and in the impact on the Sustainable Growth and Longevity of those companies. The results in the economic, social, and sustainability areas may affect the local community but also wider regions and areas.

The primary focus of the research was on service SMEs, the biggest employers and great producers of wealth all over the world. These companies usually have a brief life; they have fragilities related with their small size and they are very exposed to fast and powerful contextual changes.

Design knowledge in those companies, if it exists at all, is minimal, and the use and integration of design are very focussed and occasional. Their managerial and strategic issues are usually not very well-developed, thus reflecting in the Sustainable Growth and Longevity (SGL) of the companies that can be improved.

This chapter also presents the Research Questions, the Hypothesis, and the Objectives, strictly connected with the previously defined research problem and framework. The Methodology, the use and integration of design in the research, and the document structure are the final components presented.

This chapter prepares the reader for the understanding of the entire research, being the contextual foundation for all the following chapters.

The research was firmly based on simultaneous developments. The 2008 world crisis strongly affected everything from the country's political, economic, and

social spheres to the individuals' quality of life. The research field definition was influenced by the unstable and intricate information and context.

Micro and SMEs have short life-cycles, and those created by the need for job creation and family sustenance are more fragile and at risk of a premature unwanted collapse. It is possible to predict with accuracy companies' insolvencies and to identify their most common reasons.

The design discipline has grown into closely connected areas and it can positively affect companies' abilities, efficiency, and market presence.

The object of study, deeper data related to the research, and the researcher's motivation are also displayed in this chapter.

The framework, problem, research questions, hypothesis, and objectives are presented, too.

Finishing this first chapter, the methodology, the document structure, and other communication and development issues are also described.

1.01 The Crisis

The global financial crisis of 2008 affected countries' economies and societies worldwide, in a systemic influence, causing a change of social and economic paradigms, being studied by different disciplines and through different approaches.

Strong crises in previous centuries started by technological and communication improvements, like the telegraph and trains in XIX century and the internet at the end of the XX century. In the last decades, the real estate crisis in Japan in the 90s was followed by the global crisis in 2008: a culmination of real estate, credit, and housing bubble growth and related issues.

The 2008 crisis was defined by the management of disapproved risk, unethical leadership (inappropriate conduct), and consequent impaired labour relations.

The immediate results of technical errors and economic fluctuations were also important factors for the situation.

The general crisis was characterised by the increase in unemployment worldwide, leading to the creation of new companies as a "quick and easy" answer for job creation. Broadly speaking, new companies vanish in a short period, but those created on an immediate needs basis and with no structured support commonly die even faster. This large global volatility triggered resource misuse, both financial and human, impacting from the individual to the macroeconomic level (Euromonitor, 2017; OECD, 2017a; Chang *et al.*, 2017).

1.01.01 The Global Crisis Reached Europe

Portugal is the most south-westerly European country, with specific cultural, social, and behavioural characteristics. Comparing with all the other countries of the world, it is a small territory (92,212 km2), with a population of under 11 million people. Considering just the European countries, it is seen as a medium-sized country with a low cost of living, a mild climate, and to be safe and friendly. Portugal has been characterised by an inverted age pyramid since the end of the 90s, and the majority of employment is supported by service micro and SMEs.

Portugal was severely influenced, specifically in the bankruptcy of established companies, the numbers of which took off. Unemployment, already high since the beginning of 2000, rose even more. In Portugal, the employment rate was higher than the average of the EU until 2008, but became lower since then. Only at the end of 2017 did unemployment numbers achieve the 2008 values. Emigration levels have increased, and the typical profiles and proportions of each have changed: the "brain drain" and three-generation families became more typical in this migration. Some of the effects were the even smaller number of new-borns and children, and the rise of the abandoned elderly. Poverty levels have also increased since the start of the crisis (PORDATA, 2017a; INE, 2017a).

European and national support programmes have been improved and increased to support the creation of new companies, focussing on the unemployed and on youth (Conselho Nacional da Juventude, 2014).

Newly created companies and their extinction fuelled the unemployment loop over and over again. Nevertheless, some established and young companies survived the crisis (PORDATA, 2017b).

This research was developed in an unstable period deeply related to the 2008 international crisis, and the 2011-2014 external financial support. In the international scene, the fast pace and tension became more common; as a consequence, there was a reinforcement in adaptability, investments, and global solutions.

1.02 The Companies

Micro and SMEs have always been the most common company type all over the world.

The Portuguese definition for Micro and SMEs (Small and Medium-sized Enterprises) used corresponds to the values presented in the Table 01.

Table 01: Portuguese definition for SMEs, Micro, Small and Medium-sized Enterprises [Workers/Employees; Business Volume, in MEUR (Million Euros), and Balance Sheet Total, in MEUR]

Enterprise size	Workers	Business Volume (MEUR)	Balance Sheet Total (MEUR)
Medium size	< 250	≤ 50	≤ 43
Small size	< 50	≤ 10	≤ 10
Micro size	< 10	≤ 2	≤ 2

Source: PORDATA, 2017c; INE, 2017b

Nowadays, services are responsible for the highest economic value and employment generators in the world, particularly in the OECD (Organization for Economic Cooperation and Development) countries (OECD, 2000).

Portugal has an old and strong cultural basis characterised by its traditions and specific way of living. The high taxes are important attributes for the population

and companies. The high taxation of salaries and social contributions are also strong influencers for the growth of the parallel economy.

The unemployment crisis was a reality, and people were forced to face the situation and the global competition. Creating and growing their own small businesses was one possible way out. In Portugal, micro and small-sized enterprises offered through special education and training, and quick assistance support services were created, but nevertheless, companies were still disappearing, specifically Portuguese SMEs. The unwanted death of companies brings heavy damage to the company owners, investors, employees, families, and other stakeholders, influencing the close community and society negatively (IMF, 2017; European Union, 2016; IAPMEI, 2016).

Schumpeter, since the 40s, maintained that fast and complete life-cycles are an important and integral part of dynamic, productive, and innovative economies. Creative destruction is part of the prosperity of economies that include research, experimentation, innovation, and technological evolution. The decreasing and death life-cycle stages are important, and a selection parameter, highlighting the market inadequacy of new and old companies that are not prosperous. These stages should be considered to be an important part of the learning process. Schumpeter also identified that these dynamic life-cycles are common in countries with individual and societal entrepreneurial abilities where creative destruction is considered normal (Schumpeter, 1976).

However, in Portugal, and in Europe generally, the decrease and extinction of companies is usually connected with fraud and often a personal incapacity to manage the business and the company, causing a severe social impact for the individual, the family, and the closest affinity group.

Some of the barriers to entrepreneurship identified in Portugal are the individual (risk-aversion, fear of failure, lack of competences in quick adaptation, learning, and strategy) and the new company's costs.

To predict insolvencies, some authors developed models like Beaver in 1966, Altman in 1968, Deakin in 1972, Blum in 1974 and Laitinen in 1991. These models, either one-dimensional or multidimensional, were based on financial ratios. At the extremes, one can consider the older ones that could predict 78% of the insolvencies in a five-year period, and the latest ones that can predict 93 - 99% of the cases, in a one-year period (Wood, 2012).

In 2008, Ooghe has shown that Argentin presented that bankruptcy trajectories can be defined in three main types, already in 1976:

. 1st - the typical failure path of a start-up company that 'never gets off the ground' because of a deficient management structure;
. 2nd - young companies that go bankrupt after very precipitous growth and an even steeper decline;
. 3rd - mature companies that have been trading successfully for a number of years or decades.

Ooghe has referred to them and also proposed that three more important company characteristics for bankruptcy are the number of jobs, the size, and the age of the companies. According to Ooghe and Prijcker, start-ups insolvency processes are usually connected with a limited amount of knowledge in management, financial mismanagement, and a weak business plan. The lack of adaptation to contextual change is one reason for the older companies' failure (Ooghe *et al.*, 2008). According to these authors, the four main characteristics why companies go bankrupt are:

> "... the failure process of an unsuccessful start-up (...), the failure process of an ambitious growth company (...), the failure process of a dazzled growth company (...) and the failure process of an apathetic established company (...)." (Ooghe *et al.*, 2008, p.12)

1.03 Design

Design has been the subject of studies and research all over the world, and the Herbert Simon's 1969 book[8] is considered to be the cornerstone for the more scientific study of design.

Design is characterised by creating subjective influences, qualitative benefits and intangible results. It has been proven that design has benefits, which can be for the subjects commercialised by the companies, for the companies themselves, for the closer and local community (Mozota, 2002; Best 2011) but also in the countries and wider ecosystems (Design Council, 2007; Danish Design Centre, 2003).

8 Simon. A., (1969). *The Sciences of the Artificial*. Cambridge Massachusetts, MIT Press.

Design integration in companies is needed, urgent, and creates benefits, allowing faster leaps and developments (Mozota, 2003; Design Council, 2015).

Small economies and those in recession strongly need to transition to healthier stages, namely by design integration in companies (De.:SID, 2011).

It is known that the relationship business-design-academia has benefits (Design Council, 2016) and that in Portugal they are in need of being strengthened (De.:SID, 2011).

Design can be a strong moderator and interface between these different elements (Dorst, 2006) and design has been evolving in Portugal, even during the crisis (Agapito *et al.*, 2015).

In some countries' governments, design and designers have been included in multidisciplinary teams to study national subjects and problems, the named wicked problems. A good example is the Transforming Public Services program in the UK (Design Council, 2017).

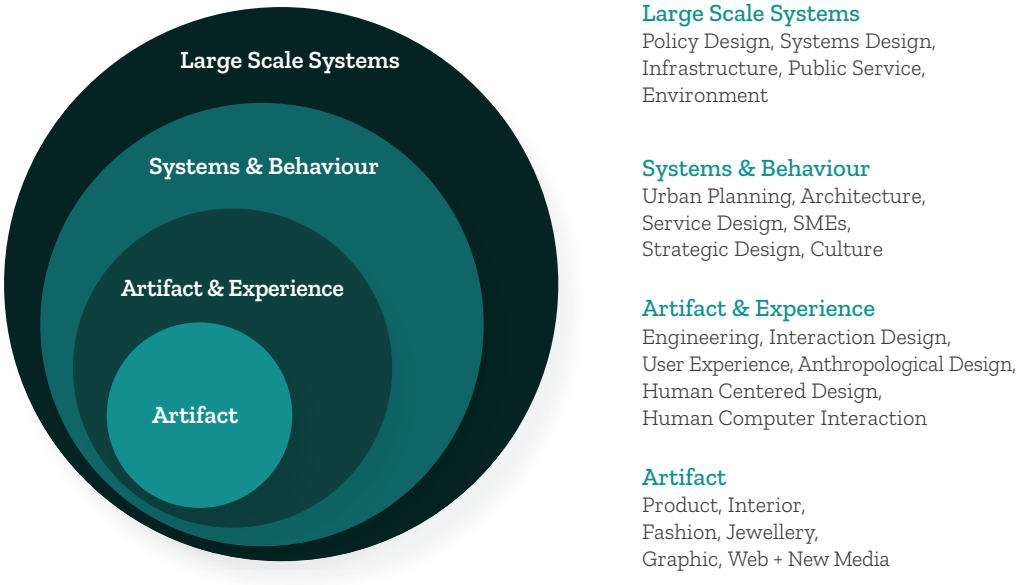


Figure 01: Stratification of Design Thinking and complexity levels
Source: Adapted from Russo, 2013

1.04 The Research

The social impacts of the recession period were strong and negative and, in the present, they still need to be overcome and to give consistency to the achieved accomplishments. An important national political concern is to develop the population's quality of life. A strong national indicator of change caused by the crisis is the number of weddings, traditional and same-sex (since 2010). In 2017 the values increased 11% (36,100) when compared with the 2016 ones (32,399). In 2014 the weddings were at the lowest number, only 31,478 (Sábado, 2018).

Even though the central idea was indicated since the beginning, it must be highlighted that at the start of this research process narrowing the field was a very difficult stet, mostly due to all the different unstable contexts.

It was firmly defined since the beginning that the limited field needed to be of real interest to the researcher and to society. It was also a major premise to avoid, as much as possible, the areas where the financial support programs were focussing, and institutional influences more generally including national and international institutions and influences. However, the Portuguese socio-economic and political environment was very inconsistent, mixed and multi-dimensional at that time. Consequently, it was hard to identify and isolate subjects from each other. Time was needed: the decisive field was only chosen when the context was more clear and understandable.

The convergent step in defining the research field was influenced by the contextual non-linear development and characteristics. The available information was unstructured, fragmented, and at various levels of development. The sources are becoming more similar; scientific and other communication sources and channels are becoming less distinct. Replication by different authors and simultaneous presentation in various media and channels are other factors to manage.

The information overload is a contemporary issue and the main reasons for it are, firstly, huge volumes of data and an exponential increase in channels to give and receive information. This is reflected in an increasing weight of data. The simplicity of creating, duplicating, and sharing information is extreme,

which allows for very high volumes of information that has conflicts, is contradictory, inaccurate, and often obsolete. There is also a lack of data structured management, in a large number of online sources. The pressure to create and disseminate information is commonplace, including in academia, so the publication and distribution of developed research has grown very fast. Scientific journals, and conferences and their proceedings, have also increased in number and as businesses. All the elements referred to were identified as potential creators of quantity over quality results, and the researcher is aware of these difficulties and their possible effects.

One early stage of reading covered the research period until the selection and definition of Sub-sector Y[9]. Following that stage, the researcher's literacy in several themes was reinforced, including in related themes to those required for the main research development. For this, reference publications, periodicals, and monthly summaries were read, statistical data was consulted, and international and national organisations and institutions were regularly queried, giving referenced foundations to the research. Some of the most-used sources of international statistics were European institutions and the OECD.

Several national reference publications were followed daily, namely Jornal de Negócios and Jornal Económico. Other institutional periodicals and synthesised information (weekly or monthly summaries) were also considered, in particular those from OE, AERLIS, and CIP. Other national organisations, like AICEP and IAPMEI were regularly consulted.

Most of the national statistical information was acquired from PORDATA and INE, and special reports from these institutions were taken into account, but also from different European institutions and international organisations including the OECD, UN, WB, WEF, WTF, and WTO[10], for instance. The information based on the PORDATA website covers the values from 2004 to 2015. Exceptionally, other years were considered, and they are mentioned individually in the corresponding entries.

9 Sub-Sector Y - Provisional name given to the research field while it had not been fully defined and narrowed-down.

10 Referenced institutions in order of appearance: OE - Economists Order; AERLIS - Business Association of the Lisbon Region; CIP - Business Confederation of Portugal; AICEP - Portuguese Agency for Investment and Foreign Trade; IAPMEI - Agency for Competitiveness and Innovation; INE - National Institute of Statistics; PORDATA - Contemporary Portugal Database; EC - European Commission; EU - European Union; OECD - Organization for Economic Co-operation and Development; UN - The United Nations; WB - World Bank; WEF - World Economic Forum; WTF - World Trade Foundation and WTO - World Trade Organization.

1.05 Object of Study and Deeper Data

The research was firmly based on contemporary developments thus, to define the research field was a hard task. The context was unclear, difficult to understand, developing fast and with many synchronous developments. It was necessary to research different data and with different levels of profundity, to clarify and take a decision on the research field's definition.

There is no strict definition for Developed Countries or similar expressions like Developed Economies. Different organisations have their own classifications, reflected in the various country rankings like the ones from UN, CIA, IMF, OECD and WB[11]. However, since the beginning of its use, it was commonly agreed by the different rankings and organisations that developed countries have high GDP (Gross Domestic Product) per capita, and they are service-based economies. The several different rankings are dissimilar in their evaluation formula. In general, their updated formulae are more oriented to population and development, containing new factors like the HDI (Human Development Index), for instance. Some of the most important rankings include Portugal in the highcategory, for example in the four systems defined by the UN, IMF, OECD and WB, presented below:

UN - The United Nations

The UN's 'developed economies' include 36 countries, which create more than half of the world's wealth, and are divided into three main groups:

. 28 EU countries;
. Three other European countries: Iceland, Norway and Switzerland;
. Five non-European countries: Australia, Canada, Japan, New Zealand, and the United States (UN, 2014).

IMF - International Monetary Fund

The IMF defined the seven major developed economies (G7) in 1976, and they were: Canada, Japan, France, Germany, Italy, the United Kingdom, and the United States.

11 Referenced institutions in order of appearance: UN - The United Nations; CIA - Central Intelligence Agency; IMF - International Monetary Fund; OECD - organization for Economic Cooperation and Development and WB - World Bank.

The G20 Forum was established in 1999 based on the G7, plus the EU (added on with the status of rotating council presidency). The twelve newly-introduced countries were: Saudi Arabia, Australia, South Korea, Russia, Argentina, Turkey, Mexico, Brazil, China, South Africa, Indonesia, and India (Investopedia, 2017). In 2015, the 19 countries of the G20 had a GDP per capita gap of over $50,000, between $56,115.70 in the US and $6,104.60 in India (WB, 2017).

OECD - Organization for Economic Co-operation and Development

The OECD was founded in 1961, and Portugal was one of the founding member countries. This organisation has the main purpose of contributing to world economic development through the promotion of policies for sustainable economic growth and employment, the lifting of living standards, and financial stability (OECD, 2017c).

WB - World Bank

This organisation divided 218 countries into four categories: Low-Income Economies, 31 countries; Lower-Middle-Income EconOmies, 53 countries; Upper-Middle-Income Economies, 56 countries; and High-Income Economies (HIE), 78 countries. WB classified Portugal as a HIE in 1994, and has kept that classification until 2017 (World Bank, 2017b). It is standard that large investments are made in goods, services, and activities considered to have the highest value/return, for the short-term and also for the future. ICT, knowledge, and creativity are currently some of the areas ranked in the highest position of this investment/return ratio, in particular by the developed countries, where high standards in facilities and infrastructures are common (Investopedia, 2017b).

On a growing development curve until 2008, Portugal suffered greatly with the international crisis that started in that year. In the global financial context, the country's position decayed abruptly, in a serious set-back to its previous stages of development. To overcome the difficult national circumstances, in April 2011 Portugal requested economic support from international organisations. The period of the Economic and Financial Assistance Program (EFSP) started in 2012 (1st of January), and the leading organisations involved were the IMF, EC, ECB, and ESM[12].

12 Referenced institutions in order of appearance: IMF - International Monetary Fund; EC - European Commission; ECB - European Central Bank, and ESM - European Stability Mechanism.

All the leading organisations involved had important and differentiated roles in the process, and the conditions and their application basis were negotiated with sovereign domestic institutions. The EFSP was based on three pillars: fiscal consolidation, stability of the financial system, and structural transformation of the Portuguese economy (Banco de Portugal, 2017).

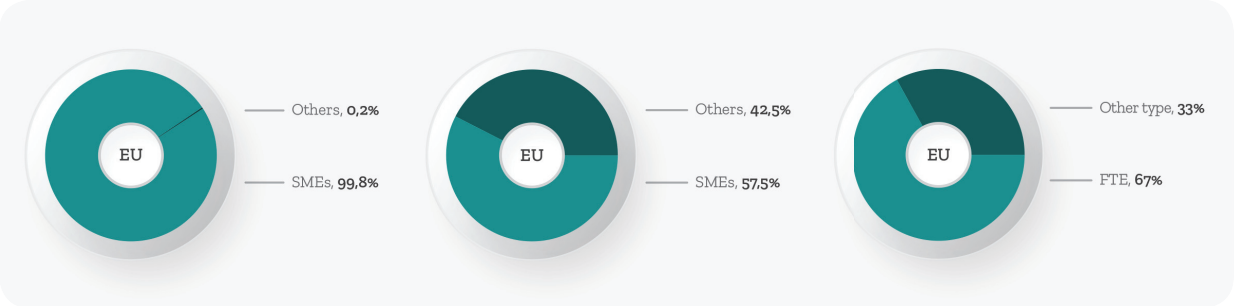
During the EFSP period, Portugal tried to keep the balance of the economy in recession and implement the required changes for a quicker and better economic recovery. The EFSP impacted the whole country broadly and deeply. The population was directly or indirectly affected by a decrease in quality of life, for instance in employment, social support, social assistance, education, health, and rising taxes (Fundação Francisco Manuel dos Santos, 2016; Portugal Desigual, 2017).

The EFSP ended in 2014, on the 30th of June. Through the fast fulfilment of the many conditions imposed on the country, the support period was regarded as having been exemplarily and unexpectedly short, when comparing Portugal with the other countries simultaneously in EFSP (Greece, Ireland, Romania, and Ukraine), and also comparing to past EFSPs. The conditions of the subsequently agreed Monitoring Program (MP) were fulfilled later on, allowing the MP to be concluded on the 17th of February 2017.

The number of large enterprises globally is small, and the developed countries are characterised by a large share of companies with fewer than 250 employees. In European Union countries and Portugal, these companies provide more than half of all employment, and more than two-thirds of the GDP (European Commission, 2012; European Commission, 2015a).

From a total of 22,346,729 companies in 2012, the proportion of SMEs in the EU28 was 99.8%, creating 57.5% of the Gross Value Added (GVA) and 67.0% of the Employment (Full-Time Equivalent Employment - FTE). In this same year, Portugal had 793,235 companies, and 99.9% of them were SMEs (European Commission, 2012).

Different knowledge and criteria are used and referenced by several institutions like the UN, IMF, and WB. These international institutions and their studies have varied objectives, depth, and development ideals.



Graphic 1: SMEs in the EU28
Graphic 2: Gross Value Added (GVA) created by SMEs in the EU28
Graphic 3: Employment (Full-Time Equivalent Employment - FTE) created by SMEs in the EU28.
Source: Adapted from European Commission, 2012

As an example, EU developed the Micro Data-Linking Project[13] (MDL) and used a four-item scale to classify companies: medium-high and high technology manufacturing; low and medium-low technology manufacturing; knowledge-intensive business services; and other services (European Commission, 2017b).

This classification is used to rank and classify the countries based on their companies' types. It demonstrates the required ease of making important distinctions between the use of technology and knowledge, and between manufacturing and service products in companies and then in countries.

> "In all countries, the number of enterprises active in services is far greater than the number of enterprises active in industry. Depending on the country considered, there are three to five service enterprises for each enterprise in industry. However, service enterprises tend on average to be smaller in size." (European Commission, 2015a, n.p.)

European service SMEs are the enterprises creating the highest proportion of added value. Medium-sized companies and dependent SMEs have a greater share of international trade, having strong similarities with large enterprises, primarily through being more exposed to international markets. Smaller and independent SMEs are less externally oriented, and consequently less exposed to the international markets.

Although in an economic depression all businesses are impacted, large enterprises are more affected by international business cycles than SMEs.

13 The MDL Project of 2015 considered eight European countries: Austria, Denmark, Finland, Latvia, the Netherlands, Norway, Portugal, and Sweden; they followed a group of enterprises that existed in 2008 over the period 2008-2012. It assessed companies smaller than 250 employees and in the non-financial business economy (European Commission, 2017b)

Some of the countries more exposed to external markets are those smaller ones with a large share of exports (European Commission, 2015a).

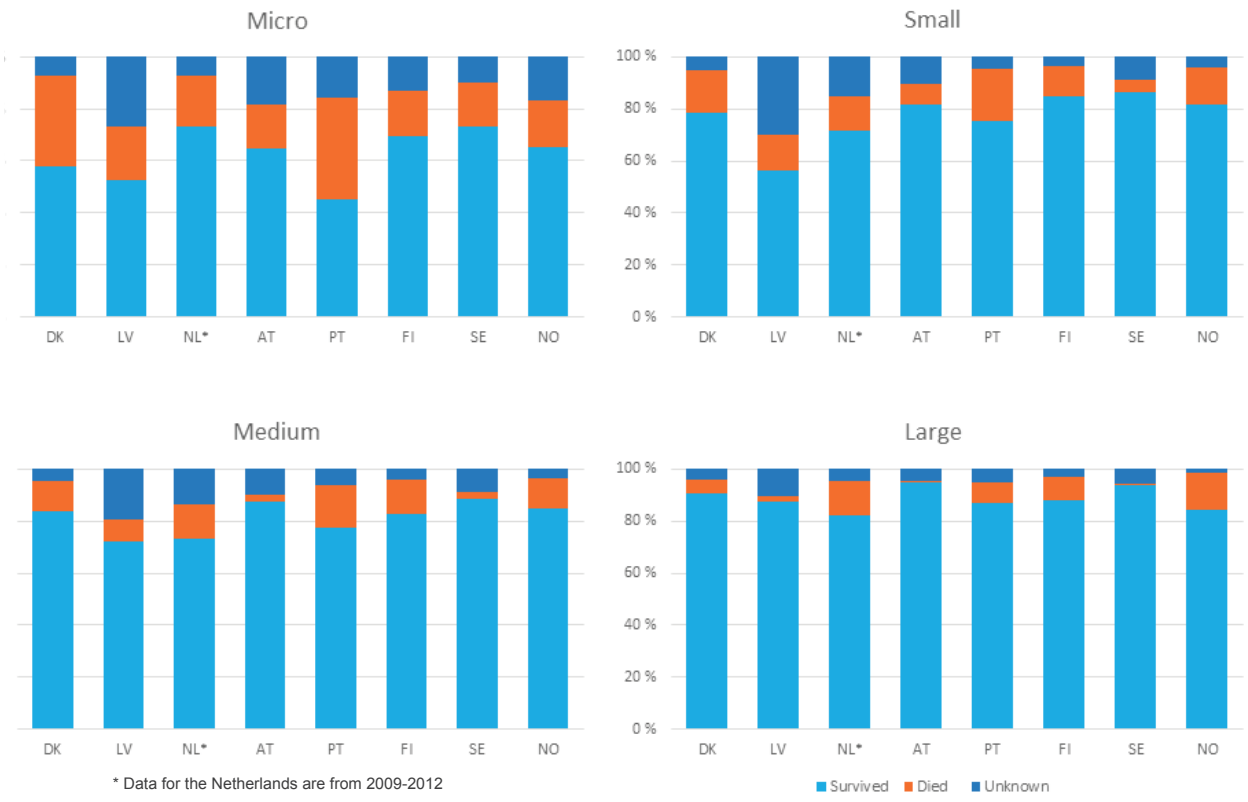
Economic issues have a strong impact all over the world, but nowadays policy-makers of some of the most developed countries are becoming more aware and concerned with social issues.

> "Enterprises that generate most GVA make the economy wealthier, but those that create jobs contribute to employment creation and thus help keep the unemployment rate low." (European Commission, 2015a, n.p.)

SMEs and entrepreneurship are considered important elements to ensure economic growth, innovation, job creation and social integration, in particular by the EU (European Commission, 2017c) The COSME (Program for the Competitiveness of Small and Medium-sized Enterprises), included the period 2014 - 2020 with a 2.5 BEUR budget. This Program is just one of the visible faces of focus and effort given by the EU to new companies and the business environment (European Commission, 2017d).

Regarding the 2015 MDL project, certain findings were gathered on the studied countries: the biggest generator of GVA was the 'other services' category (at the extremes were Norway with 31% and Latvia with 55%); Finland had the highest ratio in productivity (ratio GVA/employment); the 'other services' sector, in dependent SMEs, had a GVA of 38% and 49% in Germany and Latvia, and an employment share of 29% and 27%; SMEs had a larger ratio of knowledge-intensive services and were more productive than large enterprises; dependent enterprises had a high proportion of generated GVA (maximum of 60% in Finland and Norway); dependent enterprises in Germany, Latvia, Finland, and the Netherlands are more productive than the independent ones. In Europe, most companies are small and do not export.

The exporting companies are usually medium or large-sized enterprises with big growth potential. European service companies are usually smaller than manufacturers, and they are characterised by short life-cycles. The crisis influenced the size of the European companies that survived: most of these companies stabilised or decreased in size. However, some of the companies that started to export were increasing in size (European Commission, 2017b).



Graphic 04: European Companies distribution according to their evolution, 2008 to 2012
Source: European Commission, 2015b

Having some similar cultural and social characteristics to other European countries, Portugal has a strong tradition in the social state, a religious background, and is very family-orientated. Risk-aversion, a friendly professional context, low aggressiveness, and low levels of competitiveness are distinguishing features of business in the country. Nearly 90% of active companies in the world are family businesses (FB), including in Europe and the USA (Adachi, 2006).

In Portugal, personal and professional spheres quite often overlap. A large proportion of Portuguese companies are SMEs and FBs, traditionally with almost level growth and exports. Broadly speaking, FBs are created to provide, maintain and sustain the family and its needs and expenses. Stability in business life is more important than the instability created by the company growing and developing.

Traditionally, the decreasing stage or death of the business is truly unwanted, not only because of family survival but also because of the community and social evaluation and status of the family and its members. The renowned old family companies of Port and Madeira wine are known for their stability, resilience, and differentiation

characteristics. It was common that these companies' distinctive features were not related with high speed, competitiveness, or disruptive innovation.

FBs are also characterised by a mixture of private and professional issues such as business priorities oriented to personal/family issues; low business education; change resistance; and difficulties to accept and implement outside knowledge and support. However, other characteristics of these companies are personal and social awareness and orientation, continuous development of empirical knowledge, and the creation of distinctive business traits. Human resources commitment and loyalty, strong long-term stability, high interconnectivity of investment and management, quick decision-making potential, strong relationships between the company values and the decision-makers' orientation, are a few examples (Lodi, 1998; Remondes, 2015). However, less than 10% of these companies can keep power and control of the company in the family after the third generation (Le Breton-Miller, 2004).

In the last decade, there has been an optimisation of the state procedures concerning its relationships with companies and businesses (the need for improvement was identified by the directives of the financial support program 2011 - 2014). Minimising bureaucracy, like "Simplex" (Simplex, 2017), speeding up processes in company creation and development, like "Empresa na Hora" (Empresa na Hora, 2017) were developed to simplify and hasten the processes.

The improvements connected with the registration and protection of new brands, patents and designs were also developed and implemented by INPI.

Portugal has been raising the quality of the education system and the amount of the population with higher school levels, which is currently an ongoing process that needs further improvements (OECD, 2017b).

Traditionally, the university education levels were synonymous with the "job for life". However, this job security has changed; in 1992, 48,000 people with a university degree were unemployed (from a total of 194,100) while in 2016, this number increased to 109,000 (61,000 more people than in 1992, from a total of 573,000) (PORDATA, 2017d).

The Portuguese State, particularly in governmental organisations, has many highly-specialised employees in the following areas: health, justice, national

security, education and higher education, research and development. Traditionally, the education system was characterised by small reinforcement in managerial and business areas, and the university system was also dominated mostly by specialised education. However, the employment market has changed, and the educational systems need to adapt to prepare a new generation of workers: business and company owners. These individuals need to have fast, high-quality specialist training and education in business and management to be prepared for their professional lives in a private sector characterised by services micro and SMEs[14] (Valente, 2017). In the educational system, particularly in academia, there has been a growing effort to incorporate innovation, entrepreneurship, and businesses culture.

In the present, funding and financial support are available for Portugal and European countries through the Horizon 2020 program. The selected companies have special privileges for investing. Specialised support to micro and SMEs to apply to these supporting programs is given by national institutions like IAPMEI, and by local and sectoral ones.

Training and education in entrepreneurship and start-ups are also reinforced by European and national organisations like those mentioned above, by the National Entrepreneurship Strategy (StartUp Portugal), and by several contests organised or implemented by municipal chambers, national associations or local organisations.

In the education system, many colleges have entrepreneurship departments; and in the universities, special support departments and tools were created (Rede 2E, Entrepreneurship net by ULisboa[15]). Business incubators and clusters, private or not, have increased and had fast development.

Specific organisations are also focussed on supporting new businesses and company activities and contests for youth (ANJE, Fundação da Juventude); women (international group PWN; We Connect International, Girls On the Road), national associations (APME), national projects (DonaEmpresa by APME; FAME by IFDEP and MINA - Mulheres & Ideias by CVP)[16]; and minority groups.

14 SME - Small and Medium-sized Enterprise.

15 ULisboa - University of Lisbon

16 ANJE - National Association of Young Entrepreneurs; PWN - European Professional Women's Network; APME - Portuguese Association of Women Entrepreneurs; IFDEP - Institute of Development for the Development of Entrepreneurship in Portugal; CVP - Portuguese Red Cross.

Big companies like banks or Telecommunications Companies are promoting contests and success-case presentations (Saldo Positivo - CGD, Concurso Acredita Portugal - Banco Montepio Geral, Prémios Empreendedor XXI - BPI and NOS).

Particularly in older generations and other more traditional contexts, cultural and social changes are slow. There has been a big effort in younger generations, to whom the rapid integration of changes is simpler and more easily accepted. These significant investments in the new generations were made, for instance, in the national educational system as it was presented, in basic entrepreneurship, business, and management knowledge and know-how. These investments have been made at every school level, in other training and educational systems, and also in "working-life integration programs".

As it has been widely suggested, Portuguese differentiation characteristics, significant and targeted investments in education, training, entrepreneurship, and business knowledge are particular areas on which to focus.

According to present and future national and global needs, Portugal must develop and apply more sustained decisions to be more competitive, adaptable, and fast.

With those developments, it can be possible to overcome the crisis for good with a more solid base, reach an equilibrium state and develop the country to a leadership position again. The integration of technology, innovation, R&D, quality, design, management, and strategy are identified as investments raising good value-creation.

1.05.01 Entrepreneurship

Different communities are classified by their different levels of entrepreneurship and risk-aversion of their population. Some communities distinguish themselves by their low risk-aversion and the high entrepreneurship levels.

The fast life-cycle of companies (from creation to death) is considered to be an important part of the experience, in business and professional life. It is common that young and newly-created companies, unless they are business-consulting companies, have smaller levels of business knowledge, usually acquired through hands-on experience.

Portugal and Europe have similar risk-taking and entrepreneurship attitudes and skills (Amway, 2015a).

In Portugal the entrepreneurial character is not highly-developed. As a Latin country, with strong Catholic influences, the majority of the population is by nature risk-averse, with low abilities in business and commerce, trusting and depending a lot on social welfare and support. The dream of a good life and a perfect job is common, but the activity level is harder to achieve. As a consequence of the job market, many people create their own companies and small businesses that, by tradition, are an acute projection of the entrepreneurs' personality and skills.

According to the OECD in 2008, these can be classified by their value created, and the amount kept by the entrepreneur and / or by others. The self-employed (subsistence entrepreneurs or micro-businesses) create little value for themselves or for others; social entrepreneurs (volunteers or development workers) create a lot of value for others; and the entrepreneurs create high value for themselves, but not necessarily for others. Those creating significant value or wealth for themselves and others are known as "born-globals" or "gazelles" (OECD, 2018, p.18).

Table 02: Entrepreneur types and Sectorial entrepreneurship.

Entrepreneur types	Sectorial entrepreneurship
Skeptical	Social
Copycat	Political
Researcher	-
Determined	-
Accomplished	-

Source: Constable, 2015 and Fuller, 2013

The resources, capabilities, and opportunities of the entrepreneur are briefly presented in the Table 03.

Table 03: Entrepreneurial Activity in the Commercial & Wider Environment: Types of Creative resources, Innovative capabilities and perceiving opportunities

Creative resources	Innovative Capabilities	Perceiving opportunity
Invention/creativity	Perceive and recognise a fit	Un-met market need
Technology changes	Secure resources and markets	Under-deployed resources
Change of/in property	Employ and develop capabilities	-
New capital	-	-
Unique employees	-	-

Source: Adapted from: Ahmad, Seymour, 2008

Even though there has been a slow increase in some parameters, low risk-aversion is still a defining characteristic.

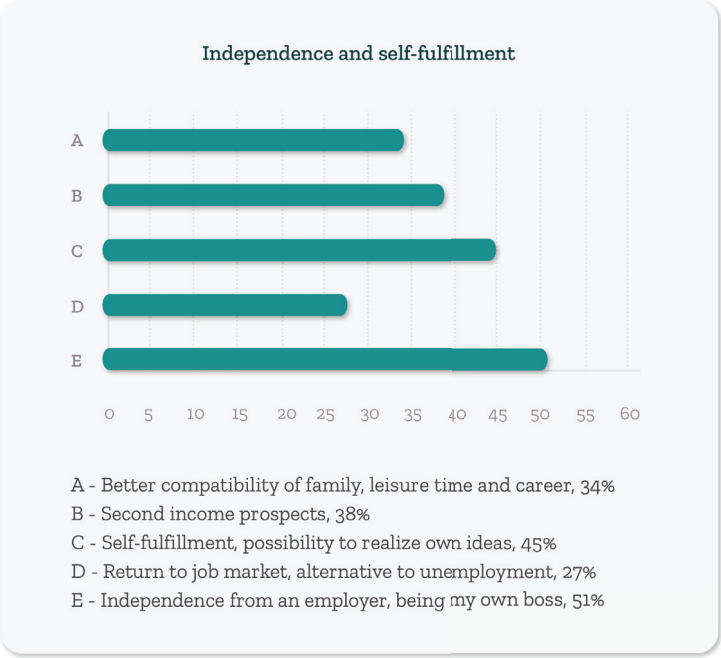
As an example, in the Global Entrepreneurship Report AGER2015, 44 countries all over the world were studied (Amway, 2015b). The final report presents data divided into three main groups. Some global and Portuguese values are shown below. The first information group regards the entrepreneurial attitude and potential. The Table 04 highlights that global results are better than the Portuguese ones, specifically in entrepreneurship potential.

Table 04: Entrepreneurial attitude and potential (Global and Portuguese values)

Entrepreneurial attitude and potential	Global	PT
Entrepreneurial attitude and potential: positive attitude towards entrepreneurship	43%	39%
Entrepreneurship potential (measured as the portion of respondents who can imagine starting a business)	75%	57%

Source: Amway, 2015b

Regarding the independence and self-fulfilment of individuals from 35 to 49 years, the Graphic 05 highlights the main reasons why people want to create their own companies. The most frequently selected reasons relate to independence from employers and personal fulfilment levels.



Graphic 05: Independence and self-fulfillment levels
Source: Adapted from Amway, 2015a

The Amway Entrepreneurial Spirit Index evaluates the entrepreneurial spirit and considers three main topics: Desire, Stability against social pressure, and Feasibility[17]. In all of them, Portuguese values are lower than global ones, and the greatest difference is in Desirability at 10%, visible in the Table 05.

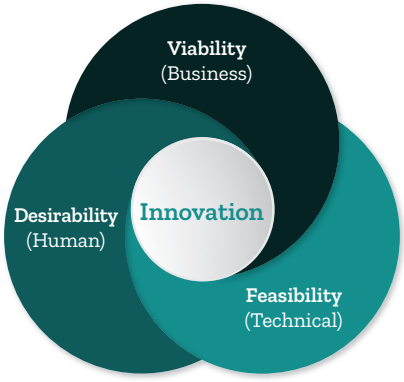


Figure 02: Innovation
Source: Adapted from Brown, 2009

The same study also focusses on the fear of failure which is very high in Portugal (70%). In the global values, it is possible to identify that the fear of bankruptcy is the individuals' biggest fear (41%) (Amway Global, 2015b).

17 The three main topics cover:
. Desirability: whether respondents desire to start a business;
. Stability against social pressure: whether respondents would let their social environment, such as family and friends, dissuade them from starting a business;
. Feasibility: whether respondents feel prepared to start a business (Amway Global, 2015).

Table 05: The Entrepreneurial attitude and potencial (Global & Portuguese values)

Entrepreneurial attitude and potential	Global	PT
Desirability	55%	45%
Stability against social pressure	49%	45%
Feasibility	47%	42%

Source: Amway, 2015b

Concerning the country and society's entrepreneurship-friendliness, the global values are average (50%) while Portugal is in the penultimate position of the total of 44 countries (16%).

The global values of the most selected entrepreneurial characteristics, likes, and needs are: desire to learn (84%), life enjoyment (78%), being in charge (75%), taking risks (70%) and national safety (70%).

Table 06: Fear of failure (Global values)

Fear of failure	Global
Financial burdens up to bankruptcy	41%
Threat of the economic crisis	29%
Threat of unemployment	16%
Legal consequences, lawsuits	16%
Personal disappointment	15%
Being forced to take over the responsibility	13%
Disappointing or losing my family	12%
Not to be given a second chance	8%
Reputation loss in front of friends, co-workers, or business partners	8%

Source: Amway, 2015a

Table 07: The Characteristics of the Entrepreneur (10 top reasons, global values)

The Characteristics of the Entrepreneur	%
Entrepreneurs like to learn things	84 %
Entrepreneurs want to enjoy life	78 %
Entrepreneurs like to be in charge and tell others what to do	75 %
Entrepreneurs look for adventures and like to take risks	70 %
The safety of their own country is very important for them	70 %
Entrepreneurs like to stand out and impress other people	68 %
Entrepreneurs want to help people	62 %
Entrepreneurs think people should always follow the rules	60 %
Entrepreneurs want justice for everybody	54 %
Entrepreneurs are traditional	48 %

Source: Amway, 2015a

Several properties of the context, the owner, and the company can affect the companies' results. For instance, the company can be different in the economic activities, technology, differentiation type, and life-cycle stage. Regarding the owner, education level, ambition, and life stage are just a few important factors.

One of the newest groups of companies is primarily based in technical services, usually those with short lives. Many of these companies are created in entrepreneurial and start-up environments, usually characterised by mutability, volatility, and a frenetic rhythm.

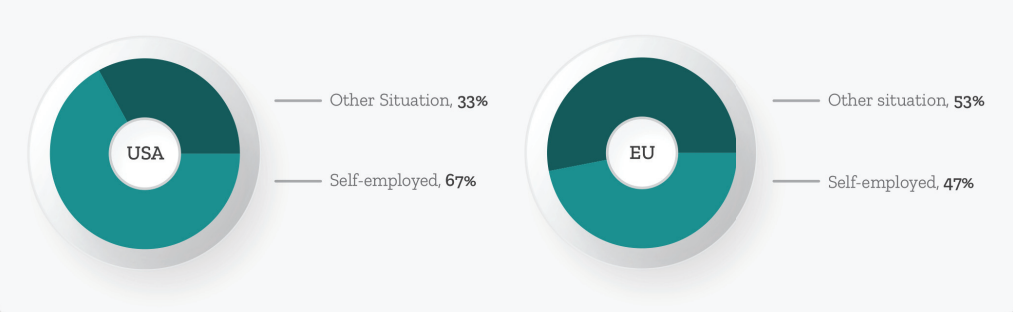
A large number of these businesses and companies are created by entrepreneurs with very limited professional experience and low managerial skills, but evidencing very high technological knowledge. Usually very young, these entrepreneurs are quite often supported by their families, and they typically have low responsibility, skills, and experience in professional and personal life.

Their businesses typically have null or small economic investments, quite often raised among family and friends. The initial team is usually composed of the individual or by a small team of friends or colleagues with low knowledge in

company management and strategy. However, in entrepreneurial and start-up environments and ecosystems, it is very common that investments are strongly targeted on business knowledge, exercises, and mentoring.

Entrepreneurship Portugal/EU/USA

Regarding entrepreneurship, the will to be self-employed is a strong indicator of risk-aversion. The population of the USA that would prefer to be self-employed is 67%, while in EU it is only of 47%. Risk-aversion is a strong cultural and national characteristic, and most Europeans prefer to be employed (European Commission, 2013, p.8). Risk-aversion has a direct relationship with the company's portfolio. In Europe, the viability of an idea is quite often questioned, and products are not implemented. In the competitive American society, the speed to put ideas on the market is higher, resulting in new companies that, even though they are usually smaller to start with, tend to grow faster.



Graphic 06: USA Population average of self-employed
Graphic 07: European Union Population average of self-employed
Source: Adapted from European Commission, 2003

Already in 2003, the European green paper of Audretsch stated:

> "What can EU Member States do to make the balance between risk and reward more favourable to promoting entrepreneurship (reducing the negative effects of bankruptcy, making more social benefits available for entrepreneurs reducing the tax burden either in terms of administration or rates)?" (European Commission, 2003, p.24)

Several institutions and programs have been created in Portugal, mainly in the urban centres. The entrepreneurial ecosystem has grown, and it is expanding very quickly in breadth and depth. More recently, Lisbon became a spotlight

for technical start-ups and hubs. Fast evolution is part of the new image of the Portuguese capital. Lisbon became an international trend spot in the entrepreneurial ecosystem, mostly young and technological, and also for the trendy mass tourism that has invaded the city.

However, business speed and aggressiveness can lead to resource exhaustion in different areas and levels. A discrepancy between the entrepreneurial system and the engaged systems and resource sustainability has been identified. A strategically designed and structured evolution could lead to better results in the present, medium, and long-term. The uniqueness of the country and the city must be highlighted and protected, and external examples should be studied but not directly applied.

However, it is to be emphasized that this research started at a very different moment. Nonetheless, the initial problem statement and then issues addressed are still important and current.

1.06 Motivation

This research originated in the researcher's questions and concerns arising from previous knowledge, professional and personal experience, and the context at the time.

The main issues and questions addressed were closely connected with the international situation, but mostly with Portuguese society, economy, and culture. Under the adverse environment, the general Portuguese mind-set was deeply negative. Through design, the researcher's strong belief and desire was to develop a model that could improve the users' situation.

Several distinctive features of the professional experience emerged during the research process and design of the model. The researcher is a professional designer with a varied working background, who naturally uses Design Thinking, practice, knowledge, and belief as a way of life.

The researcher's experience in other professional areas (teaching and training, management, business, social marketing) was also important to reinforce the strong belief that through the connection abilities of design and

design integration, strengthening the relationship between "the real world", academia, and business is desirable, possible, and very fruitful.

After more than ten years of national and international professional experience, the researcher returned to academia and to design research, as a desired and well-considered professional change and growth stage.

The return to academia was first tested in the years 2009-2010 when the post-graduate degree in Strategic Design and Innovation (cooperation ISEG/IDEF and FA of Lisbon University) was completed with a high mark. In that period, the older foundations of management, marketing, design, and innovation theory was refreshed, and the initial interest became more intense and deeper. New knowledge was studied and developed with great pleasure, both individually and in a group. Some professors were very positive when asked by the researcher about continuing their studies to a PhD level.

The theoretical foundation-stone for this research was launched at this stage, and the previously studied theory was used for the initial proposals to the university and for the scholarship application.

During the one-year post-graduate course, teamwork and the different presentations over time were considered to be very important. It was possible to share experiences and inputs, cross-pollinate and fertilise different ideas among different people, subjects, and groups. Some Portuguese creative companies were studied, and from that, it was possible to have knowledge of the companies and a broad view of the national situation of companies and professionals. One focus of these studies was the importance of the Design Process used.

Then, it was possible to study the very well-developed Design Process of one Portuguese company and from that base to develop it. This evolution was presented, discussed, and approved by the design leader of that company. The Design Process was studied, organised and re-organised, understood, analysed, and worked on through experimentation and working mock-ups. It was possible to develop an object that was light, playable, turning explicit some implicit knowledge, stressing the most important elements of the Design Process,

but also present the less critical parts. From the existing company process, using visualisation and understanding, a "Fortune Teller" game was conceptualised[18].

At that time, it was already known that understanding through simple visual objects is important for information spread and knowledge development. The sensory and the short term memory (induced by the sense of sight and touch) and the procedural memory (induced by the child game) were used. The former is very much exploited in the modern world, and the latter is a very stable memory of human beings. This kind of procedure was adapted and used in the model developed in this research.

In the Athena Design & Company Model, presented in chapter four, the use of a two-dimensional representation of a 3D model synthesises broad and deep information from different areas. At that time (2009-2010), a smaller amount of data was transformed into a real three-dimensional object, made of paper.

So, one can say that the theoretical study and work part of this research started in the post-graduate degree, as reflected in the comprehensive General Bibliography.

From the return to Academia to the PhD research was a small step but a significant professional and life decision. One of the main reasons to decide to start the PhD came from the researcher's professional background and future career direction.

The researcher worked for several years at other levels of teaching and training, and wanted to evolve to have the opportunity to become a lecturer in the Portuguese Design Academy.

All the required conditions were grouped and prepared for this important stage[19]. The opportunity was sought, found, and approved. The skills and knowledge development through the PhD process are important concrete steps for the continuous professional development path.

18 The "Fortune Teller" origami game is called "*Quantos Queres*" in Portuguese.

19 During the research, many of the necessary conditions changed negatively, as has the global context. Resilience, persistence, endurance, structure, and the support of close friends and loved ones were fundamental to reach this moment.

The Architecture University accepted the PhD application. For the first year, the researcher asked for the equivalency of courses from the post-graduate degree in Strategic Design and Innovation. The request and the equivalency of three of these courses from the first semester and another three from the second semester were accepted and the evaluation was high.

Many other contextual subjects were additional fertilisers to the seeds of this project and its genesis:

. born and living in Portugal;
. the personal characteristics and belief;
. the "always designer" mind-set;
. the life stage;
. the international link, background, and potential (important in the decision to use the English language);
. the set of questions based on real issues;
. the belief that simple and small changes can improve development;
. the belief in the results of coherency, consistency, empowerment, knowledge creation, and knowledge sharing;
. the social conscience and the hope for a better future.

One of the initial challenges was to match these diverse and wide factors in appropriate and achievable research in a very unstable context.

The time influence was also a substantial consideration. Distinct concerns, objectives, and focus areas led to different findings. Relating, managing, and achieving a better compromise between past (experience and knowledge); present and short-term (needs); short and medium-term (goals); and medium and long-term (wider results) was a big issue.

It was a strong concern and desire that the field of research needed to be of real interest for current societal issues and the researcher.

It was also a major principle that the chosen field of action should not be subject to the direct focus of international financial support institutions (IMF and various EU institutions) or any national organisations. Avoidance of all kinds of external institutional influences was then defined as a rule.

Bypassing the governmental and international areas of influence, several different national and international institutions' data and classification lists were reviewed. SICAE was studied, and also the CAE - Rev. 3 related to Portuguese economic activities. Also examined were NUTS related with the national statistical territories, and IES[20] information related to business was considered complementary. European classifications of economic activities were also used, like NACE Rev. 2 with economic activities, and CITA Rev. 4[21] linking them with industries.

In addition to the mentioned national and international organisations that were the most-used as foundation stones for knowledge formation, more specific ones were also used to narrow the research field. Several national organisations were used as the basis for the required and collected information. Related to economic activity one can mention DGAE and, concerning labour and social solidarity, MTSS Ministry and its strategy and planning office GEP/MTSS[22]. For the referenced issues connected with science, technology, higher education, and international network one wants to highlight GPEARI/MCTES. Advancing into the employment and training areas, IEFP was a vital reference complemented with the vocational training assets by European OEFP and with the Portuguese Classification of Professions CPP/2010[23]. Apart from the previously mentioned international institutions, one wants to reference ESPON[24].

The socio-economic hurricane and political instability were a strong national reality at that time, and it was hard to identify and isolate national and international subjects from the global melting pot. Time was needed: the definitive field was only chosen when the context was more clear and understandable; it was really difficult to narrow the field of research.

20 SICAE - Information System of the Portuguese Classification of Economic Activities; CAE-Rev. 3 - Portuguese Classification of Economic Activities - Revision 3, Decree Law of January 2007; NUTS - Nomenclature of Territorial Units for Statistical Purposes; IES - Simplified Business Information.

21 NACE Rev. 2 - General nomenclature of economic activities of the European Communities Revision 2; CITA Rev. 4 - International Classification, by Industry, of All Branches of Economic Activity Revision 4.

22 DGAE, General Directorate of Economic Activities; MTSS, Ministry of Labour and Social Solidarity; GEP/MTSS, Office of Strategy and Planning of the Ministry of Labour and Social Solidarity.

23 GPEARI/MCTES, Office of Planning, Strategy, Evaluation, and International Relations of the Ministry of Science, Technology and Higher Education; IEFP, Institute of Employment and Training; OEFP, Employment and Vocational Training Observatory; CPP/2010, Portuguese Classification of Professions of 2010, published in II Series of the Diário da República nº 106, of June 01, 2010.

24 ESPON, European Observation Network, Territorial Development, and Cohesion.

To read the reference news media and to follow the national and external context to understand the political and social evolution was a daily activity. To understand and keep track of the macroeconomic data presented by natio-nal and international reference organisations was a challenge (INE, PORDATA, Eurostat, European Commission; WEF, WB, OECD, UN, etc.). All the myriad information was important to take decisions but it was usually complex and hard to read.

However, the central concept had been identified and targeted at the back of the researcher's mind since the early stages. The researcher wanted to synthesise different areas of knowledge to achieve a positive and relevant result through design, with potential for practical use and provision of benefits.

At the beginning of the scholarship process, the candidate and the application were qualified and accepted by FCT (Science and Technology Foundation); the scholarship was approved and begun in January 2012.

Initial Research Calendar

. October 2009 - July 2010: Post-Graduate degree;
. October 2010: PhD academic year;
. December 2011: research project approved by the Architecture Faculty, public test of Scientific Aptitude (PAC - *Prova de Aptidão Científica*);
. January 2012: FCT scholarship;
. February 2012: beginning of the research project.

1.07 Framework

In the last decades of the XX century, China and Russia had an outstanding development. In the 90s, BRIC[25] emergent countries arose as significant players and influencers in world geopolitics and geoeconomics (O'Neill, 2001).

The competitive production of other countries was already affecting Portugal, and many European multinationals were relocating their industrial activities to

25 BRIC is the acronym of Brazil, Russia, India, and China, created in November 2001 by Jim O'Neill. In 2010, the BRIC group changed the Acronym to BRICS when including South Africa.

other nations such as Eastern countries including China. The Chinese industrial sector raised 39.8% of their national GDP in 2016 (AICEP, 2017).

The industrial production, especially that characterised by low differentiation and skills, was particularly affected.

1.07.01 Portuguese Economic Data [26]

Generally speaking, Portugal was in an economic growth period until 2008[27]. From 2009 to 2013, the country had an economic downturn that slowly began to invert in 2014.

According to national data from PORDATA regarding the years between 2004 and 2015, 99.9% of the companies created were SMEs (PORDATA, 2017e). These small and medium-sized enterprises started to grow in number in 2014. However, micro-sized companies began a little earlier, in 2013.

The average distribution of employment in SMEs stayed similar during the 2004-2015 period: micro-sized companies from 55% to 58%; small-sized from 23% to 28%; and medium-sized from 18% to 19% (PORDATA, 2017e). Until 2008, the general tendency was positive, decreasing from 2009 on. Micro-companies started to employ more people in 2013; however, only from 2014 did the employment numbers created in small and medium-sized companies rise. In 2015, the total number employed (2,897,135 employed) was still lower by almost 400,000 people than in 2008 (3,176,056 employed) (PORDATA, 2017f).

Until 2008 the general tendency was positive, and started decreasing from 2009 on. Micro-sized companies started to employ more people in 2013, followed in 2014 by the small and medium-sized companies. In 2015 the total number employed (2,897,135 employed) was still almost 400,000 people fewer than in 2008 (3,176,056 employed) (PORDATA, 2017f). The yearly financial turnover was similar: growing until 2008, decreasing from 2009 until 2013 and increasing again from 2014.

26 PORDATA was the most used information source, and the data refers to the values from 2004 to 2015 (PORDATA, 2017c)

27 From the total number of SMEs in the period 2004 - 2015, ≥ 95% and ≤ 97% were Micro companies, 3% were Small companies, and less than 1% were Medium-sized companies. Regarding nominal values, 2008 was the turning-point for the number of SMEs.

Small and medium-sized companies had a light positive evolution in 2010 (219,744.0 MEUR), lost already in 2011 (208,317.3 MEUR). In 2015 the yearly turnover value (201,761.5 MEUR) was still below that of 2008 (232,695.7 MEUR) by almost 31 MEUR (PORDATA, 2017g).

It must be said that the turnover averages are quite even for micro, small, and medium-sized companies with the maximum varying between 31% and 35%.

Regarding the VAB, it was somehow similar. All three sizes of companies have a share of around 1/3 (from a minimum of 30% to a maximum of 34%). The values only started to rise in 2013-2014 (2013 in small and medium-sized, and 2014 in micro-sized companies). The 2015 values (52,423.50) were still nearly 8,000 MEUR lower when compared to 2008 values (60,471.40) (PORDATA, 2017h).

The number of new companies decreased from 15.20% in 2007 to 12.40% in 2012. In 2013 the number of new companies increased to 17.9%, decreasing again in the next two years to values of 15.40% to 15.50%.

In the years 2004 - 2007, the mortality range was between 10.30% and 12.60% while in the 2008 - 2015 period the values were between 13.30% and 16.00%.

Regarding survival to 1 year period, between 2005 to 2008, the taxes have varied from 74.30% to 77.00% being smaller from 2009 to 2013 (69.7% to 71.5%).

The survival rate to 2 years in 2006 - 2008 was between 57.40% - 58.90% while in 2009 - 2013, the rate varied from 48.70% - 52.80%.

Even though the number of new companies was above the values of 2007 (15.20%) from 2013 on (15.40% to 17.90%), the mortality rate was also growing, from 10.30% to 12.60% before 2007 to above 13% from 2008 on (13.30% to 16.00%). Companies are still dying very early: only close to 70% overcome the first-year barrier (69.70% to 77%) and 50% the second-year (48.70% to 58.90%) (PORDATA, 2017i).

However, the proportional values of these stages (born, survival to 1 year, survival to 2 years, and mortality) must be evaluated taking into account the real nominal values of active SMEs per year that varied from 1,260,302, the maximum value in 2008, to 1,085,894, the minimum in 2012, and rising to 1,180,331, in 2015 (PORDATA, 2017e).

One can say that between 2004 and 2015 the legal form of companies has been similar.

Even though there were big differences in the number of active companies during the period 2004 - 2015, the ratio between single owner companies and limited companies only varies by about 5%. Single owner companies vary between 78.44% in 2011 to 83.80% in 2013 while 21.55% to 16.20% is the variation in extant societies, thus keeping a ratio near 80/20 (PORDATA, 2017j).

For the period 2005 - 2013, the resistance and survival ratio of single owner companies was higher for single owner companies in the first year than for societies, but societies were more resistant over the two-year period. The survival values of single owner companies in the one-year period was between 73.91% and 78.78%, while in societies it was between 21.22% and 27.87%.

Regarding the two-year period, the averages have a significant variation: single owner companies have values between 66.85% and 74.75%, while societies have values between 25.24% and 33.15% (PORDATA, 2017k).

Investment in R&D has been growing since 2005, from a share of less than 40% of companies' investments, relative to the total national amount. The biggest national values were in 2009 with more than 2,750 MEUR, with companies' investment growing but still less than half (47.30%). The values decreased until 2014 when they started to rise again. However, companies' investments in relation the total national amount also decreased, and in 2014 the share was 46.41% (PORDATA, 2017l).

Concerning the education and literacy levels of the Portuguese population, through a strong effort in adult education and training, in the ten-year period of 2001 - 2011 the illiterate population decreased from 9% to 5.2%. However, the ratio is still greater for women than men (PORDATA, 2017m).

The population with a university degree has grown since the 90s, when women equalled men in number. In 2009, of almost 675,000 graduated, 58% were women (PORDATA, 2017n). In 2010, the Bologna Process was totally implemented in Portugal. In 2011, the country increased the number of graduates to 1,245,000, and the share of women to 60%. These values are especially relevant

given that the population under 24 years old decreased from to 2001 to 2011 by almost 35,000 individuals[28] (PORDATA, 2017n).

Regarding unemployment, the total unemployment values in Portugal were rising until 2007 (440.6 k individuals). In 2008 there was a spike inversion (418.0 K individuals), that was surpassed from the next year on until 2013 (855.2 K individuals), since when the numbers have diminished again slowly (2015 - 646.5k individuals). The unemployment of University graduates had been growing regularly until 2007 (57.6 k individuals), with a small inversion in 2008 and 2009 (55.8 k individuals and 54 k individuals), rising again from 2010 on (61.7 k individuals), then growing rapidly, almost doubling to 2012 (122.1 k individuals). From 2013 on (136.5 k individuals) the numbers started to diminish slowly, however, they stayed very high (2014: 119.4 k individuals and 2015: 115.4 k individuals). Only in 2015 the numbers become similar to the 2011 ones, respectively 9.2 % and 9.0%. (PORDATA, 2017o).

Taking the Portuguese values of 2015, more than 25% of the population have never used the internet, and almost 50% of the population does not have the basic digital competences. Concerning companies, 19% of them sell online, and sales to other countries and electronic commerce values are increasing in importance. Portuguese companies have a smaller number of websites and less developed ones than the European average. The death of Portuguese companies is higher in companies with less R&D, and which are less knowledge-based (IAPMEI, 2016).

For High-Intensity Knowledge (HIK) jobs and high technology, there has been a national effort since 2010 to converge with the EU. Since 2012, national values of employment have been higher for those with higher levels of knowledge than for those with lower ones.

The national companies with HIK have bigger investments and bigger business volume. The portuguese HIK products create 20% of total exports to the EU (European Commission, 2017e; European Commission, 2017f).

28 One of the main objectives of the Bologna Process was to equalize the education system in 45 countries. One of the most important changes was to standardize the university education in three levels: degree, master and doctorate, thus promoting mobility, one of the objectives. (EHEA, 2017)

Micro-sized companies make up more than 95% of the SMEs, generating almost 60% of the SMEs' employment and almost one-third of the SMEs' GVA. The number of employees in micro enterprises is around 1.5 per company (IAPMEI, 2016).

In 2016, services created 74% of GVA nationally. Total national exports have grown in all services with the exception of tourism. Exports in services have been rising in ICT and also in advertising, market research, and commerce.

Portuguese exports to EU countries have been resilient, and they have grown to Spain. Exports to Brazil and China were also recovering, and the ones to Angola are decaying but not so intensively as before.

From 2016 forecasts, it is foreseeable that exports will continue to grow compared to the years before, but still far from the values of 1995-2007, especially to the non-European markets where there was a greater reduction.

It is predicted that the services sector will grow slowly in 2017-2019 and tourism and consumer exports are the two main contributors.

It can also be foreseen that employment will grow near to 1% per year, mainly in the private sector.

Big investments in long-lived products happened in 2016, as it is usual in the recuperation cycle, and also in response to easier financing conditions. It is foreseeable that Portuguese national development will keep the structure of a reducing population and high levels of debt. It is also likely that service prices will rise, especially in the most dynamic service sectors like tourism.

It must be emphasised that, for an economic recovery, the country needs to invest in further structural reforms (Banco de Portugal, 2016, p. 13 - 15, 17, 27, 31).

Figure 03: The Research Mind Map
(following pages)

RESEARCH MINDMAP

3

WORLD
- Change
- Dissatisfaction
- Evolution
- Economic crisis
- Values crisis

BRIC
- Brasil
- Russia
- India
- China

EAST
Mass production
emerging economies
investments:
- Education
- Technology
- Innovation
- Design

EUROPE
- Economic crisis
- Knowledge economy
- Creativity economy
- Systems approach
- Adaptation and flexibility
- Design & Innovation:
  - Policies
  - Evaluation
  - Investment

PORTUGAL
- Communication economy
- Technology economy
- IMF
- Crisis
- Ill organizations
- Industry in decline
- Services, biggest share of:
  - GDP
  - Employment
  - Exports

(OECD, WEF; EuroStat, ECB; INE, BDP, Pordata, AICEP)

BACKGROUND PROBLEMS
- Education
- Inversion of the age structure
  (Low birth rate, aged population)
- Design vs Economy & Management
- Technology
- Innovation
- R&D
- Design lack

2

KONWLEDGE
- Needs hierarchy Pyramid (Maslow)
- Value chain (Porter)
- Innovation, R&D, Technology
Design Driven Innovation (Verganti)
- Innovation Evaluation
  - Frascati, linear, inputs
  - Oslo, interactive, outputs
  - Development, system, wide

INTERNATIONAL TRENDS
- Creativity Economy
- New Services Industry
- New Management (Theories and Models)

1

DESIGN DEVELOPERS
- United Kingdom
- Finland
- Norway
- Germany
- Denmark
- Netherlands
- France
- Italy
  ...

- National development offices
- Design Councils/Associations
- Universities

- Design National Policies
- Design Programs
- Design Statistics:
  - National data
  - International Rankings
- Case Studies

DESIGN DEVELOPMENTS
Theoretical and Empirical

- Design Management
- Design Strategy
- Strategic Design
- Design Ladder
- Design Thinking
  (Mozota, Best, SEE, SITRA, Australia)

- Service Design
- Experience Design
- Systems Design (UK, Brown)

- Design returns beneficts
- Evaluate - Metrics & KPIs
  - Quantitative (Business)
  - Qualitative (People, perception)
- (Design Council, EU)

- Ethics
- Sustainability
- Design Process
- Human Centred
- User Centred
- Client Perception
- Transformational Design

PERSONAL
- Knowledge, new tracks
- Expert & specialist
- Skills development:
  - Organization
  - Methods
  - Methodologies
  - Interpersonal relations
- Network

Yss COMPANIES
- Adapted Design Kowledge for Yss
- Directives on:
  - Design applyance
  - Design evaluation, Metrics & KPIs

- Investement returns
- Strategic & long term thinking
- Design levels integration
- Service quality

CULTURE

- Against:
  - Change
  - Innovation
  - Mobility
  - Entrepreneurship
- Short term view
- Lack of ambition
- State dependency

- Problem solvers
- "Smart"
- "Cool"

ENTERPRISES

- Declining
- Bankruptcy
- Insolvencies
- Adapt or die?

COUNTRY DESIGN OVERVIEW

Lack of:

- Laws and regulations
- Professional organizations (APD, AND & CPD)

Micro & SMEs

"Artists"

- Focused on:
  - Graphic and communication
  - Product / industrial
- Not focused on:
  - Sustainability
  - Consumer & customer
  - Total quality
  - Global service
- Design ladder levels 1 & 2 (?)

- Little empathy
- Little commercial
- Aversion to numbers
- Dislike of management & economy

4

POTENTIAL PROBLEMS & RESTRICTIONS

- Information accessibility
- Partners availability
- Companies availability
- Design and Yss development
- Country and global evolution
- Personal aspects

5

STUDY POSSIBILITIES

- 3 years period
- Yss, Small yet important (GDP, exports, etc)
- SMART (E):
  - Simple,
  - Manageable
  - Achievable
  - Realistic,
  - Timely (Ecological)
- Practicalities
- R&D?
- Innovation?

- Yss Study
- Design, use & needs
  - Categorization
  - Characterization
- (State of the Art + Survey)

DEVELOPMENT & VALIDATION

- Pre-test
- Experts panel
- Pre-Conclusions
- Conclusions

- Service Design
- Design integration in Companies
- Design beneficts
- ...
- (State of the Art + Case Studies)

KNOWLEDGE CONTRIBUTION

- THEORETICAL DESIGN DEVELOPMENT
- FOR EMPIRICAL USE Directives:
  - Guidelines for Design integration in Yss
  - Metrics & KPIs, beneficts evaluation
- RECOMMENDATIONS

BENEFITS

BUSINESS (others)

- Potential adaptation

UNIVERSITY/ACADEMIA

- Research design development
- New research tracks

NATIONAL

- Yss characterization
- Design evaluation

- Yss future development (GDP, exports & employment)

- Awareness of Design importance for country development
- Design research development

INTERNATIONAL

- New knowledge
- New tracks
- West Europe, Portuguese case

Relation & Coproduction Promotion

International Network

1.08 Problem Statement, Issues Adressed, and Research Questions

The set of issues presented below was developed in the early stages of the research project, as can be verified in the Methodology. They have undergone several changes during the research process, but in the majority, they have kept to the same path (the initial Mind Map is presented in the Figure 02).

1.08.01 Title

The Strategic Design in the Service Sector:
Impact on the Micro and SMEs Service Companies

1.08.02 The Problem Statement and Issues Addressed

The Problem Statement

A macro-economic crisis causing many economic and social problems in the majority of countries, and with strong impact and influence on Portugal.

The Issues Addressed

The strong impact and influence on Portugal of the crisis had significant consequences. Several of the most important were linked to the international financial support received by Portugal. The funding assistance included the imposition of various policies to reduce costs, implementing harsh laws for companies and rules for the population, and a context of austerity.

The consequences were increased instability and uncertainty, and the negative mind-set for all of society. The reduced income per capita and the increase in unemployment were critical factors for the fast and deep decrease in the population's level of welfare and happiness.

The research focussed proactively on the creators, sustainers, and amplifiers of national development, targeting the main contributors to Portuguese financial and employment growth, and their typical problems and sources of failure. It also identified a group with good potential and in strong need of investment.

1.08.03 Research Questions

Question 1

Which are the primary contributors to competitiveness and quality of life for Portugal and other European Union countries?

Supplementary Question 1.01

Is it possible to identify specific sub-sectors that are attainable for the research and have good expectations for growth and returns?

Question 2

The ratio between new companies and those that fail is high. What are the main reasons for this?

Supplementary Question 2.01

Which are the main factors that differentiate companies that overcome the first three-year cycle?

Question 3

Is it possible to improve companies' situations through business, strategy, and design knowledge?

Supplementary Question 3.01

Is it possible to use design to reduce the gap between the academic and businesses spheres, increasing knowledge transfer and their performance and returns?

1.09 Hypothesis

It is possible to create a design-based and user-oriented model illustrating service SMEs' common evolution and processes and the benefits of design (Design Thinking, Strategic Design, Service Design; its integration into companies' different decision levels; and its use in various company activities), in order to increase company decision-makers' knowledge and awareness of design.

1.10 Objectives

1.10.01 Primary Objectives

Objective 1

Through design, develop a model that synthesises relevant knowledge of businesses, strategy, and design for company decision-makers' learning, memorisation, identification, and use.

Objective 2

Through the model, build a bi-directional knowledge bridge between academia and business. Academic and theoretical knowledge and global Sustainable Development Goals on the one hand, and micro and SMEs' practical know-how and sustainable growth and longevity on the other.

1.10.02 Secondary Objectives

Objective 3

Study and characterise Portuguese micro and SMEs, their importance to the national economy, their most demanding life-cycle stages, their major problems, needs and aspirations, and contextual threats.

Supplementary Objective 3.01

Compare these Portuguese facts to those of other nations and groups of countries.

Objective 4

Study Portuguese service-sector micro and SMEs that have an exceptional character in two groups (experienced, and young companies), characterise them, and identify their shared and contrasting characteristics.

Objective 5

Study design-specific subjects like Design Thinking, Service Design, Strategic Design, and the impact and value-creation potential of design in SMEs, other companies, and countries.

Objective 6

Study Identify possible contributions of design to Portuguese service-sector micro and SMEs.

Supplementary Objective 6.01

Identify routes for companies to follow towards enhanced Sustainable Growth and Longevity.

1.11 Methodology

This research started as a natural development of the researcher's professional path. The Methodology was formulated and chosen at the beginning of this research process, taking into account the researcher's main design interests. It was validated in the public Test of Scientific Aptitude (PAC - *Prova de Aptidão Cientifica*).

It must be highlighted that, since the very early stages, the main structure of the Methodology and the thesis document were used as the fundamental structure for the entire research and writing process. It was decided that the research methodology would be non-interventionist and qualitative, and several methods and tools were considered for use during the different stages, as presented in this sub-chapter, firstly in outline, and secondly in more detail.

Following the stated non-interventionist and qualitative research methodology, the stages, methods, and tools were defined, and are briefly stated below and visible in the next figure.

The methodology is presented in groups chosen for operational reasons:

. the first group includes all the stages from the beginning to definition of research questions;
. the second group includes the preliminary study, the State of the Art and the Hypothesis;
. the third group includes the active research and the development of the Athena Model;
. the fourth group includes the preliminary model and the experts' evaluation of it;
. the fifth group includes the model development, the preliminary conclusions, and the verification of the Hypothesis;
. in the sixth group, the conclusions are developed, and then it is possible to compare with the initial stages and present the contribution to knowledge;
. the dissemination group is a stage of the methodology that was developed throughout the research process, thus being considered a particular group.

The First Group

In this group, methodology stages and methods were defined after outlining the theme, the provisional title, and the problem.

A part of the Literature Review was performed, mainly to identify the most important and updated developments in the areas concerning this research, to clarify, narrow, and define the target and focus. This part was carefully developed to guarantee the practicality and usefulness of the research, and that the influence of the contextual instability would be smaller.

The unclear national and international contexts were a difficult external influence to manage and overcome. As a consequence, and to collate relevant information, the researcher reviewed existing studies and performed the first *ad-hoc* exploratory interviews and surveys with peers in this first stage of the research. The main objective of the use of all these methods in this working stage was to thoroughly clarify, narrow, and define the research field, in a more predictable manner.

The field of research was refined and defined as: service-sector SMEs, with a special focus on new companies and start-ups pursuing Sustainable Growth and Longevity. The group ended with the formulation of the Research Questions.

The Second Group

This group contains all the subsequent stages up to definition of the Hypothesis, the preliminary study and the State of the Art.

The main intention in the preliminary study was to achieve a better understanding of design knowledge developments, and the current situation of Portuguese service SMEs, with special interest in their characteristics and relationships with the use of design.

The study of specific design areas was performed, namely in Strategic Design, Service Design, Design Thinking and Design Benefits. Research on the areas of business, management, entrepreneurship, and start-up areas was also performed.

The Third Group

This group includes the active research and the development of the Athena Model. According to the chosen methods, tools, and previous methodological knowledge, qualitative data was the main focus of the active research that included the Survey by Inquiry and the Case Study. From the obtained results of the Questionnaires some findings were drawn. A comparison was made relating these findings to previous theoretical knowledge. It was decided to collect more data to ameliorate and improve this stage's findings, through the case study of an exemplary group of 50 selected young national companies. From the Survey by Inquiry and the case study, the initial results, and their match with the theoretical base, the findings were produced.

The online questionnaires were developed and circulated with the objective of identifying a group of extreme results related with exemplary characteristics, specifically the pursuit of Sustainable Growth and Longevity.

The most important ways to achieve a representative respondents group were: the development of a closed introduction note (definition of specific characteristics), and the use of defined and specific networking groups and web pages, aligned by nature with the problem.

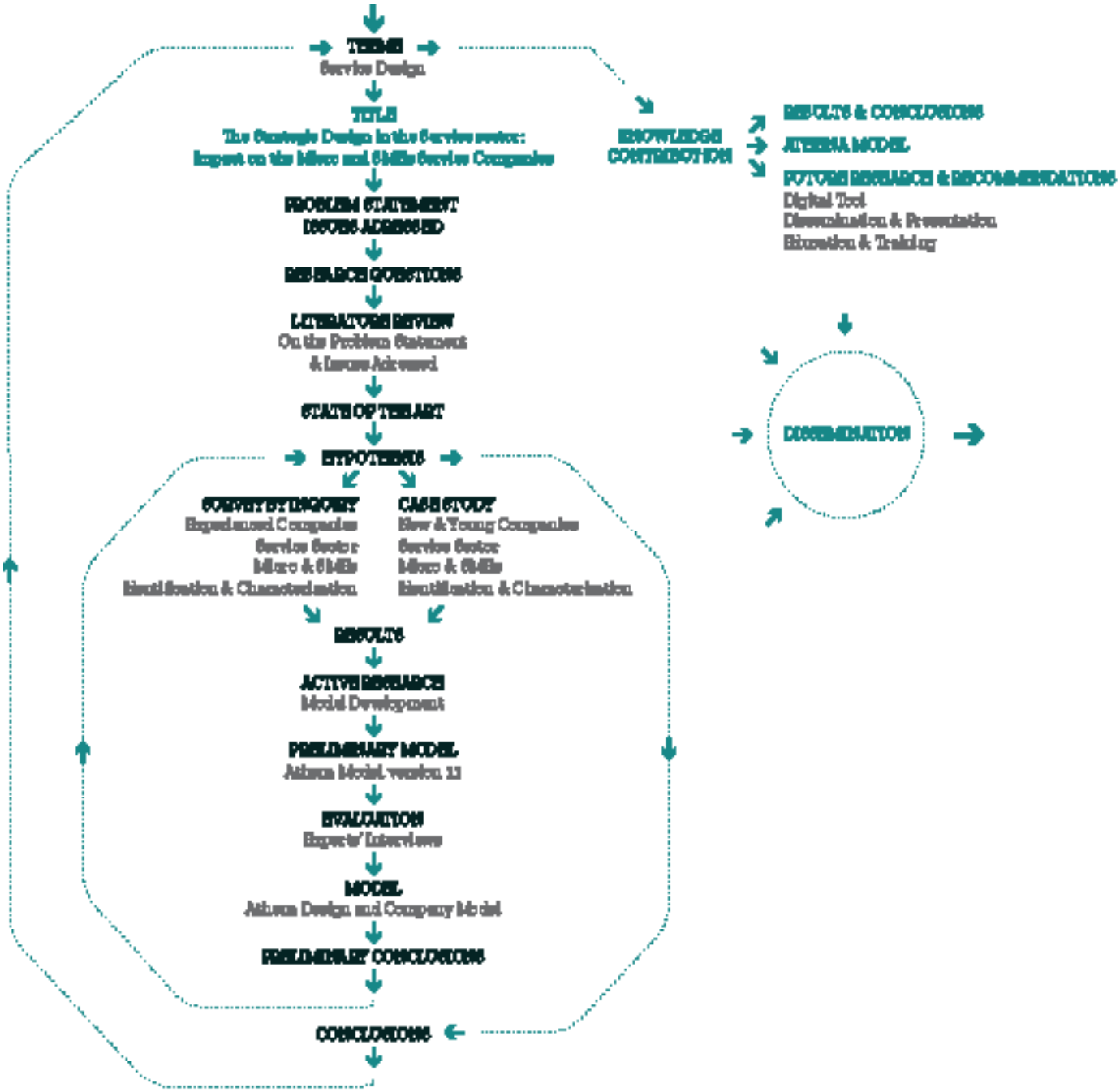


Figure 04: Research Process

For one month after launch, the received answers were monitored, which allowed for the decision to end the questionnaire dissemination: a selection of valid, usable, and good results was achieved. The 50 answered and valid questionnaires were analysed and synthesised, and their study gave the initial findings. From this first part of the Survey by Inquiry, a smaller group of companies was selected. The characteristics of that specific group were identified, and four specific ones were chosen: service companies; SMEs; companies in a positive

stage of development; and companies older than three years. Through the detailed answer analysis and syntheses, it was possible to develop more refined and expressive findings, and also relevant and practical data. Cross-checking of these findings with prior theoretical knowledge showed them to be, in the main, very much aligned and concordant. However, to achieve a richer perspective of reality, to give a better basis to the findings, and to improve the research, it was decided to reach for more data although resources were already very limited.

The case study of young companies, or those in the launch phase, was a worthwhile decision. In keeping with the research stage and the possible options, it was decided to use a group of national companies already preselected by their differential characteristics. The resource used was a special support program for start-ups and entrepreneurs, mentored by a credible organisation (a big Portuguese telecommunications company) and with public data. The original data was given by the companies' entrepreneurs or decision-makers, and then the support program collected, organised, and published it. From the wide range of companies (more than 480), the researcher selected a group of 50 companies by their specific characteristics, to be used as the analysis group. The study was completed, and initial findings were identified. The companies' answers were then analysed more concisely to achieve more detailed findings.

From the Survey by Inquiry and the Case Study, it was possible to achieve more developed findings regarding the knowledge, use, and integration of design and business knowledge in the studied companies.

The Fourth Group

This group contains the model development up to the preliminary model and its expert evaluation.

The preliminary model development was a continuous design process, prototyped in this stage and named Athena Model version 1.1.

Individual expert interviews were prepared and held to obtain their inputs and evaluation of the presented preliminary model, then studied to achieve synthesised and usable information (for the refinements to the model design implemented in the subsequent methodological stages). Even though the

concept of the model arose early in the research and its development was a continuous process, the preliminary model was conceived at this stage in a condensed timeframe. From the previous work and resulting findings, it was possible to define and develop the first preliminary model.

For the expert panel, a group of professionals was identified and assembled, characterised by their quality and differentiation across various relevant areas of professional expertise, experience, and academic backgrounds.

The meeting was structured, defined, and prepared, namely the presentation of the preliminary model and the set of structured questions. However, due to the available resources and schedule conflicts, it was not possible to convene the prepared expert panel. Individual expert interviews were the tool used to gather the defined experts' inputs on the preliminary model. The evaluation, suggestions, critiques and other inputs were recorded in written notes and as audio.

From the expert interviews and their recordings, it was possible to work up the collected information: to analyse, compare, and synthesise it to be used in the following stage.

The Fifth Group

This group covers from the next stages of the model development, the preliminary conclusions, and the verification of the Hypothesis;

During this stage, it was possible to include the refinements from the individual expert interviews in the model. All the suggestions for current application, critiques, and suggestions for future developments were safely recorded, inserted in the model, and presented in this document. From the refinements, it was possible to develop the preliminary conclusions. From this step, the Hypothesis was verified.

The Sixth Group

In this group it was possible to develop the conclusions through the verification of the initial Research Questions and the Objectives, confirming the pertinence of the theme, ending with the contribution to knowledge, that includes the

theoretical knowledge collected and presented, the model itself, and its potential usage. Future research developments and recommendations were also part of the achieved contribution.

The Dissemination Group

Dissemination was done through public presentations, posters, papers, and presentations to specific networks, and was developed throughout the research process. All the experts' pertinent inputs were introduced into the project. Academic dissemination was undertaken in the FA-ULisboa through the three research labs and other presentation meetings. Designed posters, papers, and other research products were also presented to academia nationally and internationally.

Circulation in closed networks and to specific individuals was carried out, and all the exploratory interviews, the questionnaire distribution, expert interviews, and other group discussions gathered very rich inputs.

The researcher was invited to present the project and the model in a workshop of the Via Criativa project's first international meeting. The presentation was adapted in particular for the international workshop participants and to the specifics of the Alentejo region. This conjunction of local examples and international audience gave very interesting results, that reinforced the project's pertinence and the partial conclusions obtained by the questionnaire and the case study. The theoretical model was successfully applied to different real-life cases, with positive reactions from the participants, which were explored and inserted into the research.

The researcher was also invited to present the project and the model to the 23rd Lisbon PubhD, an international initiative that started in England and promotes young researchers that want to share their research projects and develop their presentation skills.

These dissemination efforts obtained different experts' inputs that were also introduced into the model development.

1.12 Document Structure

This document is the final result of the research "The Strategic Design in the Service Sector: Impact on the Micro and SMEs Service Companies" and it has two volumes. The First Volume is organised in three parts, while the Second Volume is divided in two parts.

First Volume

This document was developed according to the structure of the table of contents and it has three main parts. The second part is organised in chapters, sub-chapters, sections and sub-sections.

The First Part

In the initial part, several elements are presented. Firstly the Dedication, Credits, Acknowledgements, and the Epigraph followed by the Abstract and Keywords in English and Portuguese (*Sumário* and *Palavras-Chave).* The six different Indexes (General, Figures, Tables, Graphics, Annexes, and Appendices), the List of Acronyms and Abbreviations, and Glossary are the last elements of the first part.

The Second Part

The central elements of the research are presented, divided into five chapters.

The 1st Chapter - Introduction has, in the first four sub-chapters, an introduction to the 2008 international crisis, Companies, Design and the Research. The Object of Study and Deeper Data and Entrepreneurship issues are presented in the fifth sub-chapter. The next introduces the Motivation, while the seventh presents the research framework and same Portuguese Economic Data. The following three sub-chapters, introduce the Problem Statement, Issues Addressed, and Research Questions; the Hypothesis; and the Objectives (primary and secondary). The last sub-chapters cover the used Methodology, the Document Structure and Other Subjects concerning the Research. The chapter is completed with its Summary and with the corresponding Bibliographic References.

The 2nd Chapter - Theoretical Framework has an introduction, and the following sub-chapters address the context, design knowledge and its relation to management, businesses, and services. Design's relationship with innovation and R&D, and with sustainability, development, and longevity are also introduced.

Presented in the second sub-chapter are Design Thinking and Design Process followed by the third, related with design's evolution up to Service Design and System Design. Design, Business, R&D, and Strategic Design, are focused in the fourth sub-chapter. The fifth presents the Design's relationship with SMEs and entrepreneurship, while the next three sub-chapters cover Design Value, Indicators, and Metrics; Design Benefits Evaluation; and a Brief Perspective of Design in Portugal.

The global issues of Sustainability and Sustainable Development, and companies' pursuit of Sustainable Growth and Longevity are presented in the nineth sub-chapter. The relationship of Design, Innovation, and R&D is presented in the last sub-chapter that also cover the Change, Innovation, and Competitive Culture section. The chapter ends with the Chapter Summary and Chapter Bibliographic References.

The 3rd Chapter - The Survey by Inquiry and the Case Study covers the study of the companies' situation, through questionnaires and case study. The chapter is introduced, and then the questionnaire development sub-chapter presents the subjects and relates them to previous work; then the development, the application, the results, and the relevant information gathered are explored. Next, it presents the second analysis of a narrower spectrum of respondents and their companies, and some findings and comparison to previous theoretical knowledge.

The cases studied in the Case Study sub-chapter concern all the subjects related to the previous work, the development, first results, and data. Findings and cross-references with prior knowledge are also presented. The final findings cover the questionnaires, Case Study, previous knowledge, and considerations. The chapter ends with its Summary and the corresponding Bibliographic References.

In the 4th Chapter - The Athena Design & Company Model, the first two sub-chapters introduce the Athena Model, present the name, and the initial developments of the preliminary model.

The third sub-chapter is related to the experts' interviews, evaluation and results but also with other received inputs from dissemination.

The following sub-chapter, the Athena Design & Company Model, Version 1.2, includes the sections related with inputs integration and further developments, the description of the Athena Model, and a description of the time-scale relationship. The following sections concern the future developments and the preliminary conclusions.

The chapter ends, as the previous ones, with the Summary of the Chapter and its Bibliographic References.

The 5th Chapter - Conclusions is the last chapter and presents the main conclusions of the research process and the research final results.

The first sub-chapter presents the Methodology path followed by the sub-chapter in which the Research Questions Status and Answers are presented as well as the Hypothesis Verification and the Objectives Achievement Status. The following sub-chapter, presents the Model Design Process and the fourth presents the Future Research Development and Recommendations including the sections of the Digital Tool and the one connected with the Dissemination, Presentations, Education, and Training.

The chapter concludes with the Final Thoughts sub-chapter.

Third Part

The final elements of the First Volume are the General Bibliographic References and the General Bibliography divided into seven categories: Articles and Proceedings; Books; Dictionaries and Encyclopedias; Electronic Sources; Governmental and Commercial Reports; Periodic Publications, and Thesis and Dissertations.

Second Volume

The volume is divided in two parts adding data and supplementary information to the main document: the Annexes and Appendices.

The several annexes present data developed during the research and used as an essential basis for its development. These supportive steps were essential for the research development and crucial for the achievement of the final results. It is to be noted that, for a better reading of the main document, it is advisable that this material is called into the thesis reading whenever it is suggested or referred to.

The appendices include preliminary existing documents used throughout the research and crucial for its development.

1.13 Other Subjects Concerning the Research

Language definition

It must be highlighted that presenting this research in (British) English was a conscious and strategic decision from the first moment. Even though it slowed down the process, it can allow greater identification and higher number of readers and readings, promoting better dissemination and communication in the international academic and business environments, in which English is the most common language.

The use of English was suggested by several experts in these areas. The extra effort, to obtain a greater circulation potential, was based on the prior English experience of the researcher, which was mostly in everyday life and professional speaking rather than academic. It can be said that the research has been somewhat hampered by the time, effort, and attention required. However, international studies are mostly in English, international terminology doesn't yet have a true and correspondent translation to Portuguese, and a study of terminology has never been an objective of this research.

Even though the researcher is vigorously defending the Portuguese culture, language tradition, and character, writing the thesis in English was the researcher's strategic decision. It was known from the researcher's previous experience that this decision would require a greater effort, but that it can later prove to be a time-saver.

So, this effort was almost a Universal Design effort, in the sense that it has the ability to respond to the implicit academic internationally-defined language for communication and dissemination.

Further, there are more Portuguese-speakers speaking English that English-speakers speaking Portuguese, which was an important consideration in this decision, as English is nowadays considered to be almost a basic skill for the research and development and scientific research fields[29] (Observatório da Língua Portuguesa, 2017).

As a final note on this subject, it should be highlighted that English has different spellings. The (British) English was the used one for the writing and proofreading (e.g. analyse, behaviour, centre).

Design Use and Integration in the Research Project

During the research, design knowledge was used (processes, methods, tools, etc.). A journal[30] with many schemes and drafts was a tool developed and used during the whole process, while brainstorming, user tests, and Wordclouds were used at specific moments. However, at some moments, different tools were used simultaneously.

Design research techniques can be divided into six stages: discover, define, conceptualise, design, implement, and evaluate (Design Research Techniques, 2017). Some of them were used as presented here for each stage:

. Discover: brainstorm, mind mapping, concept mapping, contextual design, cross-impact study, empathy tools (interviews and initial exploratory interviews), environmental scanning (understand the

29 Speakers in millions are: 1 - 848 for Mandarin, 2 - 399 Spanish, 3 - 335 English, and 4 - 261 Portuguese.

30 The journal can be consulted on request, and some of the schemes referred to are presented in Annex 23.

context), experts' interviews (when experts' panel was not possible), foresight (also used in the interviews), inductive analysis, literature review, mobile diaries, modelling and simulation, open-ended interviews (initial exploratory interviews), simple personas definition (to create the first versions of the model), questionnaires, semi-structured interviews, SWOT analysis (questionnaires and case study).

. Define: 5 Why's (into the problem), content analysis (cases, quantitative measure of words to create reproducible inferences/deductions, common in those companies), intercept interviews (entrepreneurs and enterprise owners), make tools (generative research), prototyping (the model);
. Conceptualise: grounded theory, morphological analysis;
. Design: standards and guidelines (communication design);
. Implement: in the Athena Design & Company Model, the thesis document, and other communicational supports;
. Evaluate: in all contacts with experts and potential users.

For the future development, it is foreseeable that other design research techniques will be used, as presented in the sub-chapter Future Research Development and Recommendations.

Chapter Summary

Micro and SMEs, mainly the youngest and smallest, are known to have a short life. The main reasons for their early death were identified, and they are:

. inadequate management and deficient professional consistency;
. lack of strategic thinking and sense of direction;
. lack of resistance to contextual changes;
. debt.

These complex issues were faced with specific theories and models, simulation and diagnosis tools, and directives, developed in distinct knowledge areas through their specialised subject lenses. However, this highly-specialised and complex knowledge is not prudently applied in practice by companies. The bankruptcy of modern companies is mainly for the same reasons as before.

Moreover, literature reviews reveal that owners and entrepreneurs have a significant lack of business and management education and training. Thus, typical business people are action-oriented, avoiding entangled theories that cannot be applied immediately. For them "time is money".

It has been proven that adult's learning is very much based in visual and procedural memory, and that interactive tools (bi-directional and responsive to user inputs), which are straightforward to use and involve practical application or simulation are essential to higher retention levels.

In this chapter, from the in-depth study of the Portuguese situation considering the social, economic, and cultural context, some significant issues emerged, also concerning SMEs and their decision-makers. Later on, they were used as directives for the model design that, being user-friendly, should:

. be simple to communicate;
. allow a quick identification of the company's situation in the model;
. facilitate a clear understanding of the subjects;
. enable visual simulation, and thereby show cause-and-effect relationships;
. provide more in-depth resources to satisfy the user's needs and curiosity.

The research thesis and the Athena Design & Company Model are the primary results of the research to encourage continuous change and improvement in service sector Micro and SMEs, and in their Sustainable Growth and Longevity.

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2nd Chapter
Theoretical Framework

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Theoretical Framework

In this chapter, the topics involved in the research are presented briefly, in particular referring to the contemporary context and design knowledge, the initial seeds of this project. For the definition of the analysis sector, the presentation of the background before the 2008 crisis, its influences on the national social and economic context, and some of the design needs of Portuguese enterprises are presented.

Also presented briefly is the design field, from its initial and basic characteristics to the latest design evolution in the areas that are addressed by the research. Design Thinking and Design Process are two of the highlighted themes.

For this matter, just two examples are the evolution of design in the activities and results of companies in which it stands and acts (on the operative, tactical, and strategic vectors), and design's evolution from the initial stages to current activities and responsibilities (such as being part of multidisciplinary teams that study and present solutions for wicked problems).

The advantages and benefits of design for companies and their evaluation difficulties are also displayed, as is the connection between entrepreneurship, SMEs, and design.

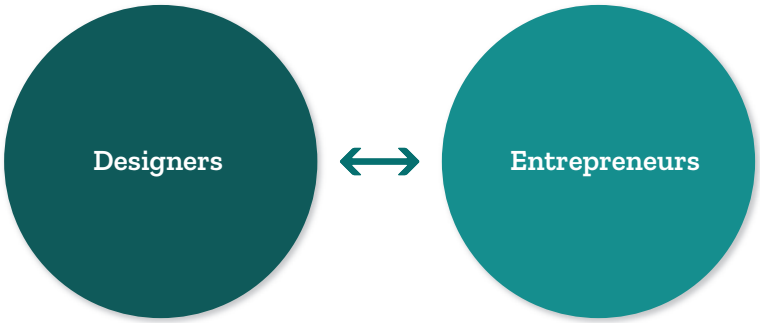


Figure 05: Designers and Entrepreneurs have several similarities
Source: Adapted from Serpa, 2014

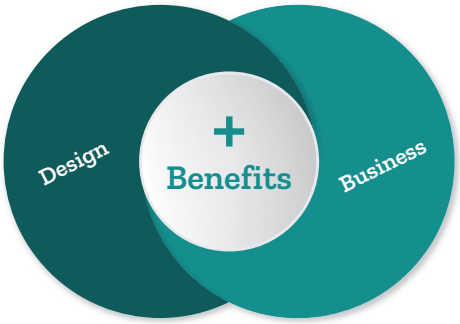


Figure 06: The conjunction Design and Business raises Benefits

The themes regarding the triangles A-D-C (Academia - Design - Companies) and the triangle D-I-R&D (Design - Innovation - R&D), and the connected themes or concepts of Sustainable Development (global), Sustainable Growth and Longevity (companies) are also introduced.

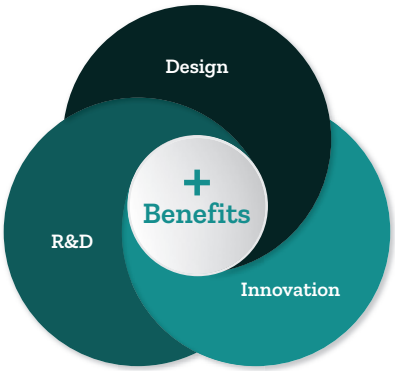


Figure 07: The conjunction Design, Innovation and R&D raises Benefits

Design in Portugal and its specific context and situation are included to give a deeper understanding of the specific reality, reinforcing the purpose of the research.

2.01 The Context, the Sector Definition and Other Related Issues

The basis of the project was related with certain concerns: the national effects of the crisis; the lack of design integration in Portuguese companies; the beneficial aspects of design on companies; and the potential ability to develop a research project that could be used to fulfil certain design needs of some Portuguese micro and SMEs.

The research field was open, and it was named "sub-sector Y" for operational reasons[31].
The unstable conditions of the country were a big constraint on this definition phase. Several approaches were used to delineate it:

. The analysis of Portuguese sectors in design need (through Economic Activities Classification and analysis of national reports);
. The discussions among colleagues and peers (ad-hoc experts' panels);
. The use of a questionnaire (the first one done during the research).

Several specific areas in "design need" were identified, but they were not classed as suitable for the present study. This part of the research work was very important to sustain the next stages.

After the previous inconclusive efforts, various new approaches were attempted. Instead of looking for one area with a very well-defined specialism, the delineation of the sub-sector Y was performed through a set of characteristics that can be summarised as service-sector micro and SMEs with potential for export and in an early stage of development.

The selection was based on previously acquired knowledge. The Portuguese economy is mostly supported by private companies, and micro and SMEs are the largest majority by number and by employment. The smaller-sized companies are by definition least resistant, and easily weakened by negative and external

31 Later on, the focus area was defined by the services sector and by the micro and SMEs sub-sector, as presented in the title:
"The Strategic Design in the Service Sector: Impact on the Micro and SMEs Service Companies"

changes. Unemployment was a significant factor for the creation of many new businesses and companies. However, by its nature, Portuguese culture is not known for its entrepreneurship and management abilities, and the rate of company failures is very high for new companies.

Table 08: Sector selected characteristics

1	Size	Micro and SMEs
2	Development stage	Initial stage of development
3	Economic activity area	Services
4	Potential for export	Exportable

Source: EU, 2017

Small companies have less hierarchical structure, so, in principle, they are easier to contact, to communicate with, and the highest decision levels of the company are more accessible and open to raising interest and feedback. From the contacts made with older micro and SMEs, it is possible to understand some field experience, and the positive and negative points of their businesses.

Services, either from the third or the fourth sector, are crucial for the country's economy and the required national leap. The most-developed services are those that have a higher value-creation and investment return, and they are the ones based on intense knowledge, creativity, communication, and technology. Considering the private sector, they are also the ones that invest more and that use a specialised and highly-educated workforce.

The remote services (non-proximity services) are less expensive and easier to export, allowing the companies and employees to stay in the country, and extending the market to other countries. New, young companies are small and more open to innovative, different ways to achieve better results, and they appreciate all the help they can receive to their benefit.

The different companies and their activities can take advantage of design knowledge and intervention, and they can be part of the company from its

inception. Starting from the most common and best-known design actiities in the lowest intervention levels, the design influence can be spread: the decision-makers can enlarge their knowledge about design and the relationship with it, opening the potential of design to a wider and deeper implementation, hopefully to the strategic level. The intervention of design has been deeply studied, and it has been proven that there is a relationship between benefits created and the influence of design in companies: the higher the design investment and influence, the better are the results for the company.

The sub-sector´ selection for this research project was an exhaustive task, and some potential problems were identified, mainly external factors: the outside influences, the wide range of business types, and their levels of complexity. The intrinsic factors found were the practical questions of the research and the different knowledge areas, important for the study. The surrounding themes were still blooming and were distraction factors. The study of many reports and cases gave important information on real cases, international specialists´ knowledge, and a necessarily broad overview of other knowledge areas.

Meetings were other information sources through academic and non-academic events, the latter mainly related with entrepreneurship, start-ups, and companies. It should be born in mind that managing the traditional academic sources and the different events was a difficult task: if the traditional sources are very concise, dense and focussed, the others need the use of social, communication and networking abilities to manage the prolix, light and divergent environments.

With a Polaris/Lodestar direction (the sector and sub-sector definition), the research was standing on an upper step of the ladder and ready to evolve.

2.02 Design

2.02.01 Introduction

One could not find a clear and defined agreement about when design activities and objects were first developed and created. One can consider that the first

designed objects were those made as a reaction to existing needs. On the other hand, the emphasis can be given to different subjects, like for example, the graphic embellishment of objects, decorative environments, serial production, or the project prior to production.

Design is characterised by communication and aesthetics. Designers use their creativity, experimental development, communicational abilities, and "hands-on".

Having expression and information transmission as a core issue since the beginning, design is a communication discipline by nature. Designers are experts in expressing objects, ideas, and developed concepts that can be used to work as a "hinge" among different professional and working areas. Drawing, modelling, and prototyping are specialities of the area and profession, be that manually or using IT tools, programs, and processes.

Design is considered to be a new activity and research area, which has been characterised by subjectivity since its early days. Design is studied and researched all over the world, and its field is vast and expanding.

The great and rapid enlargement of design knowledge is characterised not only by conceptual developments but also by innovations for real use, including methods, tools, and processes.

In this design research project, Design Thinking, Service Design, Strategic Design, and Design Benefits were addressed, as well as areas related with micro and SME service companies and their connections with design. One can say that these specific areas are all recent and related.

Design is well-known for having subjective influences, qualitative benefits, and intangible results, whether in the subjects commercialised by the businesses, in the companies themselves, or in the community and wider ecosystems. Understanding the quantitative value of design has been a concern for many researchers, and several efforts have been made to measure, prove, and present it. This issue has national value for several countries. It has been studied by special government agencies (e.g. the Design Council in the UK), and design has been included in political decision centres (Farrell, Goodman, 2013)

Considered a new working, knowledge, and scientific area, design theory, definitions, terminology, processes, methods, and tools are evolving very fast. The

discipline and profession are in constant development, and one can say that its evolution is deeply connected with other knowledge areas. By tradition, Design History has been studied in direct connection with Art History.

Experts from other areas were the first developers of design theory, and their roots and previous experience were broad, influencing the creation of design knowledge and its improvement and evolution. Later on, the "new" designers also became theory developers and, in following phases, contributors from other "new" areas (like management or marketing) also became authors of design theory. All this variety increased the richness, mutual influences, and impacts on the engaged authors and disciplines.

As a young field of knowledge, design created its own space between the areas where it began, extending itself into them, gaining and creating new territories, comparing knowledge and influences. Designers work more and more in multidisciplinary teams on intersecting and cross-disciplinary questions, bringing their knowledge to the subject and using intrinsic communication and connection skills.

Design accompanies the societal, technical, and cultural developments, the evolution of the political and economic context, and follows the current globalisation, fast pace and change, and blending tendency.

Scientific developments and definitions in design have been identified as vague, inconsistent, and needing further improvement, coherence, and basis. The lack of consensual pillars and foundations led to deeper and wider developments, and some of them became the target of infinite quotation, strong opposition or even later renunciation.

The subjects and terms evolved from the extremes of evolutionary improvement to counteractive, common knowledge developments. Design is evolving simultaneously with other scientific areas, influencing one another. Scientific areas are more open than before, sharing knowledge among them and being mutually influenced (Gregor, 2007).

Globally, the fast growth of scientific production has been identified as a two-sided coin: the increasing quantity versus the decreasing quality and

depth. The tendency for generalised concepts, orientation paths, or guidelines is notorious in society and is reflected in scientific production.

The distance between the academic sphere and the general public is decreasing as a consequence of ICTs (Information and Communications Technologies), the new information democracy, and the breaking of other old frontiers. Several experts with credible work and research are presenting them in a more approachable way, using more common language, understandably presented and synthesised. This critical and usable way to communicate uses a less hermetic language, commonly simplified to be easily understood.

Relevant authors publish not only in the academic sphere but also in mass-media articles or interviews. Academic and research publications, and the "less scientific media" and general publications are also sharing common concerns and information. For instance, it is possible to gather design information in news from academia (e.g. Rotman School, Harvard) and education and training (e.g. Design Thinking network academy).

It is also possible to find design information in news from specific areas of design (e.g. DMI - Design Management Institute, SDN - Service Design Network, Interaction Design Foundation), Design Networks (e.g. The Design Network, Design Network North, Swiss Design Network, Design Network Africa) or design media (e.g. Design Observer, Fast Company, Core77, Dezeen, Design Week). Design news are also spread by business news (e.g. Business Week), by regular columns in daily news media (e.g. The Guardian, The Washington Post), and by magazines (e.g. Forbes). Social media quite often uses concepts and terms in an imprecise way, which is an important influence for the popularisation of design terminology and its incorrect public use. Under the umbrella of design, new terminology and tools have been presented as trendy, fast, and superficial panaceas, almost like cheap and quick problem-solving prescriptions.

Design as a service has mostly been a consulting activity, commonly identified with creative graphics and the form and function pair. From new needs and the recent relationship between designers and their clients, design activity areas were born, and the evolution can be briefly presented starting from Graphic Design to Product Design, from Service Design to Experience Design, and later on to System Design. Design is expanding hand-in-hand with society; instability,

complexity, ambiguity, and intangibility are now more and more common. Design's influence inside companies has also evolved in the influence levels where designers can operate, but also in their responsibilities through the work and the company.

Good design has been a constant challenge, and Dieter Rams, a famous product designer, explored it as a challenge to define and synthesise it. His ideology started to be developed in the 50s; however, his Ten Principles for Good Design were hard to achieve, and only launched at the end of the 70s. It is presented in the Table 09 (Vitsoe, 2017). These principles are used, discussed, and taught all over the world in design and related areas.

Table 09: 10 principles of good design Dieter Rams[32]

01. Is innovative	06. Is honest
02. Makes a product useful	07. Is long-lasting
03. Is aesthetic	08. Is thorough down to the last detail
04. Makes a product understandable	09. Is environmentally friendly
05. Is unobtrusive	10. Involves as little design as possible

Source: Vitsoe, 2017

Contemporary Development

The economic types and classifications follow the current phenomena e.g. technology developments. These contemporary economies are all characterised by investment, development, and democratisation: the information, technology, knowledge, and creative economies. However, in 2015, a report was launched by the Design Council called The Design Economy (Design Council, 2015), and another report was launched by the same organisation called Designing a Future Economy (Design Council, 2017). From a different perspective, the new economies also include the green and blue ones (Schneider, 2012).

At the beginning, design was a very practical area in which material prototyping and being hands-on were essential. With the information explosion and technological developments, the amount of information and the speed of mechanical and virtual prototyping have increased radically. The complexity has increased, the time has decreased, and the resulting quality must be higher.

32 These principles can be shared accurately and fairly under the Creative Commons CC-BY-NC-ND 4.0 licence.

Design is being shaped by the directions and developments of the present time (e.g. aesthetic, technology).

It is possible to read very theoretical design texts which are not based on real experience, but also the opposite, with design texts based on practice and existing cases, but not well-founded in theoretical background or support. The theoretical developments feed and are fed by the general evolution of the world; to mix practicality and theory is a real need, but are often not well-balanced.

Some of them are based, shaped or adapted to new contexts. If on the one hand, one can see developments raised from a theoretical or practical base, on the other hand, one can see developments in process, principles, methodologies, and the perspectives and contexts from which they were started or oriented.

The World Economic Forum Growth Competition Index selected 32 items to be studied, and this ranking of creative competitiveness was based on these. For example, an investment in research and development, innovation ability, the degree of customer orientation, and the originality of product design. The ranking was based on business competitiveness and creative competitiveness.

In this ranking, Switzerland is in 1st place, given that design competitiveness is greater than national competitiveness. Next come Singapore, Sweden, Denmark, and Finland, and only after these come Germany, Japan, and Canada. Ranking national competitiveness greater than design competitiveness, the order would

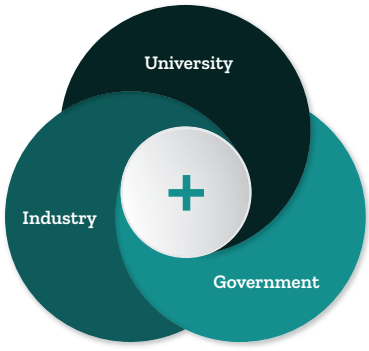


Figure 08: The Triple Helix: the conjunction University, Industry and Governments raises Benefits
Source: Adapted from Etzkowitz, 1995

be Switzerland, Japan, Germany, Sweden, the United States, Denmark, Finland, the Netherlands, France, Austria, Singapore, and Belgium.

So, it is possible to relate countries' high competitiveness levels with their design investment and the nation's growth and competitiveness.

Design is connected with innovation (Brown, 2009, Martin 2009) which is one of the major drivers for value creation (Mozota 2006), for business growth (Design Council, 2007, 2017), and for national competitiveness (World Economic Forum, 2016).

> "Innovation is particularly important for economies as they approach the frontiers of knowledge, and the possibility of generating more value by merely integrating and adapting exogenous technologies tends to disappear. In these economies, firms must design and develop cutting-edge products and processes to maintain a competitive edge and move toward even higher value-added activities. This progression requires an environment that is conducive to innovative activity and supported by both the public and the private sectors. In particular, it means sufficient investment in research and development (R&D), especially by the private sector; the presence of high-quality scientific research institutions that can generate the basic knowledge needed to build the new technologies; extensive collaboration in research and technological developments between universities and industry; and the protection of intellectual property." (World Economic Forum, 2016, p.37)

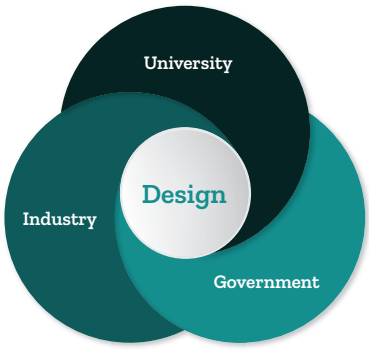


Figure 09: Design can link the elements of the Triple Helix (University, Industry and Governments)
Source: Adapted from Etzkowitz, 1995

2.02.02 Design Thinking

Important design institutions publish articles from relevant authors in which the adoption of this tendency is presented and the following citation is just an example. This text was posted on the Design Management Institute blog website presenting the author's point of view:

> "(...) Whatever you choose to call it - innovation, design, creativity, Design Thinking, design intelligence - let's agree that what the world needs is more integrative power of design (...)" (Westcott, 2014, n.p.)

From different areas, the connection between design and a different way of thinking had its beginnings with ideas initially explored from the end of the 60s to the beginning of the 80s, firstly connected with artificial intelligence, engineering, and architecture by Herbert A. Simon, Robert McKim, and Bryan Lawson[33].

This theme and terminology have been explored since the last century. Since the beginning of this century, and based on practice and the design theory already created, management and business professionals were strong communicators of Design Thinking knowledge.

Focussing on the relationship between design and innovation, closely connected with strategy for innovation and quite often with business, one can mention the published works of Tom Kelley and Jonathan Littman (2001), Tim Brown (2009) and Nigel Cross (2011)[34]. With particular focus on the connection between design

33 The referenced publications are, in order of appearance:
. Simon, H. (1969). *The Sciences of the Artificial*. Cambridge: MIT Press.
. McKim, R. (1973). *Experiences in Visual Thinking*. Monterey, CA: Brooks/Cole Publishing Co.
. Lawson, B. (1980). *How Designers Think: The Design Process Demystified*. London: Architectural.

34 The referenced publications are, in order of appearance:
. Kelley, T., Littman, J. (2001). *The art of innovation*. New York: Doubleday.
. Brown, T. (2009). *Change by design*. New York: Collins Business.
. Cross, N. (2011). *Design Thinking: Understanding How Designers Think and Work*. Oxford: Berg Publishers.

and business, the work of Marty Neumeier (2008), Roger Martin (2009), and David and Tom Kelley (2013)[35] is to be noted.

Focussed on the relationship between Design Thinking and innovation, Tim Brown stated:

> "Design Thinking can identify an aspect of human behaviour and then convert it into both a customer benefit and a business value. These problems all have people at their heart.
>
> They require a human-centered, creative, iterative, and practical approach to find the best ideas and ultimate solutions. Design Thinking is just such an approach to innovation." (Brown, 2008, p. 92)

Brown also said that Design Thinking can be used as a convergence tool that is necessary to balance organisation/logic and creativity/intuition in design processes. This same author described the human-centred focus, and common human capacities and abilities in more depth in 2009:

> "(...) Design Thinking taps into capacities we all have but that are overlooked by more conventional problem-solving practices. It is not only human-centered; it is deeply human in and of itself (...) [It] relies on our ability to be intuitive, to reorganise patterns, to construct ideas that have emotional meaning as well as functionality, to express ourselves in media other than words or symbols." (Brown, 2009, p.4)

In 2011, Katheryn Best explained that, by nature, designers have more knowledge and ability, and they are better prepared to use the Design Thinking approach, methods, and tools:

> "(...) as an approach, Design Thinking can provide a way of dealing with the complexity of a particular situation, handling problems that are not clearly defined and supporting early ideas before they are fully formed (for example through communicating these ideas visually)." (Best, 2011, p. 17-18)

35 . Neumeier, M. (2008). *The designful company: how to build a culture of nonstop innovation: a whiteboard overview*. Berkeley: New Riders.
. Martin, R. (2009). *The design of business: why design thinking is the next competitive advantage*. Boston, Mass: Harvard Business School Press.
. Kelley, T. and Kelley, D. (2013). *Creative confidence*. New York: Crown Business. .

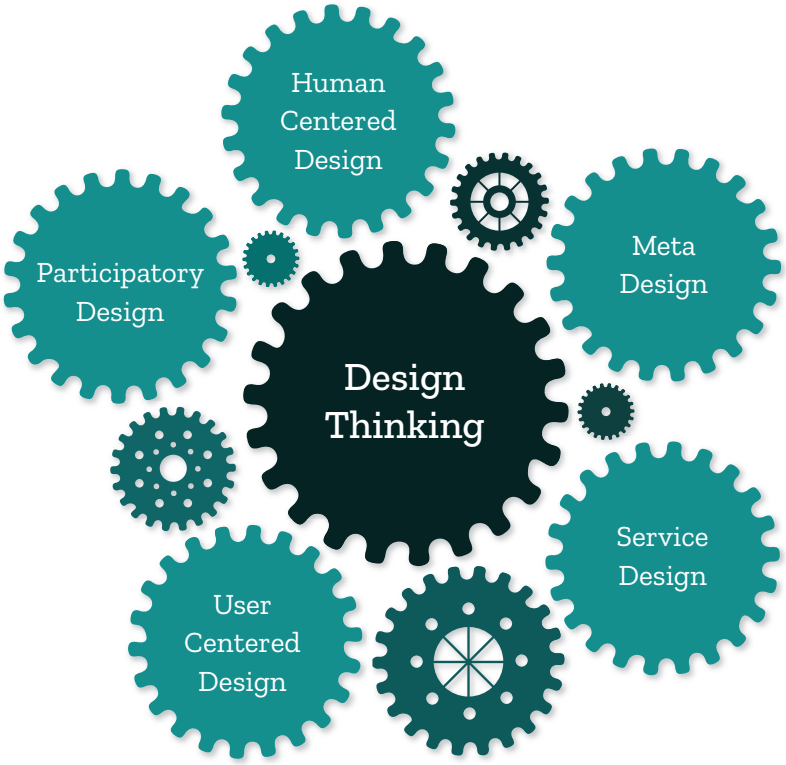


Figure 10: Design Thinking being used and linking Design specific areas and interests

With different depth levels, means, and objectives, the relationship of Design Thinking and other specific areas and interests, have been explored, from very practical to very subjective perspectives raising very different opinions.

In extreme positions one can have Thackara, focussing on ICT and the internet's influence on society, saying that Design Thinking "can reshape whole production processes, even the entire logic and structure of an industry" (Thackara, 2006, p. 18), and Mozota focussing on the convergence between design and management, presenting Design Thinking's potential to company managers: "the emerging trend toward design leadership and explains the potential of Design Thinking for analyzing the challenges faced by managers (such as, sense building, complexity, user-oriented innovation, building a socially responsible organisation, and so on). In this way, it facilitates the convergence of design and management." (Mozota, 2006, p. 53)

Some designers and design consultancies became specialised in communicating the principles of Design Thinking, either for companies and businesses with innovation concerns, or for conferences and presentations for different audiences. As an example, in 2010, in the "Workshop for Strategic Planners", Idris Mootee presented the following "10 Design Thinking Principles for Business and Strategy Innovation", presenting different facets in the same list:

> . 01 - Use creativity, sorts and clusters to organize and create problem hierarchy.
> . 02 - Use designer's sensitivity to bring customer empathy and user-centered thinking.
> . 03 - Use conceptual drawings to help discover and orient causality and relationships.
> .04 - Use building blocks to break the challenge into more manageable chunks.
> .05 - Use mantra to focus the larger organization on a common mission.
> . 06 - Use rapid prototyping to create tangible version of any futures.
> . 07 - Use storytelling to articulate customer scenarios and focus on the challenge.
> . 08 - Use design environments to fully immerse cross-functional teams in the challenge.
> . 09 - Use observational research to uncover unmet and unarticulated customer needs.
> . 10 - Use design as language to describe things that are not in our vocabulary.
> (Mootee, 2010)

This trend to simplify and create models has been commented, among others, by Nigel Cross:

> "(...) Design methodology has been predominantly occupied with the rational aspects of Design Thinking and Design Processes, and the generalization into models that have a universal character, or aim 'to scientize design' (...)" (Cross, 2001, p. 49)

Many articles and books have been written about Design Thinking methodologies and tools, by publishers from scientific and other reliable sources to mass media journals, magazines, and websites.

Design Thinking has been presented by people with diverse focusses and opinions, connected with broad themes like society, systems, others professions, organisations, start-ups, entrepreneurship, businesses, sociology, psychology, human resources, and creativity. All this complexity and divergence is common in the contemporary world, as it is in design evolution.

2.02.03 Design Process

The Design Process has been studied, for a long time and Herbert Simon was one of the first authors. The models with several shapes and versions were created or adapted for various types of activity. With different focus, the Diamond Model was developed in 2007, and presents the divergent and convergent thinking needed for the creative process (Design Council, 2007).

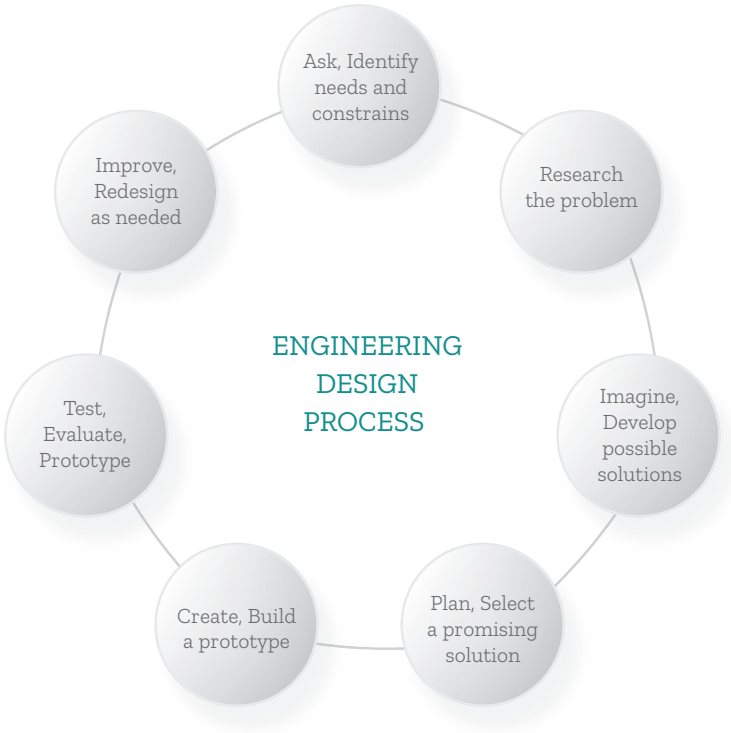
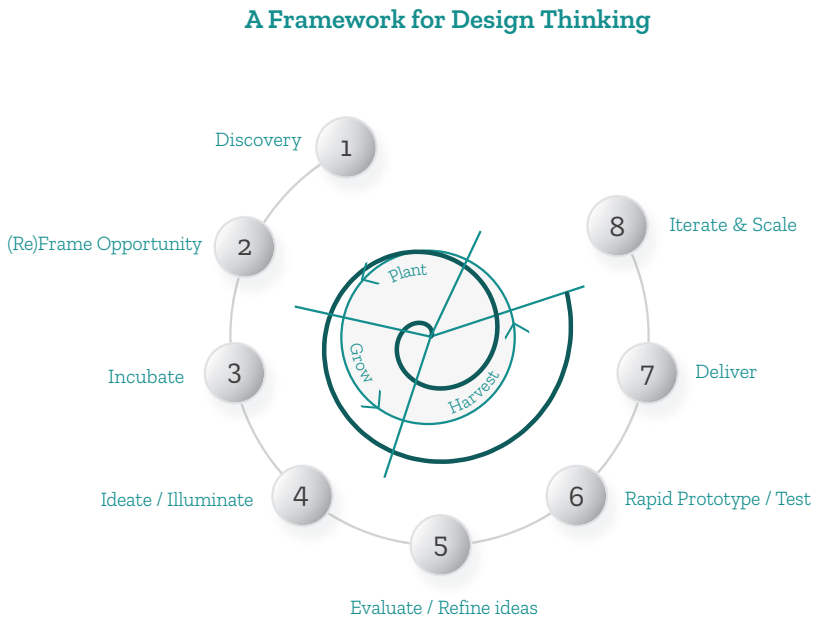


Figure 11: One example of the many adaptations of the Design Process, in the case built for students, about the Engineering Process
Source: Adapted from Teach Engineering, 2017

Taking into account the full range of specialisms, expertise, and depth, from the most basic and generic approach to the most specific and developed one, the presented Design Process has been commonly outlined as a circular scheme from the first phase (the problem) to the end (the solution).

Between the beginning and end phases, several can be included relating to research, analyses, syntheses, creativity, concepts, development, tests, market launch, etc.

All the processes are inherently iterative. Inside any phase or between phases, the evolution can be progress or regression. Return during early stages of the process is less costly than later on.



1 Discovery
Choose an affirmative, strategic topic. Gather data. Understand & empathize with unmet needs.

2 (Re)Frame Opportunity
Look for patterns & insights. Question assumptions. Frame your POV. Define your scope.

3 Incubate
Switch gears. Feed your brain with diverse stimuli. Meditate. Sleep on it.

4 Ideate / Illuminate
Experiment. Explore possibilities. Envision a desired future. Co-create in diverse team. Make your ideas visible.

5 Evaluate / Refine ideas
What is desirable, feasible, viable about your ideas? What are the constraints?

6 Rapid Prototype / Test
Think big, act small, fail fast; learn from end-users and refine.

7 Deliver
Final testing, approval and launch.

8 Iterate & Scale
Evaluate. Learn. Create. Innovate.

Figure 12: A Framework for Design Thinking
Source: Adapted from Creativity at Work, 2016

The process is generally presented as several stages in a clockwise series, which are accomplished in order. The stages are, however, not totally rigid, and the process is iterative between consecutive or non-consecutive and adjacent or non-adjacent stages (Johnsey, 1995).

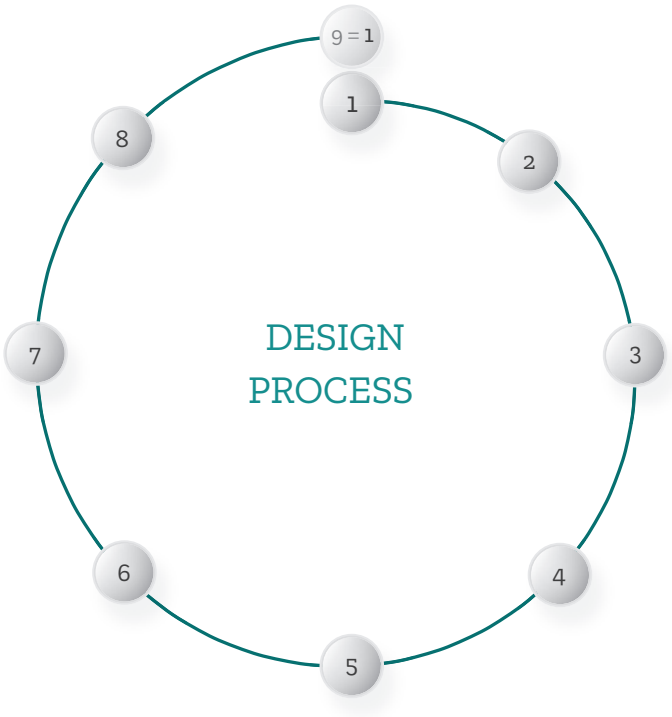


Figure 13: The Design Process used as base for the Research and the Model development. Its eight phases are:
1 – The Idea/Brief; 2 – Research; 3 – Conceptual Exploration;
4 – Concept Development; 5 – Prototyping;
6 – Design Documentation; 7 – Production Management;
8 – Internal Evaluation and Report

The normal product design process, which is the base used for the model, includes several steps. It can start with a good idea, whether internally-developed or from a client's design brief. These steps, be they from the first or the second situation, would normally be presented in a document that explains the idea, the context, the relevant knowledge, and the production or financial constraints. This brief gives the direction, the purpose, and the initial goals. It is usually not perfect in the first draft, so there is a counter-brief or a development of the brief that is adapted during this stage of the process according to the circumstances.

The next step is the research necessary to develop the ideas from the brief. This will focus on similar products, or on totally different ones but with the same kind of solution, trends, technological developments, or regulations.

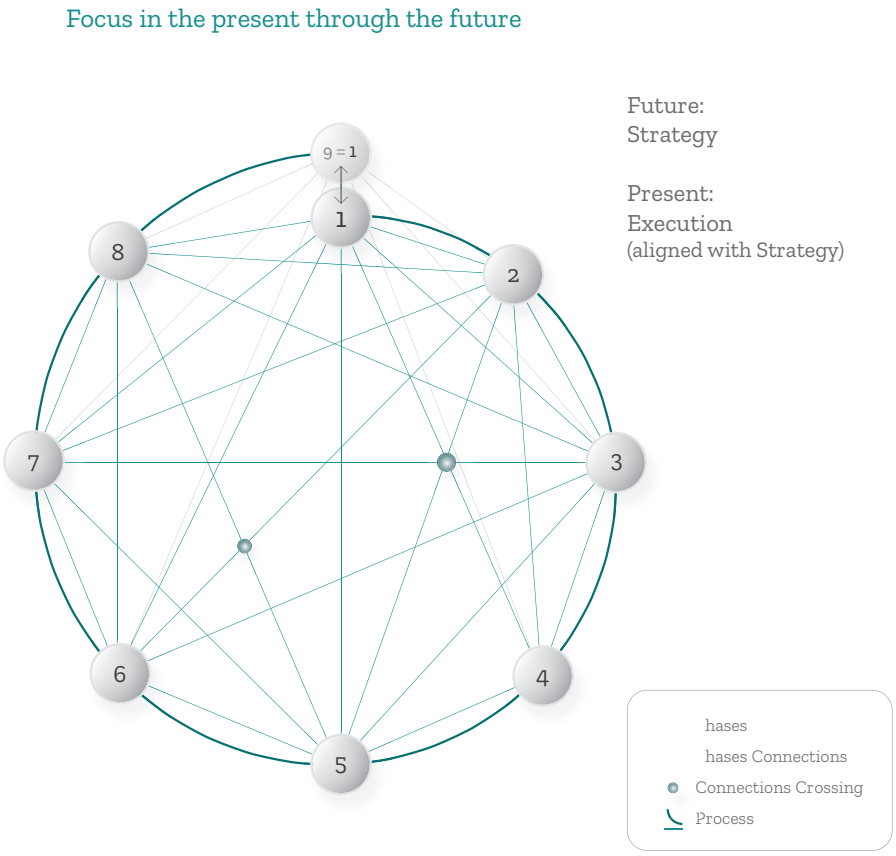


Figure 14: The Design Process used as base for the Research and the Model development: The Process, the Phases Connections and the Connections Crossings

This process usually needs to be done carefully to remove any possible pre-existing bias so that it becomes a real evaluation of current opportunities and considerations, of future opportunities, and of constraints. This stage should present the most up-to-date information about the subject.

The concept exploration is based on the previous step and the direction defined by it. It can be that a group of concepts are presented that show different directions, whether they are in the shape, colour, texture, technological developments etc. Following this concept exploration there must be a selection,

and a decision based on it, so that the most important options are presented, and the decisions are based on them.

After the concept exploration and the decision has been taken (about what to do), it is possible to work on the concept development in a deeper way. Following the defined direction, it is possible to specify the details and components, and to think about the next step of the project, whether it is refinement or production. So all the considerations have been refined, and there is a good attempt at defining all the details for the next steps to produce the service or product. One of the most important things for this step is to foresee future issues with production, cost control, users, commercialisation etc.

Prototyping, in which the product or service is tried and tested, follows the concept development. This is a proactive way to test the product and to understand if it works, how it looks, how it feels, what are the reactions, and the way how it works. It is not usually possible to make only one product prototype.

Different prototypes are built throughout the process, which can be just dimensional prototypes, or texture prototypes for example, or complete prototypes. This stage is very important to gain a better understanding of the product or service and to allow for a better development of the concept and refinement of the details.

The next step is to produce the documentation. The information can be either for production, (technical drawings with dimensions, materials, and textures) or for a service, in which case it would be sets of different types of specifications. This communication medium is very important as the basis of the relationship between the production and the developer, and it can be checked or adapted according to the situation. The next step is the production management. One of its goals is ensuring that quality is achieved, and this can be an important pivot-point for adjustments needed in documentation or in production. The management of these kinds of processes is a very important step to avoid losses. After this, it is possible to consider that delivery is fully achievable, so there follows the project or process or service delivery to the client.

The final step is the internal evaluation and report on the process. It is then possible to understand what has been done, what should have been done, what could have been done, and what will be done in the future. Both the positive and negative aspects of how things went can be evaluated to determine what could have been done differently, and what should be done in a new process. It is a learning and improvement stage, and can be used immediately after this process, in a similar process next time, or inserted in the company processes for future practice.

At this stage, it is also important to keep what can be called an 'ideas box'. It can be filled with ideas, concepts or just thoughts that were not used in this project but that can be used directly in future processes born from this one, or in any other project or even something completely different, such as another process or service that doesn't have anything to do with the oriinal one. It is a "knowledge-base" box that can potentially avoid some loss of knowledge, work, and discoveries/results.
This circular cycle usually ends at its own beginning. The focus on one of the elements of the first project sub-system, like the initial issue, process, or outcome, can create a never-ending, spiralling cycle of questions, processes, innovation, development, and design.

In some more complex processes, one of the last phases of the Design Process is the analysis and evaluation of the results and the process itself. This step helps to hold and keep secure the "loose ends" found and conceived during the first design process. They could be new questions, problems, objects, concepts, or ideas to be developed later on.

Considering the first project as a sub-system in a spiral shape, the next projects have the same form, and they focus on the same or a different subject, usually uncovered by the first. These new-born spirals can represent any element of the first process, of the relations between them, the subsystem itself, and any part of the bigger system or the system itself, as a whole.

Theoretically, this can be a never-ending, expanding process, limited only by the practicalities of the real world.

2.03 Service and System Design

> "(...) Service Designers visualize, formulate, and choreograph solutions to problems that do not necessarily exist today; they observe and interpret requirements and behavioral patterns and transform them into possible future services. This process applies explorative, generative, and evaluative design approaches, and the restructuring of existing services is as much a challenge in Service Design as the development of innovative new services (...)" (Mager, 2008, p. 355)

Much has been written about Service Design and Service Design Thinking. For example, the Interaction Design Foundation presents ten general principles of Service Design that concern the comprehensibility of the purpose of the service, the demand, and the ability to deliver. It also focusses on the customers' needs and not the company's needs, and it states that the service must be a unifiedand efficient system, which has a complete view of all contact the service presents to the user, and that these services must be creating value for the users and customers.

This system must include the exceptions, the special events, and they should be considered as normal events, just like the most ordinary ones.

The services should be prototyped before they are fully developed, designed with input from users, and in accordance with the business model of the company. In certain areas, specifically ICT, 'minimum viable service' should be used to receive feedback from users and customers, to improve the service in an iterative process until better versions are developed, always including both external and internal stakeholders.

The Interaction Design Foundation also presents the need to study the service blueprint but also the study of the "service blueprint for seeing tomorrow's services" and it is assured that "The Service Design principles ensure that this blueprint adds customer value when complete." (The Interaction Design Foundation, 2017, n.p.)

The design principles and their use are very clearly presented in a blueprint, where the distinction between front-of-stage, the interaction with the user, through a line of "invisibility", the back-stage of services where the interactions and support processes are developed. The need to identify actions, and physical evidence that the actions were completed by the users, is also presented (Schauer, 2017).

Several Service Design tools have been developed. There are four basic types of tools with origins either in social science, in business, in design, or in technology. In the organisations or institutions where these Service Design tools will be applied, it is possible to understand that those four areas are the main sources of these tools and further, that they can be specialised according to the degree of action to which they will be implemented. For example, it can be seen in the same organisation that they can be used in different stages of a process, such as in project implementation, in communication or in monitoring the system. Usually, these tools can also be divided by their users, be that the user, the operational worker, the supervisor, the committee, the technician, or the designer. So, these different areas can be used in different stages of the process, and also by different users, workers, or stakeholders of the process.

> "Design is the action of bringing something new and desired into existence - a proactive stance that resolves or dissolves problematic situations by design. It is a compound of routine, adaptive and design expertise brought to bear on complex dynamic situations." (Nelson and Stolterman, 2003, p. 127)

2.04 Design, Business, R&D, and Strategic Design

Design integration in companies has benefits and allows greater leaps and faster development, important for a small economy, strongly in need of an important change to become a stronger and healthier economy.

In Portugal, design integration in companies was identified as essential and urgent, and further design research and studies have identified it as a need in which to invest directly, namely through academic research.

It is known that the relationship business-design-academia creates benefits for countries, and Portugal is no exception. Design and designers can be strong moderators and interfaces, for instance between business and academia, but also connecting production and sales, for example. At bigger scales, design and designers have been included in multidisciplinary teams to study and find solutions for national problems and broad themes.

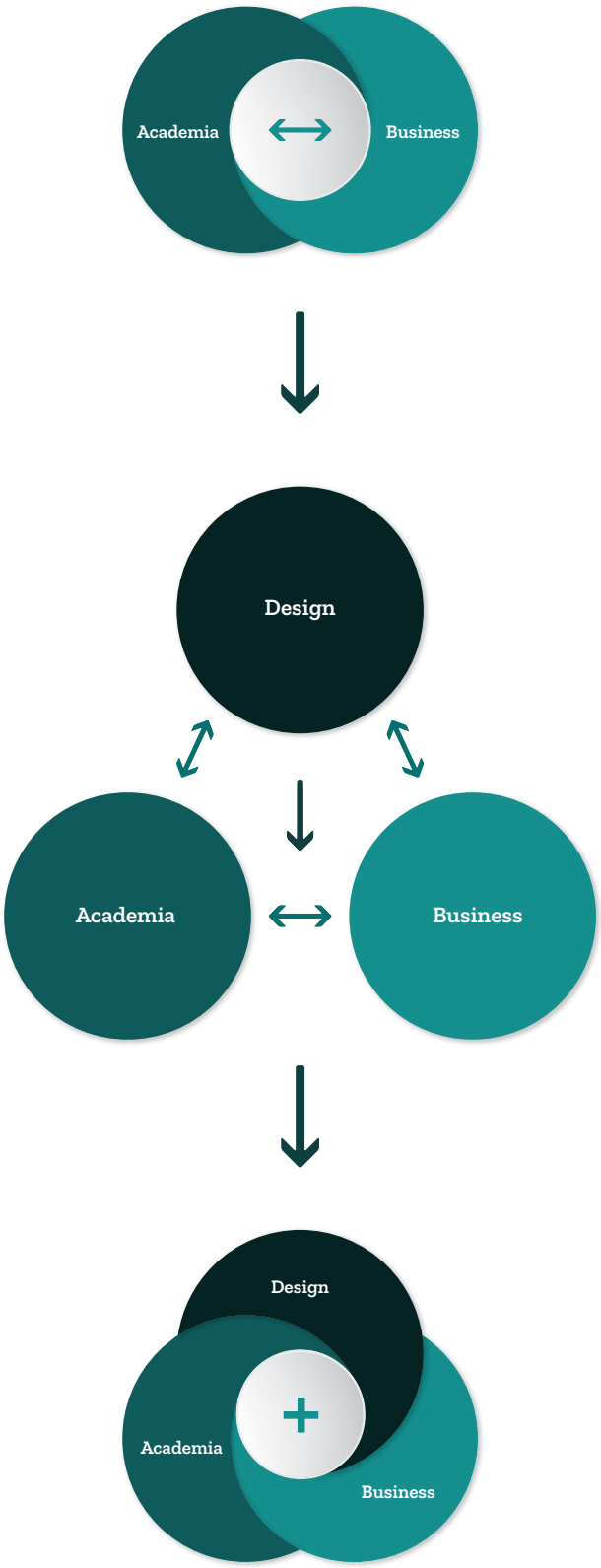


Figure 15: Design, Academia and Business:
1st - The Academia and Business Relationship is needed and Design can link them;
2nd - Design Works for both areas;
3rd - Design can be one of this triade system

The benefits of innovation have been studied, namely by Schumpeter in the last century, and his "creative destruction" has already been presented in this document (Schumpeter, 1976).

> "R&D is a type of systematic activity conducted by a company, which combines basic and applied research in an attempt to discover solutions to problems, or to create or update goods and services." (Investopedia, 2017, n.p.)

R&D and its investments are hard to relate to direct profits, but are typically much more profitable in high-technology industries than in low-tech ones.

The direct impacts are more visible in applied research (industry-oriented) than in basic research, and they can be laborious and time-consuming processes. Due to its nature, many projects are financed by the special programs for heavily R&D-based industries such as pharmaceuticals.

Innovation, R&D metrics and benefits have been studied in the past, but studies of design's benefits are more recent. The Danish Design Ladder was presented in 2003 by Kretzschmar. This Danish Design Centre tool can be considered one of the first reference models of this area, and, as is common, the model's simplicity is clear. Its evolution and several adaptations have been explored in depth and complexity, as will be shown later in this document. The Design Ladder has four main categories in which companies could be inserted. The different integration levels of design in companies are: no design, design as styling, design as process, and design as strategy.

This model can be applied in all companies, and makes it possible to categorise companies through their design use and integration, and to create initial evaluations. The following research is based on this model, especially that of Kretzschmar. Through this new model and other studies, it has been shown that the higher the levels achieved in the ladder classification, the greater is the company's performance and future promise (Danish Design Centre, National Agency for Enterprise and Housing, 2003).
At the highest level, design plays its role in strategic development, in company management, and is applied on the operational level.

At this aspirational stage, design intervention and benefits touch all of the company and its stakeholders. This simplified model is generic, and because

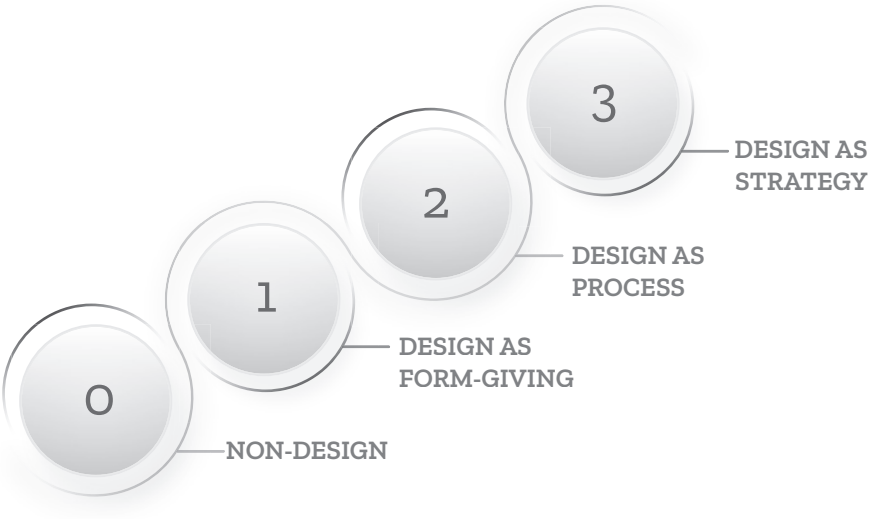


Figure 16: The Design Ladder: The four steps of design in the companies
Source: Adapted from: Danish Design Centre, 2015

3

Design as Strategy
The designer works with the company's owners/management to rethink the business concept completely or in part. Here, the key focus is on the design process in relation to the company's business visions and its desired business areas and future role in the value chain.

2

Design as Process
Design is not a result but an approach that is integrated at an early stage in the development process. The solution is driven by the problem and the users and requires the involvement of a wide variety of skills and capacities, for example, process technicians, materials technicians, marketing experts and administrative staff.

1

Design as Form-Giving
Design is viewed exclusively as the final form-giving stage, whether in relation to product development or graphic design. Many designers use the term 'styling' about this process. The task may be carried out by professional designers but s typically handled by people with other professional backgrounds.

0

Non-Design
Design is an invisible part of, e.g., product development and the task is not handled by trained designers. The solution is driven by the involved participants' ideas about good function and aesthetic. The users' perspective plays little or no role in the process.

of that is easily and broadly applied in companies. It raises the awareness of design in the company, showing the path to follow in a simplified way.

The first models adaptations can lead to misuse, misunderstandings, appropriations, adaptations to other subjects, etc. For instance, the Design Ladder by the Danish Design Centre (Danish Design Centre, National Agency for Enterprise and Housing, 2003), its adaptation into the Educational Design Ladder (Wrigley and Straker, 2005) and its adaptation to the extended version of Bryan Hoedemaeckers (2016).

Leading Business by Design is a Design Council report on a qualitative research project that investigates the strategic use of design in a sample of UK and global businesses.

The report highlights three key findings on how businesses can benefit from design:

> . Design is customer-centred - Benefit is greatest when design is intimately related to solving problems, especially customers' problems;
> . Design is most powerful when culturally embedded - It works better when it has strong support in the organisation, especially from senior management;
> . Design can add value to any organisation; design can benefit manufacturing and service-based organisations, small, medium or large." (Design Council, 2013, p.4)

Leading business by design also offers eight recommendations for how companies can maximise the impact of design:

> . don't limit the context in which design can operate;
> . use design to differentiate;
> . integrate design and branding;
> . introduce a design process;
> . trust and support your design talent;
> . embed design in your organisational culture;
> . design your work environment;
> . don't let the designer's role be a straitjacket (Design Council, 2013, p.7)

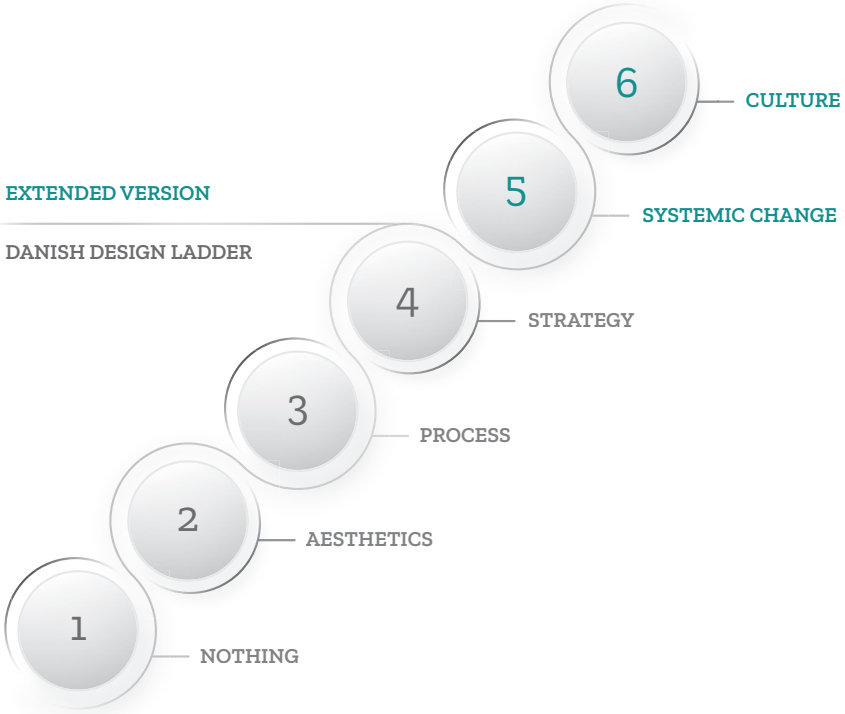


Figure 17: One example of the many adaptations of the Design Ladder
Source: Adapted from Hoedemaeckers, 2016

Already in 2007, Scherfig mentioned that design use at strategic levels has strong potential.

> "good design is created when a company is able to realise the functional, social, and economic potentials inherent in the use of design. It is particularly important for companies that are not able to compete on production costs to become aware of the huge potential of working strategically with design" (Scherfig, 2007, p. 260)

2.05 Design, SMEs, and Entrepreneurship

Design's influence on companies has been studied broadly, and design presence can be found and classified into categories. Several types of classification have been developed.

6

Stage Six: Culture

This is what we see as the pinnacle of using Design in Business. You use Design to build and harness great culture. You're shifting the mindsets of people within your organisation to align to the design mindset, people are starting to innovate, act like entrepreneurs, embrace ambiguity, listen to the voice of the customer, and lead through design.

5

Stage Five: Systemic Change

You're using design to help solve complex social issues, massive industry problems, or to streamline complex ecosystems. You're using Design to drive systemic change across numerous organisations or businesses. Government organisations are starting to do this to formulate policy within their own local or regional ecosystems. They bring disparate groups together and Design solutions that best fit that particular eco-system. They're able to drive systemic change through the collaboration with those groups.

4

Stage Four: Strategy

You use Design to inform and create your organisation's strategy. Here's a quote directly from the Danish Design Ladder website... *"The designer works with the company's owners/management to rethink the business concept completely or in part. Here, the key focus is on the design process in relation to the company's business visions and its desired business areas and future role in the value chain."* Your organisation has designers as founders, or board members, or in the c-suite. Positions of authority where they (Design) can influence investment choices.

3

Stage Three: Process

This is where you're using Design to inform your processes to create products and services, you're also likely to have adopted Design Thinking and you hold co-design sessions or workshops to inform how you actually get things done, your processes. You employ designers to do things other than styling or aesthetics. They are integral to getting your products and services out to customers through incredible experiences. Your people perform customer research, ethnography, prototype, and come up with creative ways to solve customer needs.

2

Stage Two: Aesthetics

You use Design for aesthetics, styling, or 'form-giving'. Whether through your products and services or the physical touch-points that your customers interact with. You employ designers or outsource aesthetic design work to agencies. Design makes things more beautiful. Fun.

1

Stage One: Nothing

You use Design for nothing. You don't have any formal design roles in your organisation, and you don't use design agencies. Not fun.

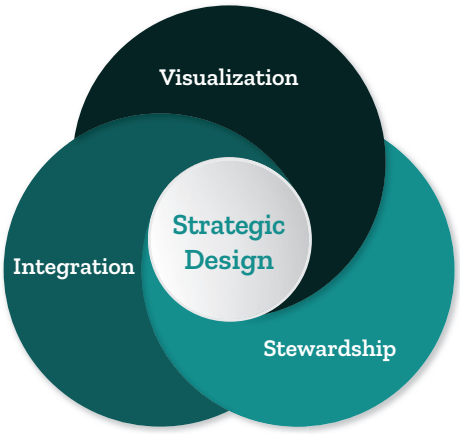


Figure 18: Strategic Designer core competencies: Visualization, Stewardship and Integration
Source: Adapted from Helsinki Design Lab, data

The Danish Design Centre divided it into four levels of design use (maturity levels) in companies: non-use, design as styling, design as process, and design as innovation.
The four levels can be identified in companies, and based on this characterisation, further developments can be defined (Danish Design Centre, 2001).

The relationship between design and companies has been studied. As an example, if in one direction management influences design, in the other direction design influences management, and the identification and classification of these relationships has been studied and defined by various authors. The management influence created different professional design areas like Design Management or Design Strategy. In the first case, the operational design activities are managed by the design manager, through design processes to align the design activities with the Design Strategy. This takes into account operational design but also the tactics to implement it to achieve the objectives of the company. As an example, it can include the company branding, product, and service development but also the selling-point definition. The Design Strategy is a defined part of the company strategy (Best, 2006; Mozota 2002).

The intervention levels in the company and its management and strategy were also developed and evaluated with regards to design and the designer.

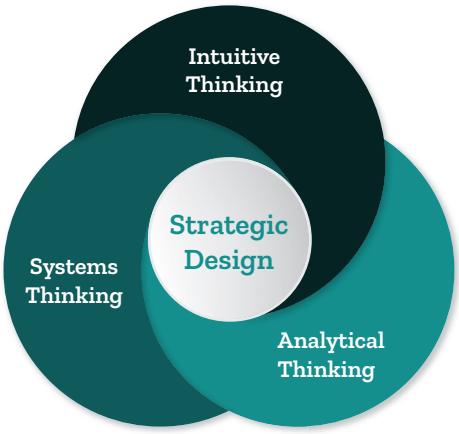


Figure 19: Strategic Design different Thinking types: Intuitive Thinking, Analytical Thinking and Systems Thinking
Source: Adapted from Martin, 2009

Design influence and integration in the company has been classified at operational, tactical, and strategic levels and new terms were then created like Strategic Design (Helsinki Design Lab, 2010). The influence can happen through design processes, tools, and methodologies, through application of the designer's skills and abilities, but also through Design Thinking.

Design and designer levels include the activities and activity levels of designers and of design in the company in relation to the company's interior levels: operational, tactical, and strategic.

Design work was used to complement other activities, and intended simply to finish the product or service for delivery as a differentiator, appealing to the subjective factors of aesthetics and emotions. With the evolution, companies started to integrate a design department (or professional) responsible specifically for the design or graphic strategy. Quantitative areas were also integrated, to develop better ways of working and measurement, also influenced by the specialisation. Design was influenced by management, but management was also influenced by design, through thinking of ways to solve questions and non-linear approaches.

Table 10: Strategic Priorities, four Perspectives

Strategic Priorities	Objectives	Measures	Targets	Initiatives
Financial	-	-	-	-
Customer	-	-	-	-
Internal Processes	-	-	-	-
Learning and Growth	-	-	-	-

Source - Adapted from Kaplan and Norton, 1992

2.06 Design Value, Indicators, and Metrics

Metrics are used to allow businesses to be sustainable, successful, and to reach profitability. However, they must also be used for future development and innovation.

Metrics are crucial for companies who want to correct the present to obtain better results. Some of them are commonly used in business, but they are important as they need to be created specifically for the businesses at a given moment.

There are primarily two types of metrics: quantitative and qualitative. The former is more internal and business-driven, the latter more externally-oriented for the user, the consumer, and their experience with the company.

From an enormous set of KPIs (Key Performance Indicators), each department can define their own. For example, finance (profit, cost, sales, expenses); customer service (acquisition, retention and churn rate, number of customers, contact volume, satisfaction levels, customer support); or human resources (employee turnover rate, employee satisfaction, knowledge gained through training, internal promotions, external hires, salary competitiveness). They can also be chosen by the service area such as Economics, Management and Accounting, Consulting and Audit, Architecture, Fine Arts and Design, Construction and Real Estate, and Marketing including Advertising and Graphic Arts.

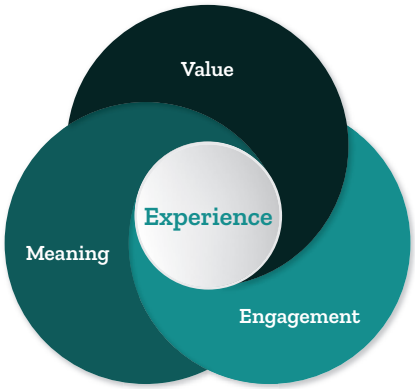


Figure 20: The Experience components of Value, Meaning and Engagement
Source: Adapted from Rodden, 2010

Becoming more used in businesses known for speed, information, and technology, the "guerrilla metrics" are fast and less accurate measurements, but they are quick to calculate and are easy to implement with simple changes, so act as a direction-setting tool.

To achieve better results using metrics, it is important to make good decisions from their creation onwards. They must be strategically defined, and they must be crucial to the achievement of the company goal, well-defined and quantifiable, applicable, and easy to understand and share. They must allow simple changes to improve the results, and they should be fast and transparent to achieve.

There is some tradition in measuring supply chain performance, mainly in three areas: inventory, working capital, and time; but also transportation.

The tendency is to measure and control, allowing a view which is holistic and of future scenarios, and of the company, business, and context.

If, on the one hand, there is a tendency to focus on soft metrics (resilience, trust, relationships, collaboration, teamwork, multidisciplinary teams; and also communication, visibility, and transparency) and on individuals (internal and external partners and stakeholders, but also customers, consumers, and users), on the other hand, hard metrics are also increasing in measurement and accuracy.

The use of new ICT increased other concerns like security issues and localisation systems, and exposed new issues in risk management.

Control and up-dated management are desirable to optimise, simplify, reduce waste, and increase efficiency.

Through these, it is possible to adapt quickly, have lean management, innovate, and manage systematic growth, complexity, and regulations.

For micro and SMEs it is important to understand and pursue the evaluation of the company and the provided services to the user and the consumer. When setting user goals, it is important to define what are the signals that users give, from which can be inferred users' opinions, be that in metrics or relationships for the defined goals.

In the new services created by ICT companies, five metrics are frequently used: happiness, engagement, adoption, retention, and the task-based relationship of the user with the company.

In the Queensland University of Technology, some experiences have been made in sales departments of Production or Manufacturing Companies.

They tried to introduce change through design integration, not only in the products but also in the processes. For this research, the internal cultural stepping stones of the companies were defined in 3 levels: time (focus on small and long-term outcomes), value creation (direct and indirect), and achieved benefits (tangible and intangible). From the final report from the AHRC of the Value of Design in Innovation,

> "The Role of Design in Innovation was (...) funded research project (...). The principal aim of this research was to identify the roles design can play in innovation, the contributions of those roles to innovation, and the conditions under which these contributions actually happen (...)" (Hernandez, Cooper, Tether and Murphy, 2017, p. 2)

In summary, the findings indicate that the great majority of the companies, and especially those that use design as process and as strategy, realise significant benefits from engaging in design. There are several indications that these

companies outperform those that do not engage in design, or that limit their engagement in design to styling. But even among this latter group, a large proportion report the benefits of engaging in design, benefits that stretch beyond those associated with a narrow use of design as styling.

In production and manufacturing companies, some experiences have been tried in which were defined three different levels of internal cultural stepping stones:

. time (focus on short- and long-term outcomes);
. value (direct and indirect values);
. benefit (tangible and intangible benefits).

Design has been used in products, but also in companies' processes.

It is also to be mentioned that Mozota has also developed a levels approach to design, focussing on its value. Design as Value was presented as:

> . Design as difference, design management as perception & brand
> . Design as performance, design management as "a" as innovation process
> . Design as vision, beyond 'advanced design' management
> . 'Good design is good business', the historic dm[36] economic model." (Mozota, 2006, p.45)

2.07 Design Benefits Evaluation

Ultimately, design a metrics system that connects with both the heads and the hearts of decision-makers, and contributes to design having a seat at the strategy table (Mrazek, 2010).

Design value and design value creation are important engines for evolution in the presented areas. Studies about design's benefits for companies have been developed in several countries, in national efforts to evaluate and develop the value of design in companies, therefore, the value of design in countries.

The positive design impacts have been studied, namely by De.:SID research project. This research was finished in 2011, and analysed the impacts of

36 dm - Design Management

design on companies in the manufacturing industry. Some central goals were the identification of the "drivers", "enablers", and "results" of design between the years 2003 and 2006, and analyse the impacts of design in those companies.

Table 11: HEART framework, Measuring the User Experience on a Large Scale

HEART	Goals	Signals	Metrics
Happiness	-	-	-
Engagement	-	-	-
Adoption	-	-	-
Retention	-	-	-
Task-based	-	-	-

Source: Adapted from Rodden *et al.*, 2010

From the Manufacturing Industry to the ICTs (Information and Communication Technologies), the other side of the spectrum, design metrics were also developed to evaluate the design impacts (e.g. by the users). From Google, and referred by Martian (2017), the Heart user experience is a framework to evaluate the user experience developed by Rodden in 2010 presented in the next table. In 2009, Wroblewski, have explored the user interfaces types of metrics, presenting them in a simple matrix (Martin, 2017), presented in the next table.

Table 12: Metric Types for User Interfaces

Type of Metric	Examples
Quantitative Metrics	Market share
	Audience growth
	Engagement
Qualitative Metrics	User Studies
	Customer Satisfaction
	Market Research
Guerrilla Metrics	Novel Measurement
	Smart Estimates
	Sampling

Source: Adapted from Wroblewski, 2009

2.08 Brief Perspective of Design in Portugal

Design in Portugal

However, between the theoretical and the pragmatic world there is a big gap: many companies' managers and owners do not have knowledge about design impacts, either at the most basic levels or at higher ones. Many countries have this same problem, even though design is known as a strategic pillar of national investment policy. In several countries, investment in design promotion, design integration programs, and design tools has been developed. The United Kingdom is one example, and through the strong investment in the Design Council and its studies and activities, design knowledge, design influence, and design support to companies has increased consistently over time in a self-sustaining manner.

Several international rankings were developed from Korea to European Countries, from Brazil to Australia.

In Portugal, the Centro Português de Design (CPD) was created in 1985; however, it was forced to close in 2013. CPD was the national institution responsible for design, and the promotion of Portuguese design, inside and outside the country. It produced generic population information, company support, designer support, several studies about design in Portugal, and external promotion of Portuguese design and industries/production.

Portugal has a non-cooperative character, and designers are a professional class that embody that characteristic very deeply.

There are two professional associations[37] that cannot unite the professionals, regulating the profession, the specialities, the processes, activities, and payments like salaries, fees, and any kind of remuneration.

Arts education has positive impacts on the, learning environment, has distinct benefits for health and socio-cultural wellbeing, "enhances overall academic skills, reduces school disaffection and promotes positive cognitive transfer." (Bamford, 2006, p. 71)

37 The two Associations are the National Association of Designers (Associação Nacional de Designers) and APD Portuguese Association of Designers (Associação Portuguesa de Designers).

2.09 Sustainability and Sustainable Development

Efforts in sustainability have developed from a uniquely environmental concern to a more global and holistic approach (Cuelo, 1997).

Sustainability has grown from a very environmental and natural focus to a more holistic approach considering the differently-sized systems and the relationships among them.

The "17 Sustainable Development Goals and 169 targets - Agenda 2030 - UN Sustainable Development Goals" are:

Goal 1. End poverty in all its forms everywhere

Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture

Goal 3. Ensure healthy lives and promote well-being for all at all ages

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Goal 5. Achieve gender equality and empower all women and girls

Goal 6. Ensure availability and sustainable management of water and sanitation for all

Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all

Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Goal 10. Reduce inequality within and among countries

Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable

Goal 12. Ensure sustainable consumption and production patterns

Goal 13. Take urgent action to combat climate change and its impacts*

Goal 14. Conserve and sustainably use the oceans, seas and marine resources for Sustainable Development

Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Goal 16. Promote peaceful and inclusive societies for Sustainable Development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels

Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development." (UN, 2015, p.14)

Figure 21: The Sustainability Triple Bottom Line: Planet, People, and Profit
Source: Adapted from Elkingtonin, 1994

The European Union-created Horizon 2020 program, is a "strategy and seeks to respond to today's major societal challenges" and "promote the search for solutions to some of the main obstacles faced by European citizens in today's society (demographic problems, social and labor instability (...) stimulating the multidisciplinary collaboration between the various scientific areas, namely strengthening the collaboration with the Social and Human Sciences." (European Commission, 2010, p.183)

Through incentives for innovation, mobility, and investments in physical capital and human resources, it aims to structure the sustainable development of productivity and the growing potential of the Portuguese economy. The collaborative support is mostly for:

> • Collaborative projects
>
> Supporting innovation and collaborative research, involving universities and companies (including SMEs) in order to achieve common objectives and share synergies in specific research areas.
>
> • Future and emerging technologies
>
> Cross-cutting projects in science and engineering, aimed at laying the foundations for new technologies (...) Horizon 2020 is the financial instrument implementing the Innovation Union, Europe 2020 flag-ship initiative aimed at securing Europe's global competitiveness. Seen as a means to drive economic growth and create jobs (...)"
>
> (European Commission, 2010, n.p.)

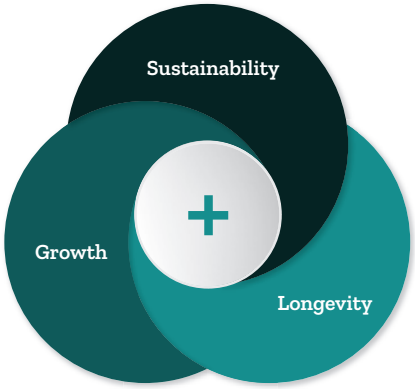


Figure 22: The companies Sustainability, Growth and Longevity as part of the Sustainable Development Goals pursuit

2.10 Design, Innovation, and R&D

The relationship between design, academia, innovation, and R&D is an important issue. Design, innovation, and R&D, and their investments and impacts, have some similar characteristics:

. investments give better results if they impact the companies as a whole (for example, in a process or procedure);
. the benefits are hard to isolate and evaluate;
. changes to small or special issues can impact the whole through time;
. the qualitative benefits are hard to measure, and therefore to communicate and present.

The three types are not easy to distinguish, and they can have a push/pull relationship. Verganti studied 'Design-driven Innovation', and Tim Brown included design (Design Thinking) into innovation strategy processes.

Through change integration in the company as a whole, one of the major needs and results is cultural change at all decision-levels and in all internal sectors.

> "Design-driven innovation has become increasing recognised and supported by a growing number of countries (e.g. Australia, Belgium, Czech Republic, Denmark, Estonia, Finland, Hong Kong, Korea, New Zealand, Norway, Sweden, UK) and more recently the European Commission as a key enabler of international business success and as a vital source of competitive advantage." (Lawlor, 2015, p.11)

In 2015, Bucolo and Matthews, in Australia, showed how Design Led Innovation (DLI) is an important asset for SMEs and thus for the country.

2.10.01 Change, Innovation, and Competitive Culture

Cultural and social changes are very hard and time-consuming to bring about. A change of mentality is a long and expensive method that needs to be based on strong resolve and discipline, usually applied with a great effort.

Change processes in companies are no exception. In the company, it is a very important step for change that it is desired at the highest decision-making levels. It is important to highlight that the higher levels should always be updated and willing to evolve, and therefore more open to change. Engaging stakeholders is also a crucial step for change processes and implementation.

The most studied cases, companies, and businesses are no exception at larger sizes and scales. These subjects can invest resources that cannot be obtained with younger or smaller companies. However, one of the side effects of these studies focusses on "the best side of the story", which in reality only means a small portion of the situation. The communication and advertising of these cases can have the opposite effect. The broader public takes it for granted and as the most common situation. Another side-effect is that there is no direct relationship between the situation of larger and older companies and younger, smaller ones with different areas of activity and geography. Transposing knowledge from one to another can be a big mistake. However, some similarities can be easily identified, either at the company's inception, such as the vision, or in entrepreneurial skills such as resilience, which are imperative in today's business environment. The culture of the company must be directly connected with the visions, values, and core of the company, and they must be shared accordingly.

From various, diverse studies, it is possible to summarise that the processes related with change (innovation, R&D, design or others) can create better results if they are early in the processes, giving a higher ROI. The company's culture must be defined at the core of the company and strategically implemented.
According to Barney in 2006, the competitive company's culture is defined by three main issues: it adds financial value to the company; it is unique; and it is difficult to imitate, which are compatible with Dennison and Mishra's statement in 1995 that effective culture is defined by four organisational traits:

involvement, consistency, adaptability, and mission, and congruent with the four items required for the 'Innovative Culture' defined by Kenny and Reedy in 2006: the company management is not risk-averse; participation is encouraged; creativity is stimulated; and the responsibility for innovation is shared.

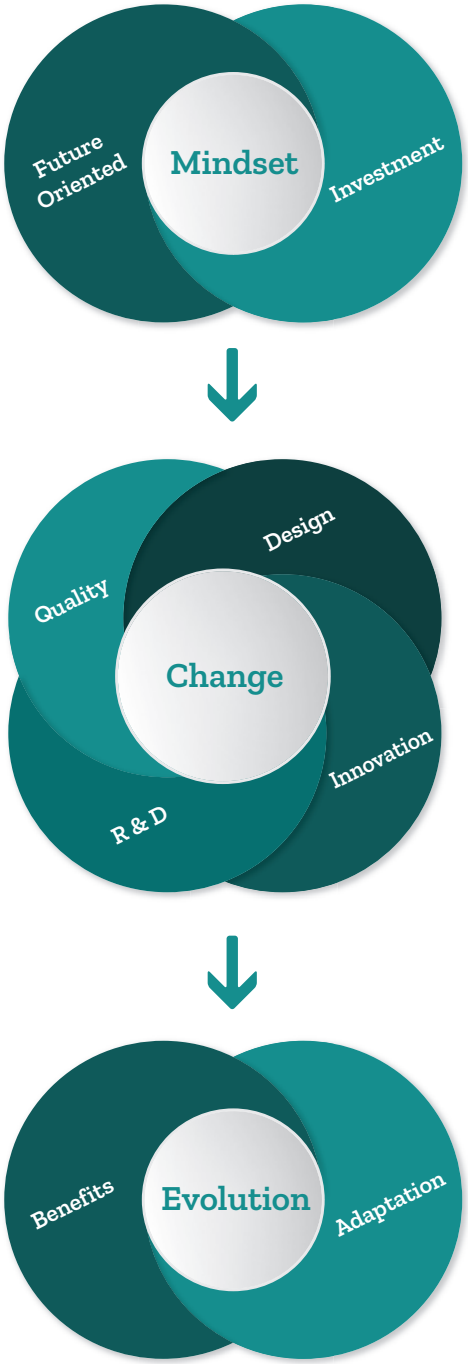


Figure 23: Progress Process: from Mind-set and Change to Evolution

Chapter Summary

Across Europe, the inter-related political, economic, social, and cultural backgrounds have similarities for entrepreneurship and business, and Portugal is no exception.

Other countries and regions of the world have a higher dynamism, but their contextual systems are distinct. Applied models and theories work pretty well in specific places, but they cannot be imported and used directly in other situations. The countries' specifics need to be known and guaranteed.

In general, investments in design by micro and SMEs are small, related to sporadic needs and considered necessary costs. Mostly connected with the communication area, these investments happen in the launch stages of the companies and their products. Minor use of specific areas of design can occur related to the companies' activities and details. Design is not integrated into the companies, into their development processes, management, or strategies.

The general design literacy is low. Several assets and paradigms relating to design and companies exist, but they are not known by the general population, business owners, or entrepreneurs. The ones who know, even if they understand the importance of design for the present and future of their companies, cannot invest due to their lack of financial resources.
At the present time, several of the design paradigms are clear and irrefutable:

a) Design is a strategy for innovation, namely through Design Thinking.

b) Design can influence the whole companies´ value chain and business model:

. Design increases companies' value creation;
. Design can reach and impact all decision levels of companies;
. Design gives better results if integrated into the highest decision levels, in a top-down direction, namely through Strategic Design.

c) Design gives more structure and quality to product-services and services, namely through Service Design.

d) Design can have widespread effects from the nano to the macro scales:

. Design has a holistic ability that can be used in different ecosystems, in particular through System Design.

e) Investments in design create genuine value (proven by international, continuous and statistical studies):

. Investments in design increase profit and raise economic value;

. Design has qualitative benefits.

f) The evolution process is quite often made in implicit cycles, unconsciously used by the unaware individuals:

. The iterative Design Process has adaptable stages and incorporates the swing between the divergent and convergent phases;

. The Design Process can contain other smaller Design Processes during its loop, and can be combined with several developmental processes;

. Awareness and conscious use of the Design Process allows visualisation of cause-and-effect relationships. Based on these, simulation, diagnosis, prediction, and prognosis can be contemplated;

. Its use foments future conscious and oriented actions, and anticipates, avoids and prevents mistakes, allowing the counteraction of future consequences.

g) Design can be very solution-based, but a focus on the user is a *sine qua non* condition for a successful User-Centred Design project.

h) Careful communication, comprehensive content, and straightforward presentation of complex information are essential for dissemination and for understanding by different individuals. It is imperative to include Design for All and Inclusive Design principles in design projects for any market.

i) Wide-ranging research and extensive potential application must also include the Universal Design principles.

This chapter was based on the understanding, triangulation, and reflection on the mentioned SMEs needs, the specific paradigmatic knowledge considered,

and theoretical developments in design and other intersecting areas. The theory exists, was developed around the world; however, even when the related fields were developed together or side-by-side, the obtained knowledge did not reach company owners. Consequently, it has not been applied, and the potential benefits have not been collected. Most of the errors, mistakes, and difficulties of micro and SMEs have been identified, but they persist.

The innovation bridge that allows the application of knowledge to create real value has not been crossed. Design is not being used in all its extents to cross the wide frontier between companies and contexts and to apply theory into practice. Its holistic quality has not been used to manage fragmented knowledge to design for real-world implementation, thus affecting systematically the community and the global system.

Some significant issues emerged in this second chapter, namely those concerning business and design knowledge, and the typical problems of SMEs. A particular subject identified was the lack and misuse of business and design knowledge, and their crucial insights to run a business and ensure its continuous improvement. Later on, they were used as directives for the model design that should:

. provide an understanding of SMEs' common stages in life-cycle, problems, and innovation gains;
. foster knowledge of design's abilities and benefits to companies;
. stimulate design use by decision-makers and their companies;
. encourage community associations and others to introduce this theme to their associates and to promote their training and support it;
. be an illustration for higher strata to mobilise and incentivise education and training in, and to stimulate companies' investments, integration and use of design.

The research thesis and the Athena Model are the primary results of the research to encourage change and improvement in SMEs' training and use of business and design knowledge for their Sustainable Growth and Longevity.

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3rd Chapter
Questionnaires and Cases

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The Survey by Inquiry and the Case Study

3.01 Introduction

After the literature review, and following the Methodology, real Portuguese companies were studied using Questionnaire and Case Study. The first tool was used for existing service SMEs, and the case study was performed in newly established service companies.

The first group was next filtered according to four specific characteristics, and then studied in more depth. The second group, with public data and easy access, was already pre-selected by the label "success cases". Its refinement by the researcher led to a smaller group of 50 companies.

There is a lot of information about the questionnaire creation and development, but is to emphasize the Young (1961), Miller & William (1964), and Kerlinger (1973) reference books[38].

The questionnaire was developed in order to obtain the best answers about Portuguese service SMEs that excel in Sustainable Growth and Longevity. Questions on classification, sectors, and the like were developed using the terminology and classifications defined by the following institutions:

. International and European institutions (e.g.: UN, OECD, EU), mostly concerned with global issues and their evolution, either through planetary sustainability or countries' growth and longevity;

38 The referenced publications are, in order of appearance:
. Young, P. (1961) *Scientific Social Surveys and Research.* New York: Prentice-Hall, Inc.
. Miller, D., William, H. (1964). *Form: Industrial Sociology. Work in Organizational Life.* 2nd ed. Bussum: Harper and Row Europe.
. Kerlinger, F. (1973). *Foundations of Behavioral Research.* 2nd ed. Holt, Rinehart and Winston.

. Entrepreneurship and start-up oriented institutions, mostly concerning their own directives, experience and counselling for new businesses and new companies (e.g.: ANJE, StartUp Lisbon, Beta-i);
. National data on the macro-economy, micro-economy, and enterprises (INE, PORDATA, BP, AICEP);
. Other studies and similar reports or detailed studies, either Portuguese or from other countries (e.g.: De.:SID, Design Council studies, and academic research).

3.02 Questionnaire Development

A search of the available online questionnaire tools was carried out. Some of the most important concerns regarded availability of facilities like structure, answer type and quantity, distribution facilities, number of results, initial results, and alternative delivery options.

The selected online software was Google Forms, also used by other researchers previously. The required characteristics and potential were again verified, and from them three different types of questions were selected (single-answer, multiple-answer, and table-questions, see Annex 05[39]). The table-questions were the hardest to build due to the double-entry characteristic. However, these questions were also the ones that gave more complete results and data.

The questionnaire was circulated to certain digital networks and groups, selected by the researcher and peers, targeting a specific group of respondents and companies: a small but representative group that would give valuable and reliable inputs. The results were received in April 2016.

The questionnaire was developed to obtain the most accurate data about three topics: design, the companies, and the respondents.

The questionnaire construction and question development were complex tasks. Initially, brainstorming was used as a problem-solving tool for the question

39 Annex 05 - Questionnaire - Construction - Type & Options: Questions + Answers.

construction and ordering. These results were then explored, as can be seen in Annex 04[40] and Annex 05, and an intermediate version of the questionnaire was built before reaching the final version (Annex 06[41]). This research addresses qualitative issues, so quantitative data was not requested (e.g. financial data).

Figure 24: First page of the launched on-line questionnaire

The final version of the questionnaire had 40 questions organised into three main topics and by type of question, as can be seen in Annex 02 (Portuguese version) and in Annex 03 (English translation)[42].

. Topic A | The respondent and some of their knowledge;

. Topic B | Design in the company;

. Topic C | Data from the company and the company's beginning.

40 Annex 04 - Questionnaire - Construction - Interrelations: Questions + Answers.

41 Annex 06 - Questionnaire - Trial Version (pt).

42 Annex 02 - Questionnaire - Full Questionnaire - All Options (pt); Annex 03 - Questionnaire - Full Questionnaire - All Options (eng).

The presentation order of the questions and the way they were written followed the main topic structure, but some of them were strategically ordered to achieve a "double-check" of specific subjects or to aid their identification and highlight their importance (Annex 04, Annex 05 and 1st page of Annex 23), for example, the influence levels in questions A.06.B, B.02 and B.07 (Annex 01[43] , Annex 02 and Annex 03).

Simultaneously, the construction and classification were designed using or adapting question types and answers possibilities from trustworthy institutions and studies previously referred to.

Some questions were adapted from other studies. In different action fields, classifications and size orders were adapted from trustworthy institutions, namely Marktest (question A.06), ANJE (question C.06), and the DGEEC (Education Ministry,) and ANQEP[44] (questions A.03, A.04 and A.05). Institutions with economic studies and data were also examined for the formulation of certain questions, such as question C.16, based on the countries to which Portugal exports the most.

This questionnaire gave important information about the respondents' companies, the respondents themselves, and the importance of design for the respondents and for their companies.

The questionnaire construction was a complex task. The myriad of interesting things to understand and the holistic view of them were hard to reduce. The first versions were initially tested by peers and then improved to its final version. The questionnaire was presented in three topics (A, B, and C) regarding the importance of design in the company; the company; and the respondent.

The questionnaire was written in Portuguese and distributed mainly to national networks, because it was anticipated that respondents would be Portuguese-speaking and with data related to Portugal. The questionnaire development followed a studied structure and several rules in order to obtain the most accurate data.

43 Annex 01 - Questionnaire - Full Questionnaire - Online Original (pt)

44 DGEEC - Directorate-General for Education and Science Statistics;
ANQEP - National Agency for Qualification and Vocational Education.

Google Forms was the software used after analysing the on-line questionnaire market and the available construction options. Google Forms' graphic design abilities, number of questions and answers, distribution quantity, features for delivery of results, and questions types were some of the possibilities and details that were part of the reasons for its selection.

The Construction of the Questionnaire

The requirements of the research needs and the available technical options of Google Forms were the two main contributors to the questionnaire's final design. The question types used were the single-answer questions, multiple-answer questions, and table-questions (presented in Annex 05).

The table-questions were harder to construct and to analyse, as they had horizontal options (organised in rows) and vertical options (organised in columns). This double-entry characteristic allowed a more complete and complex collection of data.

Nonetheless, and even though the questionnaire had been tested several times before launch, after the collection of data it was realised that a few questions allowed ambiguous results. In those cases, during the data study, the straight answers were interpreted in order to correct for the misunderstandings, and the results were reformulated as they are presented in Findings of the GAS analysis.

During the questionnaire's development, and according to the strong interest in a wide range of design subjects, several other questions were prepared and tested as can be seen in Annex 06. Some of the other questions' subjects were:

. The entrepreneur's education, and university degrees, skills, and abilities they had obtained and developed;
. The evolution of design work payments, the sectoral use of design, and the designer's special skills, personal characteristics, and values of importance were also focussed on;
. Design service evaluation (regarding a real experience), design integration in the company, and design "maturity" levels were also targeted;
. The companies´ opinion on Sustainable Growth and Longevity, for the 2014-2015 period, was also a suggested but not selected issue for the questionnaire.

However, adhering to the real objective of this research tool, a more focussed question set was needed, and some design research tools were used to develop it. This questionnaire was sent to a very specific target group who could make effective contributions to this research.

The invitation to contribute to this study was sent to a few groups of which the researcher is a member. The Google questionnaire link was distributed, and the introduction was very selective for the respondents' and their company's characteristics.

The range of respondents was characterised by some distinctive traits in educational degree and professional practice, suggesting a high degree of reliable answers.

The questionnaire was anonymous, and all the respondents were generous volunteers committed to answering it. Even though it is noticeable that answering to the later questions is less accurate, most of the respondents took this task to the end, and it can be considered that a good success rate was achieved.

The question types were all presented in Annex 05 and combined information from different sources (listed in the Bibliographic References) in Annex 04. In the first presentation of the questions in Annex 10[45] , the question type was always mentioned to facilitate the reading.

The questionnaires were pre-tested, spread and the obtained data was in a way that verified and guarantees the results reliability and validity.

Presentation of used symbols and abbreviations

It was necessary to create a set of rules, symbols, and abbreviations, including:

. the use of " " refers to quotations of the questionnaire, either the questions or the answers;

. the use of [ ] refers to supplementary detail;

. all the fraction or percentage values were rounded to the unit value.

45 Annex 10 - Questionnaire - Results - GEA (50 Companies)

The following option is used in the table as a reading example:

Table 13: Questionnaire interpretation table, reading example

Reference Number	Options Description	Numeric Value	Share
B.05.01	Design	38	27%

The abbreviations used (by order of text appearance) are:

. GAA, Initial Answer Group, 52 responses;

. GEA, Eligible Answer Group, 50 responses;

. GAF, First Selection Group, 28 companies;

. GAS, Special Selection Group, 19 companies;

. FFE, Training and/or Specific Training (*Formação ou Formação Específica*);

. PP, Professional Practice (*Prática Profissional*);

. FPP, Training and Professional Practice (*Formação e Prática Profissional*).

3.02.01 First Results

Introduction

The questionnaire received 52 answers (GAA, Initial Questionnaire Group) and 50 of them were considered to meet the required characteristics of eligibility. The rejected answers were the first and the 45th.
From now on, this 50 questionnaires group is named GEA (Eligible Questionnaire Group).

The results are presented below respecting the order of the questions on the questionnaire. In the auxiliary graphics, the followed order is the same. By rule in the text, the units and percentage values were presented in decreasing order.

In the presentation of results and findings, if the option was not selected by the respondents, it was decided not to present it in the correspondent graphic. The non-selected options may be presented in the findings text, but it was not compulsory.

It is recommended that the original questions and answering options are consulted (Annex 02 in Portuguese, and Annex 03, English version[46]) , and the corresponding group annexes, from Annex 07 to Annex 15[47].

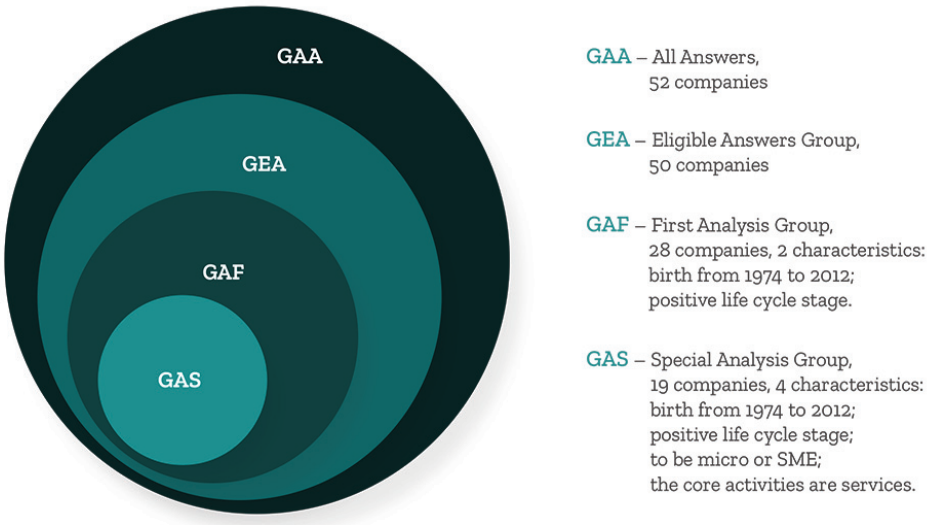

Figure 25: The initial group of filled questionnaires and the definition of three different groups

Several annexes concern the three different groups and their data, results, analysis, and findings, as presented in the following list:

. GEA: Annex 07 (data) and Annex 10 (results);

. GAF: Annex 08 (data) and Annex 11 (results);

. GAS: Annex 09 (data), Annex 12 (results), Annex 13 (analysis), and Annex 15 (findings);

. GAF and GAS: Annex 14 (findings).

46 Annex 02 - Questionnaire - Full Questionnaire - All Options (pt); Annex 03 - Questionnaire - Full Questionnaire - All Options (eng).

47 Annex 07 - Questionnaire - Answers - GEA (50 Companies); Annex 08 - Questionnaire - Answers - GAF (28 Companies); Annex 09 - Questionnaire - Answers - GAS (19 Companies); Annex 10 - Questionnaire - Results - GEA (50 Companies); Annex 11 - Questionnaire - Results - GAF (28 Companies); Annex 12 - Questionnaire - Results - GAS (19 Companies), Working Document; Annex 13 - Questionnaire - Results Analysis - GAS (19 Companies); Annex 14 - Questionnaire - Results Analysis - Comparative GAF & GAS (28 & 19 Companies); Annex 15 - Questionnaire - Findings - GAS (19 Companies).

3.02.02 The GEA Group Data and Findings[48]

The Respondents

Most of the respondents (76%) were in their 30s or 40s, and both genders were represented quite evenly. From the respondents, 96% have at least a university degree and younger people have, in general, higher academic degrees.

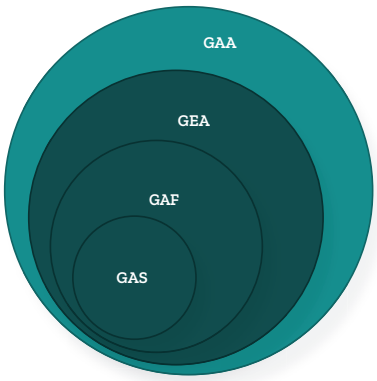

Figure 26: GEA, Eligible Answers Group

From the 8 areas selected, 62% are currently connected with two areas:

. Architecture, Fine Arts, and Design;

. Economics, Management, and Accounting.

Many of the respondents have invested highly in training (83%), and they typically show multi-area learning.

Half of them are in high board positions (52%); even from question A.06.B it is possible to see that most of them undertake functions in the three operational levels.

There is no big discrepancy between those that joined the company initially, 42%, and those that joined later on, 58%.

The knowledge of the three terminology groups was similar.

48 In this chapter, the percentages refer to the 50-company set while in Annex 10, the percentages are drawn from the respondents that provided truly valid answers.

The investments are similar in the four areas presented ("Design", "Innovation", "Research and Development", and "Quality") and most of the investments are performed in the "Growth" and "Development of the idea" life-cycle stages. These four areas are similar in increasing benefits for the achievement of SGL, and the benefits are mainly "Qualitative" (49%) and "Quantitative and Qualitative" (46%).

Design and Designers

From the many available options, 82% of the respondents relate design benefits with "Product and/or Service" and "Innovation", 66% with "Customer/Consumer/User", and the majority, at 98%, think that design has positive impacts on companies.

Designer's intervention levels are similar between strategic (41%) and operational levels (38%).

From the presented design services, 76% have already been developed in the companies, and the most identified, with values between 82% and 90%, were "Communication", "Concept", "Brand Building", and "Design and Multimedia". However, these services were performed equally by "designers" or by "designers and non-designers", with 40% for each.

From the respondents, the designer's intervention levels are quite even in the three stages and their essential characteristics (with values between 60% and 76%) are creativity, communication, business model understanding, competence, and working in multidisciplinary groups.

Most of the services are performed by external designers (54%), and by one professional (58%); regarding the implementation of design services in the future of the company, the results are even between the "Yes" and "No" Answers.

Financial factors are identified by 56% of the respondents as the biggest barriers for investment in design.

The Companies

Of these companies, 42% were created between 1974 and 1999, 40% are micro-sized companies, and 18% are SMEs, giving a total of 58%. From the many available options for the activity sectors, 50% selected the option "other services" and 40% of the companies have "Consulting and Audit", "Trade", and "Marketing and Advertising" as core activities. From the 50 companies, 56% are in "Growth" and "Maturity" life-cycle stages, and 84% are service companies (3rd and 4th economic sectors.).

Of the companies, 24% have contacted "Associations of the business' area, region or similar" and 20% "Business Associations or similar", and 28% and 22% were performing prospecting and analysis on existing studies regarding markets, users, and consumers. The decision-makers have also undertaken specific studies for their companies, mostly business plans (32%), and funding (26%).

It is suggested that these companies are mainly present (44%) and future-oriented (38%), through active and proactive thinking and behaviour. The main clients of these companies are other businesses (44%) or end-consumers (34%). Their biggest markets are segment at 34%, and niche, 22%; and the end consumers' socio-economic levels are mostly middle, 58%, and middle-high, 56%.

Their most important key values are "innovation and creativity", 64%, "communication", 48%, and "planning and organisation" also with 48%.

They were established in Portugal and their national markets are Lisbon, 54%, Oporto, 40%, and the whole country, 36%, and 18% of them do not export at all.

From 82% of the exporting companies, 4 out of 10 have 70% or higher values of export.
From the identified countries, European Union countries, 76%, and Portuguese-speaking countries, 30%, are the biggest external markets for these companies, and 30% of them have offices, delegations or agents in other countries equally divided by Spain, the United Kingdom, and Brazil.

These results were already in line with the general impression given by the literature.

As has been mentioned, after the study of the GEA, the study of GAF was then undertaken, highlighting the results. Then, later on, the study of the GAS allowed the extraction of more refined and notable results. However, before this is presented, it is important to know some background information.

3.02.03 The GAS Group Data and Findings

Characteristics of the GAS, the Special Study Group

The questionnaire was developed in order to be answered by a specific group of respondents with the purpose of obtaining the best quality results. The initial group analysis was very fruitful. During its treatment and study, some coincidences were found, and these links came to be explored throughout a deductive study.

Following this track, a group of companies that had even more specific characteristics was selected and studied in order to gather highlighted results. First, a group of 28 companies was selected and analysed. This group was defined by two variables: year of birth (from 1974 to 2012) and positive stage of the companies´ life-cycle (growth, maturity, or renewal). This group study is presented in Annex 08 and Annex 11. The study of this group results in parallel with the GAS results is presented in Annex 14.

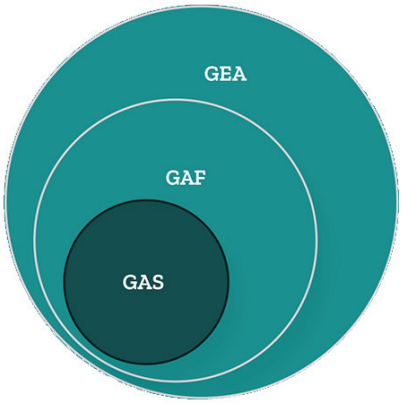

Figure 27: GAS, the Special Analysis Group

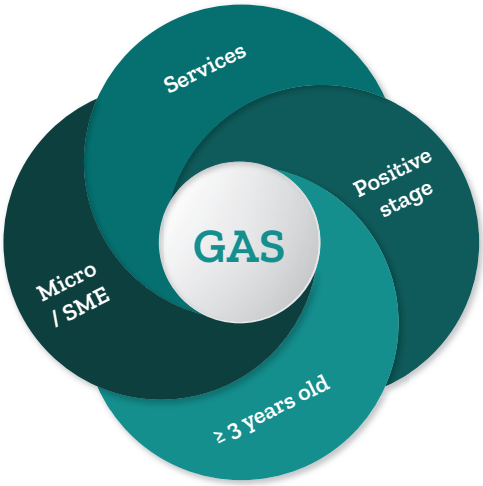

Figure 28: GAS companies´ characteristics: 1 - service companies; 2 - positive life-cycle stage; 3 - older than two years, and 4 - less than 51 employees

Almost at the end of this study, a different selection was suggested and tried: the GAS, the Special Study Group.

It was defined that the GAS would be deeply analysed in order to confront and verify some previous knowledge and ideas from the theoretical and empirical work. The study identified some characteristics of Portuguese companies that differentiate themselves on Sustainable Growth and Longevity. The findings are presented after the presentation of results.

The characteristics of the selected GAS group were as follows:

. to be micro or SME (less than 51 employees);
. question C.05 (it is a typical characteristic of the majority of Portuguese companies);
. to be 3 years old or more (created before 2012);
. question C.04 (it survived the 3-year crisis);
. to be in a positive phase of the company´s life-cycle;
. question C.07 (growth, maturity, or renewal phase);
. to have services as the core activities of the company;
. question C.08 (third or fourth economic activity sector).

The attention was narrowed to the 4 questions presented, all from the topic C. The options for these 4 questions were limited to a few available options to

guarantee the characteristics' accuracy.
It was defined that to the question "C.04 - Please select the year of creation of your company" the answer should guarantee that the company was created before 2012, that is, the selected options must have been between the options "C.04.01 - Before 1944" and "C.04.09 - In 2011".

Concerning question "C.05 - Please select the type of your company, regarding the number of employees" and to guarantee that the company had less than 51 employees, it was defined that the answer must have been between the options "C.05.01 - Single Employee | (...)", "C.05.02 - Micro | (...)" and "C.05.03 - Small | (...)".

As regards question "C.07 - Please indicate the stage of development where your company stands today", the answer must have clearly indicated a positive phase, so it must have been one of the following options ("C.07.03 - Growth", "C.07.04 - Maturity" and "C.07.06 - Renewal").

To the question "C.08 - What is the main economic sector in which your business operates today?" the selected answer must be related with the service activities contained in the "C.08.03 - Tertiary" and "C.08.04 - Quaternary" options.

3.02.04 Findings of the GAS Analysis

The Respondents

The basic characterisation of GAS (Special Study Group) showed a female/male proportion of 42% to 58% and, regarding age, 85% of the respondents were born in the 70s and 80s.

During their careers, most of the respondents (85%) have had training and professional practice in the "A.05.02 - Architecture, Fine Arts, and Design", "A.05.06 - Economics, Management, and Accounting", "A.05.09 - Health", and "A.05.10 - Technologies" areas.

All the respondents have a university degree and 53% of them have a Master's or a PhD.

At the time of answering, 52% of the respondents were working in the areas of "A.04.02 - Architecture, Fine Arts, and Design" and "A.04.06 - Economics, Management, and Accounting".

Regarding the connection between the respondent and the company, a proportion of 58% of the respondents were "A.06.A.01 - High Board (GO 1.1)", 27% were "A.06.A.04 - Small Owner (GO 2.2)" or "A.06.A.06 - Skilled Worker / Specialist (GO 4)", and 43% of the respondents have selected "A.06.B.01 - Strategic" performance levels.

The number of respondents who joined the company at the beginning was quite even with the number of the respondents who joined the company later on (52%-48%).

Company entrepreneurs were represented by 37% of the respondents, while 26% were investors (at some moment), and 63% were hired staff of the company.

Of the respondents that were in the company at its founding, the majority were part of a group (79%), while only 21% started the company alone.

With regards to the terminology, the most identified terms were "Innovation", "Research and Development" (R&D), "Quality", and "Certification", with a total identification rate of 93%. The terms "Company", "Sustainability", "Growth", and "Longevity" had a total identification rate of 76%, while the group of terms related to "Strategic Design", "Service Design" and "System Design" were the least identified ones with a total identification rate of 49%.

Design and Designers

The majority of the respondents (94%) had the opinion that, in general, design brings positive impacts for the companies, mainly in "B.01.01 - Product and / or Service", "B.01.08 - Quality", "B.01.02 - Business Growth", and "B.01.06 - Innovation". From the selected benefits, the two options "B.01.01 - Product and/or service (practical functionality, aesthetic, and symbolic)" and "B.01.20 - Production/Process" were selected by 14%, exactly the same number as the options "B.01.06 - Innovation", "B.01.07 - Research and Development (R&D)" and "B.01.08 - Quality".

Regarding the qualitative and quantitative benefits, the first were considered to be more important than the second: the two options "B.01.08 - Quality" and "B.01.09 - Qualitative Factors" were selected 13% of the time, while the two options "B.01.10 - Quantitative Factors" and "B.01.15 - Economic and Financial Factors" were selected by only 6% of the respondents.

Design, Innovation, Research and Development, and Quality were approached in three questions, and they were considered by the respondents to be related and with a similar degree of importance (between 20% - 27%).

The question regarding the intervention levels of the designer in the design policy of the company and in its brands had 29 answers. According to the specific interpretation presented in the findings, the values were very similar between the levels (even though the individual strategic and operational levels were selected by 40% and 34% of the respondents respectively).

The first investments in the company´s life-cycle phase, concerning all four main themes, 79%. were made mainly in the following three: "B.03.B - Company introduction to the Market", "B.03.C - Growth", and "B.03.D - Maturity".

In the phase "B.03.B - Company introduction to the Market", the investments were mainly made in "B.03.04 - Quality" and "B.03.02 - Innovation". In "B.03.C - Growth", the investments were mainly in "B.03.02 - Innovation" and "B.03.01 - Design"; while in the "B.03.D - Maturity" stage the investments were made in "B.03.03 - Research and Development (R&D)" and "B.03.04 - Quality". At least one investment was made in the introduction and growth phase of the company (44%), using cumulative values.

The "B.04.C - Company Sustainable Growth and Longevity" was the most important benefit created by the four themes.

Of the benefits resulting from investments in these four themes, 62% were "B.05.C - Quantitative and Qualitative", and 34% were "B.05.B - Qualitative" benefits. The "B.05.A - Quantitative" benefits were the least selected (and those in the Innovation theme). These results are a confirmation of the results obtained in question B.01, about the possibility of design creating benefits in the respondents' companies.

The most identified services and/or activities of the designer and their practice were in "B.06.01 - Communication", "B.06.02 - Concept", "B.06.03 - Brand Building", "B.06.05 - Design and Multimedia", "B.06.04 - Design Diagnostics", "B.06.15 - Services", "B.06.07 - Strategic Design", and "B.06.10 - User Interface". However, this does not mean that those services/activities were performed in the company.

The selected activities performed in the respondents´ companies were mainly conducted by "B.06.C - Designer and 'Non-Designer'" (59%). In the companies, the most important services and/or activities done by "B.06.B - 'Non-Designer'" were "B.06.07 - Strategic Design" and "B.06.15 - Services" while those that were done by "B.06.C - Designer and 'Non-Designer'" were "B.06.02 - Concept", "B.06.05 - Design and Multimedia" and, also, in "B.06.15 - Services". The most important services and/or activities done by "B.06.A - Designer" were in "B.06.01 - Communication" and "B.06.03 - Brand Building".

The least selected "B.06.D - Have not been conducted" options were the ones that were mostly identified and performed in the company: "B.06.01 - Communication", "B.06.03 - Brand Building", "B.06.15 - Service Design", "B.06.07 - Strategic Design", "B.06.02 - Concept", "B.06.16 - System Design", "B.06.06 - Packaging", "B.06.11 - Interiors/Environments", and "B.06.10 - User Interface". These were a confirmation of the values obtained in the activities performed by the Designer and/or the "Non-Designer".

The designer's intervention levels in the company had a similar proportion for the three levels, even though the individual amounts differed by one third. As in question B.02, there was a different way to achieve the final results, the sum of the "B.07.01 - Strategic" and the "B.07.03 - Operational" levels was 76%.

The most important characteristics or skills of a designer to work for the respondents´ companies were "B.08.12 - Creativity", "B.08.04 - Ability to understand the Business Model", "B.08.07 - Professional Competence", and "B.08.03 - Effective Communication". According to the answers, 67% of the designers are not part of the respondents' companies, and 63% of those working for them were independent designers.

One-third of the respondents thought that the willingness and openness of the decision-makers could be a barrier to design integration in the company. However, 50% of the respondents thought that a greater design investment and/or integration of design can be performed in their companies, looking at three years from the moment of answering.

Regarding barriers to design use in their companies, the most identified was "B.12.05 - economic and financial factors" (44%), and the second most selected one was "B.12.02 - Company employees / workers" (19%), who may have an aversion to change.

The following items were not considered to be barriers to design use in the company: "B.12.08 - Suppliers", "B.12.10 - Institutional", "B.12.04 - Consumer", "B.12.12 - End User" which can suggest that these upstream and downstream elements are push/pull design elements for the respondents´ companies.

The Companies

Regarding the research and work performed in the phases of the idea and introduction of the company to the market, 77% of the companies performed contacts with "C.01.01 - Organisations (entrepreneurship, business creation...)", "C.01.02 - Business Associations or similar" and/or "C.01.03 - Associations of the Business' area, region or similar", suggesting that these contacts and networks were important for these companies, and they were referred to more by the younger companies. Knowledge of future markets and users/consumers was also focussed on in these companies' early stages.

Before the introduction of the company to the market, 61% of the companies made"C.02.02 - Market Research / Benchmarking / Competition Studies" or "C.02.03 - Prospecting of Users/Consumers (consultation or prior knowledge of their needs and desires)".

It should be highlighted that the financial support referred to in "C.03.02 - Funding/Support Studies" and "C.03.03 - Business Plan" was implemented by 54% of the respondents´ companies.

Almost half of the companies were created in the 17-year period 1990 - 2007 (32% between 2000 and 2007, and 15% in the 90s). All the other companies (53%) were created before 1989.

A proportion of 63% of these service companies were micro-sized companies (between 2 and 10 employees). The four most important activity sectors of the business (from a total of 26 options) were "C.06.01.09 - Consulting and Audit", "C.06.01.08 - Construction and Real Estate", "C.06.01.12 - Hospitality, Tourism and Leisure", and "C.06.01.16 - Marketing and Advertising", totalling 34%.

The "A.04.06 - Economics, Management, and Accounting" area was half of the size of the "A.04.02 - Architecture, Fine Arts, and Design" area, and it was represented only by the option "C.06.01.09 - Consulting and Audit", while the "A.04.02 - Architecture, Fine Arts, and Design" area was represented by "C.06. ... .08 - Construction and Real Estate", "C.06. ... .16 - Marketing and Advertising", and "C.06. ... .01 - Graphic Arts".

All the companies belonged to the economic services sectors (third and fourth) confirming the service activities answered before in question C.06 and defined by the GAS construction.

Most of the clients of these companies were "C.09.02 - Other Businesses (B2B | Business to Business)" with a 58% share. However, "C.09.01 - End Consumer (B2C | Business to Consumer)" clients made up 26%.

These companies were mainly focussed on the present: 58% were characterised as "C.10.03 - Activity (focus on the present, action)". However, it should be be highlighted that the option "C.10.01 - Proactivity (focus on the future, anticipation)" was selected by 37% of the respondents.

The most important markets were "C.11.02 - Segment Market" and "C.11.03 - Niche Market" (69%), and the less important ones were the mass markets and the geographically-defined markets.

The main socio-economic groups of end-users of products/services of the respondents´ companies were "C.12.01.03 - Middle High" and "C.12.01.04 - Middle" that combined had a share of 69%.

The four main key factors for creating value in these companies were "C.13.01 - Innovation and Creativity" and "C.13.07 - Communication" that combined to 38%, while "C.13.04 - Planning and Organisation" and "C.13.06 - Economic Impact Potential" had a 34% share.

The distribution of the companies´ products/services to the national market was a reality for 15%, and the two most important districts (61%) for these companies' commercial efforts were "C.15.01.16 - Oporto" (37%) and "C.15.01.13 - Lisbon" (24%).

The majority of these companies were established in Portugal (88%).

The most important countries for exports were in Europe and in Portuguese-speaking countries with a total fraction of 62%. The most selected ones were "C.16.03.05 - Spain", "C.16.01.11 - United Kingdom", "C.16.02.02 - Angola", and "C.16.01.03 - Brazil".

Regarding the export proportions, a strong division of the companies into three categories became very visible. These categories had similar values and they were: less than 19%, between 20% and 69%, and more than 70%.

Angola and Brazil combined made up 40% of the identified countries of the companies' delegations, while the Spain and Italy group had a 30% share.

Findings of the GAS Group

Most of the respondents had a very strong connection to academia/business, suggesting that these respondents knew the importance of research, and also that their collaboration mattered to the achievement of good results. The respondents had a sustained and high level of commitment to answering the questionnaire, probably because they knew that these supportive methods are meaningful.

All the presented areas of training and professional practice were selected, which may reveal that throughout the respondents´ lives, a large variety of areas were studied and/or practised.

It can be suggested that the professionals with high performance levels have a strong need for continuous education and adaptation throughout their life. The broad training in different areas suggests personal interests and working needs that lead to strong individual differentiation. It must be emphasised that the "traditional" view of design and the connection of design with innovation, R&D, and quality is common knowledge for these respondents.

From their answers, it can be deduced that all these four themes are closely interrelated and hard to differentiate, and that they appear very similar to the respondents. This may signify that they are difficult to isolate, with the investments in them and their effects being, quite often, hard to identify. In reality, it is very common that actions and activities in these areas are muddled by teamwork, multidisciplinary projects, investments, and evaluation of benefits during the same time period.

However, it was highlighted that investments in these themes were an important issue for these respondents. It is even suggested that the investments usually put the four themes in the following order: quality, innovation, design, and R&D.

According to the respondents' answers, the designer is usually a single professional, and they do not work in the respondents' companies.

The obtained results point to the real precariousness of the working situation of designers, their fragility in quality of life support and their uncertain conditions. It can also suggest that the designers' work is mostly in the operational level in small, unconnected, and sporadic projects. It suggests that designers can be easily replaced and it is not common that they have a real integration in this type of company.

However, the respondents have a good opinion and desire about the future use and integration of design in their companies. In fact, most of the respondents are "A.06.A.01 - High Board (GO 1.1)" or "A.06.A.04 - Small Owner (GO 2.2)", with

"A.06.B.01 - Strategic" performance levels in their companies, which suggests a good knowledge of design and design use, in companies generally and in their own companies.

The ordinary design barriers are related with financial issues and with employees, suggesting a common aversion to change and to change implementation.

Some of the non-selected barriers can suggest common enablers to design use. Most of them are upstream and downstream of the companies´ processes: suppliers, clients, end-users, competition, and institutions.

It can be deduced that these "non-barriers" can be push/pull elements for the integration and use of design in those companies, and that design can be driven by these stakeholders.

A pro-active characteristic was to be expected, and there is the possibility that current thinking was instability and post-crisis driven, and also influenced by the old-fashioned "today thinking" Portuguese cultural characteristic.

The most important European countries for the GAS companies reveal the importance of proximity (Spain) but also each company's own activity sector and good commercial relations (UK and Italy). The other continents' most important countries were Portuguese-speaking (Angola and Brazil), and the common historical and cultural past and commercial relations were very strong assets. The other country referred to is China, important for its size and growing potential.

Most of the respondents were in their 30s or 40s, and both genders were represented.

Younger people generally have higher academic degrees. Some of the respondents have invested highly in education, and they typically present multi-area learning and practice in a wide variety of complementary and "instrumental" areas covering, for example, management, languages, and teaching.

At some point, the respondents had "hands-on" moments. Nowadays, most of them have responsible posts and are in the upper levels of their company´s hierarchy in which strategic future-oriented thinking is necessary.

Design and Designers

The traditional view of design, the idea of sectoral design, the concept ideation and development, the communication characteristics, the multimedia and brand building services and activities are still the most well-known characteristics of design and designers.

Designers must be integrative but, quite often, designers are not integrated in the companies, and their work for these companies is occasional, unstructured, and inadequately valued.

Design investments are considered to be needed more now than previously. The first investments in design were performed mainly in the growing stages of these companies, and led to companies' Sustainable Growth and Longevity.

Design's benefits are still hard to measure. Design generates qualitative and quantitative benefits, but subjective ones were the most commonly identified. Financial factors are considered to be key barriers for investment, but they are not mentioned as one of the most important benefits created by design.

Even if the designer's intervention is mainly occasional, the designer's influence is very important in the development of the company's design policy and brands achieving all 3 levels of influence (operational, tactical, and strategic).

Design, Innovation, R&D, and Quality are interrelated and hard to differentiate with regards to activities, benefits, and investment (that are mainly performed in the early stages of the companies´ life-cycle).

The essential characteristics of a designer are creativity, business model knowledge, professional competence, and communication. The designer must be good in their area of expertise. However, they must have business knowledge specific to these companies.

The Companies

A large majority of these companies were started as a team project (group). Small companies created by one individual were represented but in a minority.

SMEs are usually companies with a small number of hierarchical levels and need to have the ability to survive. It is suggested that these companies have fewer bureaucratic issues and better communication, and a better environment within the company and the team.

These companies have been in contact with organisations concerned with business, entrepreneurs, and regional and sectoral associations to network and acquire related information. They looked up existing studies regarding their markets and their clients, but they have also undertaken specific studies for their companies covering business plans and funding.

The main clients of these companies are other businesses or end-consumers, their markets are niche or segment, and the end consumers' socio-economic levels are middle-high to high.

Their most important key values are innovation, creativity, communication, planning, organisation, and economic potential.

They were established in Portugal, and they are mostly located in Lisbon and Oporto. They are externally oriented to European countries and Portuguese-speaking countries, with a good share of exports and commercial presence.

3.02.05 Questionnaire Results

Even though companies studied through the questionnaire also have characteristics that reinforce these national values (all the respondents have skills, training or education in a variety of activities), almost all the companies have been created by just one person. As resistant companies to the negative/downward stages of the cycle, they have kept their size in

employee numbers and some of them have kept or developed their levels of export. In some cases, their markets are exclusively, or largely, based on exports and international clients.

In the questionnaire answers, it was notable that the majority the respondents' companies reacted to the crisis by reducing the scale of the company in order to survive and to overcome the crisis. Downsizing is a common reaction by companies in general, including Portuguese companies, and is more difficult in SMEs (OECD, 2009, p.6). This downsizing is reflected in increasing unemployment and company bankruptcies, but also by companies that reduced personnel, usually as one of the last survival measures (PORDATA, 2017).

The flexibility shown in the thinking and acting of those owners, in order to react and prepare the future, is recognisable. Versatility and flexibility to adapt to a continuously changing context were reinforced characteristics of the small-sized companies.

Even if the terminology was not correctly used, Design Thinking was used, namely the Design Thinking process, principles, and mind-sets (Stanford University, 2017) that can be visible in the references to shareholder focus, process system overview, fast testing of new solutions, pro-activity, and action-oriented and collaborative functioning.

In the questionnaire results, investments in and use of design were mainly identified in the first stages of the company life-cycle (pre-launch, launch, and growth) while in the other stages (maturity and renovation phases), investment and use were very limited or absent. A common characteristic of the crisis can be defined by a reduction in or total lack of investment, firstly in the areas considered to be nonessential, like design, innovation, and research and development which experienced similar reductions.

However, it has been proven that design investment in companies gives good results (e.g. Design Index - UK, The Design Value Index - US) for the companies, their products, and their finances. The investment relationship with the life-cycle stage was already inferred. There is an identified decline in use in the maturity

and renovation phases, common in other countries in similar contexts. However, to prevent and overcome the next natural development stage, the phases of maturity and renovation should also have a bigger investments.

Even though it has been presented that design and design investment must be present in all the stages of the company life-cycle, it has also been identified that, in some stages, it is common that there is a bigger focus on design and its investment, for example in the development of graphics.

Regarding the importance of innovation, quality, design, and R&D for the Sustainable Growth and Longevity of companies, it is clear that they are identified as similarly important, with a variation between 23% and 26% each. Broadly speaking, from these values it can also be inferred that there is common understanding of the importance of these investments, but an inability to perceive their differences.

3.03 Case Study

The questionnaire tool was used in existing companies, and the different studies (namely of the GAS group with the specific characteristics micro-company or SME, service companies, older than 3 years, and in a positive life stage) were performed, resulting in a good set of findings in the majority in accordance with the literature.

To give greater confirmation and legitimacy to the questionnaire findings, whether from the initial group or from the smaller analysis groups like the GAS, the researcher sought similar companies in a different stage of development and youth as a case study.

The cases were selected because they are success cases with some level of innovation, also in a positive stage of development. This selection was previously performed by a company, and the initial group was more than 480 companies. The source was selected because of the available data, its previous selection, the qualitative information, and the data presentation. Each company had its data presented in one web page, like a client file, with the data organised in ten common fields, based on ten questions.

The presented data concerns qualitative information, which in this sense seems to be more relevant and give greater confirmation and legitimacy to the research. However, in the word (and roots) analysis, a quantitative study was performed.

Nowadays, there are a large number of start-up contests and information, but the quantitative data of these companies is usually provisional.

From the beginning, qualitative data was very important to the core of the research. The study of the qualitative data of young start-ups was a weighted decision.

From a big variety of available information, the researcher chose sealed information from a national start-up company contest directed by a big telecommunications company, a reliable source. The new companies were already selected by the contest itself, and it was apparent that the provided data was scrupulously revised and selected.

The available information was public, in Portuguese, and the information of each company was organised in fields.

From the original number of over 480 companies a careful selection was made relating to the core of the research and its development stage. From the 50 selected companies (intentionally the same number as the eligible questionnaire responses), the data was collected and then studied.

Figure 29: The 50 selected cases of companies to study

The researcher carefully selected a smaller group of 50 micro and SME service companies that stood out. The selection was performed with the knowledge already gained from the research undertaken, and keeping some characteristics found in the analysis of the GAS analysis. From the results achieved, one can say that the group selection performed well, despite not having any social science support.

Most of these companies are concerned with services in new technologies. Some of them are platform applications or online shops, multi-platform games or software for connecting people. The others are facilitators or provide amenities or practical utility services (proximity services), or are specialised in sports, health food, Portugal and its traditions, or on multicultural environments. All of them present themselves as new companies with differentiation as a strong characteristic.

The information was organised in individual record cards, and tables were designed to compare the different companies' information per field[49]. The occurrence analysis was used to highlight the most important ideas and words of each main field.

The Wordcloud tool was used to help with visualization of the initial results. The selected pertinent words of each field were translated and introduced in the tool, resulting in the presented Wordclouds (Wordclouds, 2017).

The study of the 10 questions/fields is presented below and presents the selection of some sentences giving substance to the gathered findings, and their support documents are presented in Annex 16[50].

The selection stage was based on obtained knowledge, the objectives of the research, and other factors such as diversity, innovation, newness, differentiation etc. From the 480 so-called success cases, the researcher carefully selected a sample of 50, presented in the following Table 14, with the reference number and their names.

A reducing analysis matrix was developed to study and synthesise the companies. That table had the following fields: Reference Number, Name, Business (summary), Clients, Main Activity, Main Values, and the 5Ws (What? When? Why? Who? How?). Based on the analysis matrix, it was possible to obtain the following findings presented later on in this chapter.

49 The companies are mentioned by their name or reference number.

50 Annex 16 - New Companies - Data per Company (pt).

3.03.01 The Companies

The selected companies have the following characteristics:

. companies 01 and 11 are concerned with artistic issues;

. companies 26 and 42 provide services for designers or design services for companies;

. real-estate is the subject for 5 different companies (02, 05, 19, 41, and 46) working in commerce, investors, project consultancy, rehabilitation, and reoccupation, and aggregated services for owners;

Table 14: The selected companies for the case study

1	Rehabbed Market	13	360 Imprimir	25	Fruta Formas	38	The Portugal Online Shop
2	Brand New Life	14	Moço de Recados	26	Frame in	39	Offline Portugal
3	Ideia Hub	15	Shopkit	27	Home Staging Factory	40	Scraim
4	Sigma Pack	16	Surf Bus	28	Speak	41	Rés do Chão
5	Loja do Investidor	17	Salmarim	29	Bica Studios	42	Scar-id store
6	Napline	18	Boonzi	30	Followprice	43	Drivu
7	Ez-Team	19	Up to Start	31	Mathvolution	44	Seatwish
8	Betweien	20	Style in a Box	32	UAsk4.me	45	Uniplaces
9	Monstros	21	Lapa	33	Brooklyn	46	Casa Viva
10	Loyty	22	Amazing Store	34	Cuckuu	47	Attentive
11	Book a Street Artist	23	Compare o Mercado	35	Pegada Verde	48	For Babies
12	Livro de Elogios	24	Climber Hotel	36	Impactrip	49	Artinvitro
				37	Top Dox	50	Landing.jobs

. spaces are important for companies 03, 06, and 41, from co-work spaces for nomads, to resting spaces in airports for travellers, to resting areas with no internet connection;

. ecological products are mentioned by companies 04, 17, 35 related with the distribution and export of ecologic solutions, salt collection in a natural reserve,

and commercialisation of ecological products;

. sustainability is mentioned by company 22 that offers sustainable and special gifts in an on-line shop;

. the aggregation of services is mentioned by numbers 07, 14, 45, 46, 47, and 50, for companies, ordinary people, students, and home-owners; data aggregation platforms for companies; and for human resources and recruitment;

. the aggregation of services is also presented by companies 22, 23, 27, 30, 32, 37, and 47, selecting a range of special and sustainable gifts and presenting them in an on-line shop, a price comparison portal, diverse services for renovating and renting, an on-line price follower, and services for start-ups;

. entrepreneurs/entrepreneurship is very important for company 08 which is concerned with teaching and making experiments for primary and secondary-level students, while start-ups are the main target of company 32, a platform of services with a virtual assistant;

. refurbishment/reinterpretation were chosen by company 09 focussing on furniture restoration and workshops in this area; and by companies 12, 17, 36, and 41, with a strong reinterpretation base: the purpose of the complaint book adapted to the praise book, renewal of traditional salt practices and products, a new insight into the meaning of holidays and volunteering, and a proposal for re-occupation of underused street-level houses or stores. Companies 25, 34, and 49 have also created a business based on reinterpretation, the first in the natural fruit products, the second in the alarm concept, and the third in easy-care interior plants with no gardening required;

Regarding their clients, the companies can be divided as follows:

. micro and SMEs are the main clients for companies 13, 15, and 21 that offer marketing, printing, and on-line shop kits for companies that want to sell on the internet, and intelligent price management for small independent hotels. These companies are based in B2B commerce;

. specific markets are the target for companies 01, 42, and 44, being the arts market, young designer pieces, and ticket exchange. Referring to commerce, companies 02, 11, and 35 are concerned with real-estate, street artist performance bookings, and commercialisation of ecological products;

. companies 18, 20, 21, and 43 offer personal, financial management services; clothing and accessory rental services; an object locator (device and app); and

car-driving services for private users;
. students are the clients of companies 8, 31, and 45, offering them entrepreneurship training, education, online maths exercises, and rented accommodation;
. babies' parents (or care-givers) are the clients of company 48 that offers services and assistance;
. with regard to sports, company 16 offers support services for surfers.

The questions are related with the past, present, and future of the business and the knowledge they have acquired through the experience, from which they can advise and make suggestions to other entrepreneurs. The order of the fields was used as a structure for the next part of this research stage.

The questions presented in the companies' files are the following:

. 01 - What is the business? (*O que é/qual é o negócio?*);
. 02 - From where was the idea born? (*De onde nasceu a ideia?*);
. 03 - Mission? (*Missão?*);
. 04 - Financial support? (*Financiamento?*);
. 05 - Promotion? (*Promoção?*);
. 06 - Where do you hope to get to? (*Onde esperam chegar?*);
. 07 - How did you manage the initial uncertainty? (*Como lidaram com a incerteza inicial?*);
. 08 - Your trump card? Secret ingredient? (*Qual o vosso maior trunfo? Ingrediente secreto?*);
. 09 - What do you suggest for the beginners? (*O que sugerem a quem começa?*);
. 10 - What was the best advice you have received? (*Qual o melhor conselho profissional que já recebeu?*).

From the 50 individual web files, the information was collected, selected, and managed to be processed (Annex 16). A matrix table was created with more than 550 fields. According to the amount of information and its workability, it was necessary to break it in two matrix tables, one more focussed in the companies´ information reading, and the other more focussed in the fields reading. From that database it was possible to analyse the information and select the emerging data.

For a first overview, the Wordcloud tool was used, allowing a quick and evaluative vision of the information and suggesting the first findings, as they are presented

in each field's results area. In a further moment, a direct analysis of the contents was undertaken. The most found words (or families of words with the same root) were then worked and pointing some of the selected fragments in each field. The found words are presented as tables, and displayed in each field results area. From the completed word-tables it was possible to extract data, used to select some of the presented fragments but also to confirm the initial findings.

From that stage, it was possible to prepare them with the questionnaire's research findings, to relate them to the literature, and to achieve confirmed and usable data.

Introduction to the Companies

Selected fragments from the first field:

. 01 - Rehabbed Market -"Entrepreneurship, quality, sustainability, and differentiation are the pillars of this business that we explore today in more detail."

. 05 - Loja do Investidor - "The mission of the INVESTOR SHOP is to make the business relationship between owners and investors simple, accessible, and immediate."

Figure 30: Wordcloud obtained from the selected companies' introductions.

. 08 - Betweien - "It is the only Portuguese company specialised in the development of entrepreneurship among youngsters of primary and secondary education (...) The managing partners - Pedro Correia and Narciso Moreira, attest to the success of the project and the importance of the mission for the country itself, to begin at an early age to shape its future."

. 10 - Loyty - "Alfredo Neto guarantees that a customer loyalty system tends to buy more than a common customer and so has developed an open platform for companies to analyse customers and their purchases. This way it becomes possible to define the customer and even to predict what he will buy next. The Loyty concept reinforces customer communication and customises interaction."

. 12 - Livro de Elogios - "We believe that one of our main qualities, and we will continue to preserve it throughout our growth, is the team (...) It is through this sharing of ideas, curiosities, and concerns that we can become the asset of professionals and companies, causing a direct impact on their lives."

. 42 - scar-id store - "By highlighting the pieces curated in such different areas as fashion, jewellery, furniture,, and ceramics, the store functions as an incubator of new talents, projecting its work in the national market and directing it to internationalisation."

Question 01 - What is the business?

Selected fragments from the answers:

. 02 - Brand New Life - "Brand New Life - Real Estate Solutions is an agency of the Brand New Life Group, S.A., dedicated to the housing, commercial, and investment real estate market, which offers personalised multidisciplinary services as a differentiating factor."

. 03 - Ideia Hub - "IDEIA positions itself as a community, as such is focussed on people, on talents. Our service offering, namely co-working and premium private offices, training, and talent management, has as a main objective to support our community of individual and collective talents (companies) to develop their ideas, their skills, their businesses, to anticipate the future by facilitating the way they accompany the new needs and rhythms of the market and of companies, and by enhancing individual talent and the social and professional relationships that exist within and outside the community."

"We are the first financial and investment consultant to promote the meeting between owners and investors, making the business relationship between the parties simple and secure."

. 08 - Betweien - "Betweien's business is education, with a very special focus on entrepreneurship education and innovation in education. In this sense, we design, develop, and implement projects, tools, and tools to foster entrepreneurial skills."

Figure 31: Wordcloud obtained from the answers to question 01 - What is the business?

. 19 - Up to Start - "Up to Start is an Investment Consulting company whose main objective is to support the implementation of new companies and the expansion of existing companies to new markets. In this sense our services include the market study, the business plan, the feasibility study, the investment projects, and all the necessary support in obtaining financing for the company, as well as the crucial services of design and corporate image, web development, and corporate architecture."

Table 15: Word-table obtained from the study of the answers to question 01 - What is the business?

List of the most-used words in the answer (alphabetical order)
all, always, buy, companies, create, customer, first, help, home, life, market, offers, online, platform, Portugal, products, services, social, space, store, users

Question 02 - Where did the idea come from?

Selected fragments from the answers:

. 03 - Ideia Hub - "It is born of the conviction of making available all the conditions that an individual entrepreneur, a freelancer, a small company or a multinational, need to realise and enhance their talents and reach their goals."

. 07 - Ez-Team - "Together with the founder whose CV is also impressive (having worked for major national brands: Nike, Sony, 3M, L'Oreal, etc.), always in the

Figure 32: Wordcloud obtained from the answers to question 02 - Where did the idea come from?

area of corporate image, began recruiting several professionals of excellence who would be part of the team."

. 10 - Loyty - "Loyty was born from the goal of producing a unique solution in Portugal that allowed to know the profile of the customer and their buying behaviour, through an automated communication process, able to exceed expectations and optimise the company's results."

. 19 - Up to Start - "A company that is starting its 21st century market activity needs support that goes beyond planning."

. 25 - Fruta Formas - "Taking in these experiences, lived in the first person, then in 2012 the idea arises of creating a company focussed on fruit dehydration, with a differentiating concept, placing on the market unique and distinct products."

. 29 - Bica Studios - "From coffee shops we head to my house (a tiny bedsit), then to StartUp Lisboa and from there, to Labs Lisboa, where we have a team of 12 people ready to make a difference."

. 34 - Cuckuu - "Cuckuu was born of the personal needs of its founders."

. 42 - scar-id store - "There are times when it makes sense to question ourselves about the course we are developing. The scar-id was born of our will (by the plastic artist Sílvia Pinto Costa and the architect André Ramos) to create a project that would make sense in urban culture and contemporary lifestyle."

Table 16: Word-table obtained from the study of the answers to question 02 - Where did the idea come from?

List of the most-used words in the answer (alphabetical order)
across, all, areas, best, buying, clients, communication, companies, concept, create, customer, day, design, different, easy, experience, form, format, help, home, image, information, life, marketing, online, sales, space, stock, store, users

Question 03 - Mission?

Selected fragments from the answers:

. 01 - Rehabbed Market - "Allow the consumer to know what is best done in Portugal with diversity, quality, and innovation."

. 02 - Brand New Life - "Our mission is to find the best solution for each case."

. 05 - Loja do Investidor - "Our mission is to make the business relationship between owners and investors simple, accessible, and immediate."

. 10 - Loyty - "We believe that communication is key to driving sales."

. 19 - Up to Start - "By embracing each project as our own, we are especially committed to increasing the management, financial, marketing, and image capacities of each one of them, with the aim of maximising the activity of each company that uses our services in order to guarantee the success of our customers."

. 27 - Home Staging Factory - "From the beginning we have taken on the mission of 'turning walls and beams' into dreams and emotions".

. 35 - Pegada Verde - "Our strategy is always to reinforce the relationship and the proximity to the clients, being this one of our great pillars of action."

Figure 33: Wordcloud obtained from the answers to question 03 about the Mission

. 40 - Scraim - "Scraim was developed based on the best international practices of development, engineering, and quality of the software, with the objective of allowing managers of sectors of the telecommunications, banking, health, and information and communication technologies to improve the fulfilment of the deadlines, budget, and the quality of their projects based on the continuous improvement of their work processes."

. 44 - Seatwish - "We approach buyers from sellers in an environment that facilitates the business of secondary market tickets."

. 50 - Landing.jobs - "We are dedicated to bring together great talents with great companies and opportunities. In the background, facilitate the entire recruitment process and always be there for our candidates through feedback."

Table 17: Word-table obtained from the study of the answers to question 03 - Mission?

List of the most-used words in the answer (alphabetical order)
after, all, always, area, babies, best, born, business, company, concept, create, develop, emerged, era, estate, experience, first, form, founders, idea, life, market, needs, online, opportunity, Portugal, process, products, real, service, several, shop, solutions, team, world, years

Question 04 - Financial support?

Selected fragments from the answers:

. 01 - Rehabbed Market - "Without recourse to financing."

. 14 - Moço de Recados - "The financing was all done using equity (...) Besides this support still had to resort to equity. It was necessary to invest in the creation of the corporate image, in stationary, clothing, website, promotional video and Vespa restoration."

Figure 34: Wordcloud obtained from the answers to question 04 about financial support

. 15 - Shopkit - "I invested €500 at the beginning of the project to cover expenses that this type of application has: servers, bandwidth, and software licensing. After six months, we reached breakeven and continued in a sustainable way."

. 19 - Up to Start - "We were born with an enormous desire to make a difference. At the time it was chosen to increase the team and to use only Equity."

. 20 - Style in a Box - "400 KEUR through private investors."

. 21 - Lapa - "To get funding, we used the crowdfunding model through an IndieGoGo campaign."

Table 18: Word-table obtained from the study of the answers to the question 04 about financial support

List of the most-used words in the answer (alphabetical order)
always, best, clients, communication, community, companies, development, form, great, greater, life, market, mission, online, Portuguese, products, quality, services

Question 05 - Promotion?

Selected fragments from the answers:

. 03 - Ideia Hub - "In IDEIA we have always bet on digital marketing, however, it has been the word to demonstrate the most efficient channel."

. 04 - Sigma Pack - "The best advertising is the recommendation."

. 09 - Monstros- "The promotion is very much based on word of mouth, that is, all our customers recommend us and look for us again and again. We do some markets and fairs to show our Monstros[51] in loco, which is essential. On the other hand, we also have the website, Facebook, Instagram, and Pinterest, which give us some visibility."

Figure 35: Wordcloud obtained from the answers to the question 05 about promotion

51 "Monsters" is the direct translation of the Portuguese word "Monstros". It refers to old furniture in this case, but it is a common designation for bulk waste like white goods or any large-sized residential rubbish.

. 10 - Loyty - "Specialised magazines, social networks, Loyty site, and case studies."
. 14 - Moço de Recados - "I wanted to create a concept around the idea of the business. That's why both the name, the vehicle to use, the website, and the cards were all thought out in detail. I wanted to reach the media and the client, and for this I bet on creativity and originality."
. 21 - Lapa - "The promotion was essentially through digital and media marketing, both nationally and internationally."
. 26 - Frame in - "At the level of promoting the 'Frame in' brand, we can proudly say that 'word of mouth' marketing has done the work for us. Almost we can say that directly or indirectly, every client we work with brings another client."
. 46 - Casa Viva - "For promotion we use mainly our website, but also email, Facebook, online and traditional media (newspapers and TV - in the form of reporting), and all our brand image that we disseminate through our vehicles, cards, flyers, dossiers, folders, and advertising signs that we put on the balconies or windows of the apartments or offices when we make remodels, or on the facades of the buildings when we make paintings of facades or rehabilitation of the buildings."

Table 19: Word-table obtained from the study of the answers to the question 05 about Promotion

List of the most-used words in the answer (alphabetical order)
business, capital, capitals, employment, financing, moment, own, personal, Portugal, support

Question 06 - Where do you hope to get to?

Selected fragments from the answers:
. 01 - Rehabbed Market - "We hope to continue to respond in an agile and efficient way to the new forms of commerce and the needs of the market, promoting the differentiation of Portuguese brands, with design, creativity, and quality."
. 07 - Ez-Team - "Our goal is to grow as the opportunities that we are creating and those that come to us by chance! We have an internal department that develops prospects of interesting contacts and business opportunities daily."
. 18 - Boonzi - "We aim to be the most complete personal finance management platform in the world. Our next step is internationalisation, where we focus on

Brazil and, later on, the USA and the UK, among others. We are also completing a set of additional cross-platform services that we will launch during 2014."

Figure 36: Wordcloud obtained from the answers to question 06 - Where do you hope to get to?

. 19 - Up to Start - "We want to reach out to a greater number of international clients, expand our services to more countries, and support more Portuguese companies in their internationalisation.",

. 27 - Home Staging Factory - "We want to work together with investors, designers, and entrepreneurs who want to promote Portuguese products and brands across borders."

. 35 - Pegada Verde - "Our top priority is to maintain growth in a sustained manner."

. 49 - Artinvitro - "We also aim to reach the entire national market, with the recognition of the brand and the concept and, if possible, start exporting to other countries."

Table 20: Word-table obtained from the study of the answers to question 06 - Where do you hope to get to?

List of the most-used words in the answer (alphabetical order)
big, brand, business, communication, company, concept, customers, level, major, market, media, networks, online, partners, presence, product, products, promotion, service, social, social, together

Question 07 - How did you manage the initial uncertainty?

Selected fragments from the answers:

. 01 - Rehabbed Market - "Uncertainty is a constant. We work with transparency, commercial ethics, and focus, and we have a good ability to adapt to new contexts. The market changes constantly, 'adaptation' is the watchword."

. 05 - Loja do Investidor - "Uncertainty is part of the process of developing any innovative idea / project (...) With well-defined goals and the necessary strength uncertainty ceases to exist."

Figure 37: Wordcloud obtained from the answers to question 07 - How did you manage the initial uncertainty?

. 39 - Offline Portugal - "The initial uncertainty is part of the growth of the project, as it is an innovative concept, and mainly pioneering in Portugal."

. 43 - Drivu - "Uncertainty is part of the process, and it accompanies us always and not only at an early stage, especially with more innovative concepts, but we deal with it through the utmost commitment, enthusiasm, and dedication."

. 50 - Landing.jobs - "The important thing is to trust the people we work with. Uncertainty will always exist, but we must believe in what we do and where we want to go."

Table 21: Word-table obtained from the study of the answers to the question 07 - How did you manage the initial uncertainty?

List of the most-used words in the answer (alphabetical order)
all, areas, big, brand, business, cities, clients, companies, concept, continue, countries, country, create, develop, enterprise, grow, growth, have, international, internationalization, level, markets, moment, months, national, new, next, online, opportunities, platform, Portugal, potential, products, quality, reach, service, space, store, united, units, world, years

Question 08 - Your trump card?

Selected fragments from the answers:

. 03 - Ideia Hub - "But also the differentiation of the product, the excellent value for money, the experience we offer to each member of our community."

. 06 - Napline - "Our secret ingredient is the team, in addition to being very young and dynamic it is multi-disciplinary with the abilities necessary to solve the problems that may arise."

Figure 38: Wordcloud obtained from the answers to question 08 - Your trump card?

. 08 - Betweien - "Betweien's biggest asset is the ability to adapt and innovate, inventing solutions."

. 13 - 360 Imprimir - "Focus on the customer and the service. The product has a lot of quality and we guarantee the best price, but our differentiation is the service we provide to the customer."

. 17 - Salmarim - "Work, dedication, and innovation ... and have achieved a good network of work, always investigate, share. We know what we do and we always surround ourselves with good professionals."

. 20 - Style in a Box - "An excellent team."

Table 22: Word-table obtained from the study of the answers to question 08 - Your trump card?

List of the most-used words in the answer (alphabetical order)
always, believe, better, business, concept, constant, country, customers, deal, develop, exist, form, greater, have, important, initial, large, market, much, needs, product, service, solution, students, uncertainty, years

Question 09 - What do you suggest for the beginners?

Selected fragments from the answers:

. 01 - Rehabbed Market - "Planning, flexibility, positive and persevering spirit, resilience, and hard work!"

. 02 - Brand New Life - "It is essential to start by studying the market, to understand what already exists, how our idea differentiates, and why it matters."

. 15 - Shopkit - "Begin lean: build something that people really need, start small and think big."

. 19 - Up to Start - "It is important to have an idea of what you want for your company and to start a good business plan and feasibility study is essential."

. 21 - Lapa - "Never give up!"

. 22 - Amazing Store - "Be original, create a unique business that is useful to people."

Figure 39: Wordcloud obtained from the answers to question 09 - What do you suggest for the beginners?

. 27 - Home Staging Factory - "A motivated team with courage, daring, and determination can transform a medium-sized idea into a big business. Already a brilliant idea with a bad team is doomed to failure."

Table 23: Word-table obtained from the study of the answers to question 09 - What do you suggest for the beginners?

List of the most-used words in the answer (alphabetical order)
ability, always, best, customer, customer, different, experience, fashion, give, greatest, home, know, manage, market, much, process, product, quality, service, team

. 44 - Seatwish - "A small thing at the beginning of a start-up can become a huge problem at a later stage. Prepare the projects for international growth from zero."
. 50 - Landing.jobs - "The main reason for companies to fall is the appearance of riots among the founders."

Question 10 - What was the best advice you have received?

Selected fragments from the answers:
. 02 - Brand New Life - "Experience is our best adviser, and in this sense we should not be afraid to take risks and follow our intuition when we believe in something."
. 03 - Ideia Hub - "Success depends essentially on three things - work, work, and work."
. 10 - Loyty - "Work on what you love and never have to work."
. 11 - Book a Street Artist - "It builds a sustainable business that brings social value. Put people before money."
. 19 - Up to Start - "Time is money. Love what you do, do what you love"

Figure 40: Wordcloud obtained from the answers to question 10 - What was the best advice you received?

. 27 - Home Staging Factory - "More important than the project or idea is the team that implements it."
. 32 - UAsk4.me - "Not being afraid of making mistakes is necessary to the daring of an entrepreneur."
. 34 - Cuckuu - "The best advice I have ever received (if I had come earlier would

have saved me a lot of time and money) was: Take it easy and learn to say no (...) In business as in sport, preparation is everything."
"Talk to potential customers, their feedback is more important than any expert in the industry."
. 46 - Casa Viva - "If you believe in your project, do not let the first obstacle throw you to the ground."

Table 24: Word-table obtained from the study of the answers to question 10 - What was the best advice you have received?

List of the most-used words in the answer (alphabetical order)
all, always, best, business, company, first, having, team

3.03.02 Findings of the Case Study

These 50 companies are similar in many respects to those in the GAS group. They are micro-sized service companies in a positive, but still early, stage of development.

It is apparent that these companies invest in providing differentiated services and are technologically supported. Some of them are completely digital: online platforms and shops, apps, multi-platform games, or digital networks for people with similar interests. Other companies invest in local services and amenities, in areas such as practical support services, sports, healthy eating, Portugal, Portuguese traditions and brands, or even proximity services connecting and sharing multicultural interests.

The findings are presented following the question order, starting by the introductory field of each company.

Introduction

The first field for the companies' data was to provide an introduction. Several of the companies describe themselves as basing their business model on quality, sustainability, and differentiation on the one hand, with simplicity, accessibility, and immediacy on the other. They also focus on personalisation and sharing services for people, be that external clients or internal teams. Some of them are principally concerned with the development and future of the country, and others curate individuals' works and pieces followed by their advertising and commercialisation.

Question 01 - What is the business?

For most of the companies, these practical support services are targeted either at individuals or businesses. Those servicing businesses offer financial and communication services during the implementation, development, and future stages of the business. Some also offer reliable and simple networking and pairing services, maximising results with the minimum investment effort from the organisations concerned. For individuals, they offer local services and amenities, but also competency and skills development and broader education.

Question 02 - From where was the idea born?

Most of the companies offer support services, transferring knowledge such as profile, communication, and optimisation tools acquired during the professional backgrounds of the owners in larger companies to their micro and SME clients. Some of the common characteristics of these enterprises are the investment in innovation to offer services and amenities desired by their clients and designed or adapted for their users and to contemporary lifestyles and urban culture.

Question 03 - Mission?

In their mission, some of the companies say that they consider clients as partners, so they have a different agreement with them, creating a win/win relation for success.

Some of them focus on dreams and emotions in the way that they transform reality for the clients, and present the best of Portuguese quality and/or innovation.

They also focus on current needs and answers to those needs, either by improving planning and management or working processes and giving real-time information to the clients, or by offering big data gathering and data mining services.

Question 04 - Financial support?

Several of the companies mentioned that they used only their own capital to found their companies. Some of them mentioned the use of traditional financial support, or new solutions such as crowdfunding, when really in need.

Question 05 - Promotion?

All the companies assert the importance of their image, and of consistency and coherence in the use of their brands in the way they use them in different media.

They use traditional advertising methods including hoardings, magazines, newspapers, and TV, but also specialist magazines, markets, and fairs. However, several have also taken advantage of digital marketing opportunities, primarily their own websites but also new channels such as social media (Facebook, Instagram, Pinterest, and the like). It is particularly interesting that many refer to the importance of word of mouth, which is the best form of advertising available to them. Some state that one happy client will usually lead to a new client being gained.

Question 06 - Where do you hope to get to?

These companies are currently adapting themselves and growing. They want to follow that path and mention design, creativity, quality, and innovation as important factors to support this development. Some have specific departments for developing new contacts and opportunities. Several are looking to evolve internationally and into export, but also enlarging their current client group, reaching all national markets, and expanding into international markets. Additional services and/or sustainable growth are also noted by a few.

Question 07 - How did you manage the initial uncertainty?

Several companies believe that constant change and adaptation are the primary ways to address the question of uncertainty. As they are always a part of

pioneering and/or innovative processes, well-defined goals plus strength, commitment, enthusiasm, and dedication are very important to overcome uncertainty, as well as trust in people, and the qualities and skills of the team.

Question 08 - Your trump card?

In this field, the companies responded with their "secret ingredient". Apart from the relationship between differentiation, price, and quality, innovation, adaptation, work, and dedication were important. Most of the companies referred to their client focus and to the team, the latter being dynamic, multi-disciplinary with good professional skills, constant research and sharing, and a lot of work and dedication.

Besides differentiation, price, quality, innovation, adaptation, work, and dedication, most of the companies refer in this 9th field to client focus, and also to the team. With regards to the latter, dynamism and multi-disciplinary working, good skills and good professionals, constant research and sharing, and a lot of work and dedication are mentioned.

Question 09 - What do you suggest for the beginners?

The idea itself is very important, as it is thorough planning and preparation before starting anything, starting in a lean position (start small but think big), and understanding that the process needs to be interactive/iterative to ensure that a small problem now does not become a big problem later.

Most of the companies highlight people, not only clients, so that the things which are being developed are done for their specific needs or dreams, but also, the character of people working in the company, whether they are the founders, the team or the employees. They should have special skills, a lot of flexibility and positive spirit, perseverance and resilience, motivation, courage, and determination, as it is a process with many pitfalls which need to be avoided.

Question 10 - What was the best advice you have received?

The best advice the companies ever received was, for many, that success is composed of three Ws: Work, Work, and Work!

Two further important pieces of advice are that sustainability, social impacts, working, and people should come before money; and the company's core idea should be something you love to do and that you thoroughly and deeply believe in.

Besides these, you must be surrounded by a good, carefully-selected team. You must not be afraid to fail, and you must always stay calm and know when to say no. Importantly, you need to plan and prepare before starting anything and, most of all, it is essential to learn from your clients, as they are the ones whose needs your company must find.

From all the fields, the words Market, Product, Companies and Services (or familiar ones) were the most selected from the previous selected ones. The four words were very used in seven or eight fields, from the existent. The Table 25 is the result of this analysis, and the obtained results are very representative of these companies main characteristics.

Table 25: Word-table obtained from the study of the eleven word-tables above. The number of fields in which the words were selected before is identified in the left-hand column (the words only selected in one field were not mentioned)

List of the most-used words in all the fields (alphabetical order)

Fields	Words
8	market, product
7	companies, service
6	always, business, customer, online
5	all, best, concept, Portugal
4	create, develop, form, great, life
3	area, clients, communication, experience, first, have, home, quality, social, space, store, team, years
2	big, brand, buy, capital, country, different, grow, help, international, level, moment, much, needs, opportunities, platform, process, solution, users, world

Chapter Summary

To confirm the theoretical knowledge presented in the previous chapters, to sustain the positions taken, and to develop the proposal, the situation of Portuguese service SMEs was studied.

The first tool used was a questionnaire for service SMEs. From the received data, a group of companies was scrutinised in depth. These companies had some defined attributes: they were all older than three years; they survived the crisis; and they were in an upward life stage.

Most of the companies confirmed a limited and sporadic use of design in specific areas, mainly relating to communication, and in particular moments of the companies' life. This design work is outsourced or done in-house, and the investments are as small as possible, minimising the companies' design costs. These companies present their fragmented knowledge of design and their positive opinion of design influences in companies. Some of the companies' needs for design are delineated. However, resources are presented as a strong constraint.

Even though the design knowledge can be light, fragmented, limited or distorted, the use of several principles is verified, even with the wrong terminology. Although in an unaware or intuitive manner, silent design is quite often used and part of these companies' culture. Most of the experienced owners know where they invested in design, usually during the launch phase of the company and their services.

These companies show a strategic direction, and they can identify the most difficult stages of their life, and the moments where it can be inferred that their characteristics and efforts as individuals and as leaders were essential to minimise losses and for the companies' survival and development. The companies' nucleus is a crucial structure, and it has been adaptable and elastic to "bend but not break", surviving both the typical crises of company life-cycles and the global crisis. They could maintain, sustain, develop, and even re-launch their companies. The resilience of the company shows that some of the personal skills of the decision-makers are essential, but also their high levels of knowledge, namely of design and business.

The following methodological phase was the case study of 50 selected young companies already chosen as significant cases. They were selected for their diversity and degree of innovation. These companies are more communicative about their design knowledge, and they have used it since the founding of the company, but they also spend a limited amount of resources. Design use is more about image for fast communication, which is crucial to the digitally-based businesses. Through the use of new tools such as Business Model Canvas and Lean Start-Up theories, design principles are also integrated into the companies. From their early stages, design seems to be more involved and unified for these companies, and less "silent".

From the case study, it was possible to identify that most of the companies live on a day-to-day basis, which is to be expected in an early life stage. They are not able to make accurate predictions about the performance and development of the companies in the long-term, but they have a lot of stamina and positivity.

Most of the information gathered by the two tools used confirmed that there is a certain level of similarity to companies' needs, desires, real conditions, and difficulties. The most critical stages (e.g. "live or die" moments) have been identified, usually related to moments of change, and there are suggestions to strategically prevent and to act proactively to overcome them. The relationship between design and benefits has been confirmed. However, design is more identified for its qualitative side, and it is mostly seen as a necessary cost for specific stages and not as return on investment throughout the life-cycle. Several of the Design Thinking, Design Process, Service Design, and Strategic Design principles have been mentioned by both groups.

Several differences were found amongst all the information gathered from the study performed for this research and the literature review presented in the previous chapters. As an example, the companies studied by questionnaire are more single ownership type than the younger ones. However, the national levels of single ownership companies are higher than the ones from other countries.

There is a lot of information available on the vast number of subjects concerning the problem statement and the issues addressed by the research. Many connections and relationships among them were also studied profoundly and

shared. At higher levels, the relationship intersections were also examined and a holistic perspective has been taken. The systemic interference of the presented elements in the system is known. It is critical to include this knowledge at the lower levels, in the real world. Information movement between strategic, tactical, and operational levels is crucial for its current use and further theoretical and practical development.

There is a considerable amount of available data on:

. global needs, like Sustainable Development;
. countries' duties, related to the economy and the welfare of the population;
. SMEs weaknesses and connected issues.

There is a lot of available knowledge on:

. the high value-creation potential of design for companies;
. investment in design, and the measurable returns for companies and the economy;
. tools and theories for start-ups and entrepreneurs;
. accurate evaluation and forecasting of SMEs' performance and life-expectancy;
. the link between investment in employment and education, and economic return and national development;
. the connection between countries' welfare and global development goals.

However, the problems and issues are similar than before...

The gathering of real information was a critical step to confirm the fundamentals obtained by the literature review, corroborating and stress-testing them, acquiring the cornerstones for the following stages of the research. The design of the Athena Model was based on these foundation stones.

In the third chapter, from the study of the Portuguese SMEs' situation, reviewing a group of experienced and mature and a group of new companies, some significant issues emerged. They were the importance of the nucleus of the company; the knowledge and use of design (even if it is silent design); and the adaptation to market needs and fast technological evolution. Later on, some issues arose for the design of the model that should be taken into account:

. the entrepreneur's characteristics, mind-set, knowledge, stamina, and flexibility;
. the market need for digital, fast, and efficient support models and tools;
. incentivise awareness of the strategy, tactics, and operations triad, and the understanding that the value created by strategy is quite often greater in the long-run;
. simulation, prediction, and forecasting tools exist, and can be used to support better decisions on the orientation of actions towards a desired future;
. the identification and deepening of design and business knowledge can be expanded and improved according to the user's needs and desires.

The research thesis and the Athena Model are the primary results of the research to encourage change and improvement in SMEs. Being aware of the SMEs' situation, the model should be oriented to their needs, used through a simulation, and enable abilities that can foster their Sustainable Growth and Longevity.

Table 26: The evolution of some companies' characteristics through their life-cycle evolution

	Company Stages		
Characteristics	Beginning	→	Maturity
Structure	Light Adaptable	→	Heavy Rigid
Time Focus	Present	→	Future
Ladder step	Operational	→	Strategic
Effort / focus	Support Activities	→	Core Functions
Specialization	Low	→	High
Structure	Horizontal	→	Vertical
Delegation levels	Low	→	High

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4th Chapter
The Athena Model

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4th Chapter - The Athena Design & Company Model

4th Chapter

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4.01 Introduction

From the long immersion during the divergent exploratory phases and the data collection process, it was possible to evolve to a further stage. The melting-pot of awareness was fed and powered by:

. the apprehension of global and local problems;
. the theoretical knowledge of diverse disciplines (from the researcher's background to others explored for the research);
. the particular situation of the potential users (the questionnaire and the case study).

From all the information and knowledge about the research needs and constraints, the convergent step was possible, and the model design and development stage began.

According to the methodology, the creation of a model and its development would happen from a certain point onwards. However, the model has been developing in the back of the mind for a long time. It has taken different forms such as a toolbox, checklists, directives, or similar, and several versions and drafts have been done, either by hand-drawing or using CAD systems[52].

Up to a certain stage of the research process, and as an 'under-construction' phase of the Athena Model design, the global concept of the model and the included knowledge were presented as hand-drawn drafts, allowing the audience to have freer reactions to it.

During the research process, several drafts were produced. The design process of the model was long and very fruitful, particularly in graphical studies and iterations. Some representative examples of graphical trials, paths, and their iterative loops are shown in Annex 23[53].

52 During the evolution of the research process, the first model developments focused on the defined exclusive field: service SME. However, the theoretical development of the model made it usable in a wide set of situations, and the model became very inclusive.

53 Annex 23 - Research Development hand-drawings, from the Daily Journal (pt)

4.02 The Athena Design & Company Model

4.02.01 The Name

Throughout the model's design, the identification of a name for it was in progress. From a group of ideas, Athena was selected following research that proved that the name had a degree of identification and it was coherent with the model and its concepts (Greek Gods, 2017). Athena is, in Greek mythology, the goddess of civilisation, wisdom, and strategy in battle. She is also the goddess of the arts, justice, beauty, and perfection (Greek Gods and Goddesses, 2017). Athena was one of the most represented goddesses in Greek art and even the goddess of City of Athens. She is accompanied by an owl and has a spear in her hand. The owl is related to wisdom while the spear symbolises strategy to win (Encyclopædia Britannica, 2017).

Athena remained, despite many attacks throughout the centuries, one of the ancient gods with the most significant symbolism, and she was used by various political regimes to legitimise their principles, notably in France where she has been transfigured into the deity of the Republic, and received the name "Freedom". Another well-known derivation of Athena is the Statue of Liberty in New York (Deacy, 2008).

Athena was considered a symbol of identity and strategic culture throughout Europe. In recent studies Athena's image has been used in the field of economic dynamics analysis, identifying periods of reorganisation of structures and accelerated change of paradigms as phases where the influence of this goddess is exceptional. In this context, Athena's main quality is to solve problems by

In this page:
Figure 41: Athena Design & Company Model - Logotype, square version

relating careful planning, collaboration, opportunity sense, preservation of human values within an economic practice (Deacy, 2008)

4.02.01 Preliminary Model: the Athena Design & Company Model, version 1.1

The research project and the model development started in the middle of the severe crisis which began in 2008. From 2015 on, the crisis had a different evolution politically and economically. However, as the general population needs time to feel, adapt to, and adopt significant changes, some of the situational problems were constant throughout this period[54]. The model was designed to address the crisis environment, so one could think that it could later be outdated or even obsolete. However, in the present, it turned out that the model has proven that it is time-resistant, up-to-date, and usable in the past but also in the current situation.

The Athena Model arose from an identified problem related with micro and SMEs; either they have problems in being created, or in being maintained. One of the identified questions was related to the availability of data and its presentation. If, on the one hand, there is a trend to simplicity, on the other hand, the complexity and depth can be frightening:

- the trend to simplicity presents the information in an overly simplistic and superficial way and can lead to underestimation, e.g. to the creation of a company without a basic viability study;
- the trend to complexity presents the information in an overly complicated and profound way that can lead to overestimation, e.g. the company or business creation is postponed or abandoned due to the difficult and risky steps required.

Misinterpretation, misevaluation, and misjudgement can lead to negative and severe consequences, and the potential losses can be extensive. If the entrepreneurs learn about themselves, about the companies, and about their systems and systemic relationships and behaviours; if they know about design facets, value, and influence in companies; if they are more aware and

54 Some experts mention that pre-crisis conditions are very similar to those post-crisis, meaning that the lessons and knowledge that arose during the crisis were not learned and embedded, and similar mistakes are being made by the general population.

able to use and include them in their companies, the risks can be minimised, the loss can be reduced, and the value creation can be increased.

It seems necessary that entrepreneurs understand the companies' place in the system and their consequent role in the common welfare. It is invaluable that they develop a holistic understanding and their responsibility, namely to the Sustainable Growth and Longevity of their companies.

With this knowledge, users have chances to create, sustain, develop, and make their desired companies grow, with increased abilities to take better options, make effective decisions, and act accordingly.

The Athena Design & Company Model agglomerates information, and it encourages users' curiosity: from the "basics", the users can select and decide the direction, and search for deeper knowledge in the areas and subjects they are more curious about, or that they think are in need of.

Knowledge and use of the Athena Model allow for an information overview, to keep the knowledge in perspective, to visualise the chosen direction, and to identify the area to work.

At this stage, several questions were tough:

. How can decision-makers realise that some practices give better results, and some mistakes can be completely avoidable pitfalls?

. Through design, how is it possible to call their attention to existing knowledge and forecasting factors that can be used for the companies' management and development?

The primary focus of the research was on service-sector micro and SMEs. Several questions were raised relating to design, decision-makers, and companies, specifically about the way to introduce the several facets of design and their benefits into companies. According to the different facets, how it is possible to explain that:

. the Design Process can be used by companies focussing on the company, and on their products and services;

. Service Design, through its several methods and tools, can be used to

improve the company's product/service and service outcomes;

. Design can be integrated into all company levels. Strategic Design can be applied at the core of the company, an area in which design is not traditionally included;
. impacting the company core has cascading effects throughout the company in a top-down effect;
. understanding Design Thinking methodology and tools, and including them in companies, produces positive effects;
. qualitative and quantitative benefits can be achieved by several facets of design. If they are used strategically, they can generate a combination of coordinated results bigger than the sum of the parts;
. all the benefits and increases in quality affect the overall company value and quality.

The Athena Design & Company Model emerged from all the previous and cumulative assumptions. Apart from the implicit design knowledge, this model includes concepts such as time, evolution, entrepreneur, company, context, system, and systemic influence. Functions included in the model since its early iterations were to allow identification and understanding of the past and the cause-and-effect phenomenon, and simulating the present. Through visualisation, it enables forecasting the effects of specific actions, and identifying required actions to achieve desired effects.

Presented in these Figures 42, 43, 44 and 45, the first concepts included in the Athena Model were: time, the company (and its evolutionary stages), the company context, the system, and the design process, presented after to the experts.

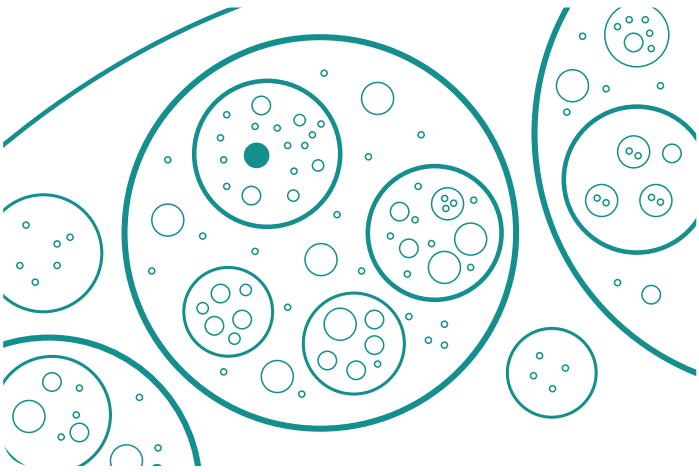


Figure 42: The companies' context (the system)

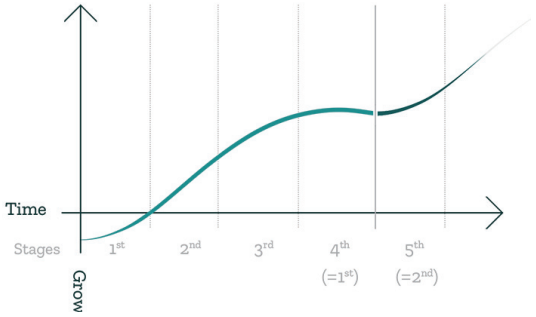


Figure 43: Companies' evolution and stages through time

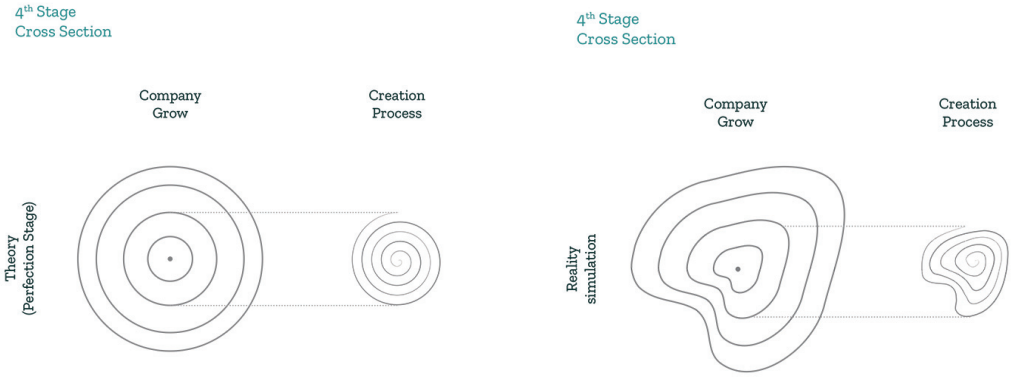


Figure 44: The company, its' evolution, and the development process
Figure 45: Consequences of context change and its influence in the company, its evolution, and in the development process

The conceptual and graphical Athena Design & Company Model was emerging. From the above schemes, the first draft of the Athena Model was similar to the one presented below and included design, time, development, company, context, and process.

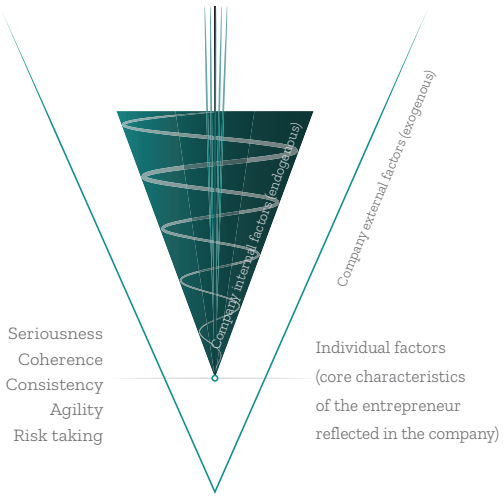


Figure 46: The Athena model, individual factors of the Entrepreneurs and endogenous and exogenous factors of the company. Adapted from the first hand-drawn drafts

The design process explored and deepened the model and clarified its content, basis, and structure. In the following figure, factors such as different individual values and the external macro environment (and others in-between, such as business) are presented, displaying that the model includes variety, complexity, and transparency, and highlights time.

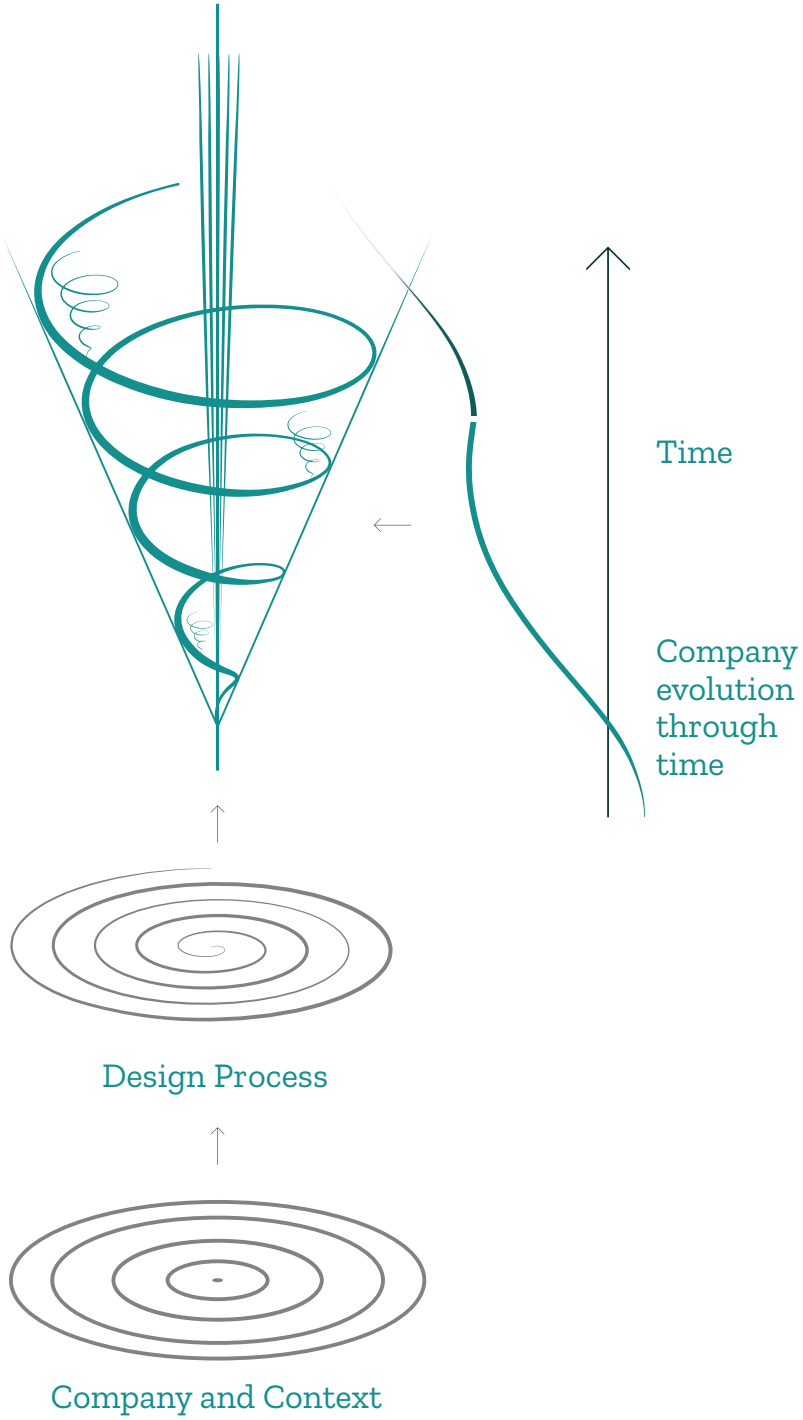


Figure 47: The Athena Model as a result of the context and company life-cycle stages through time. Adapted from hand-drawn drafts

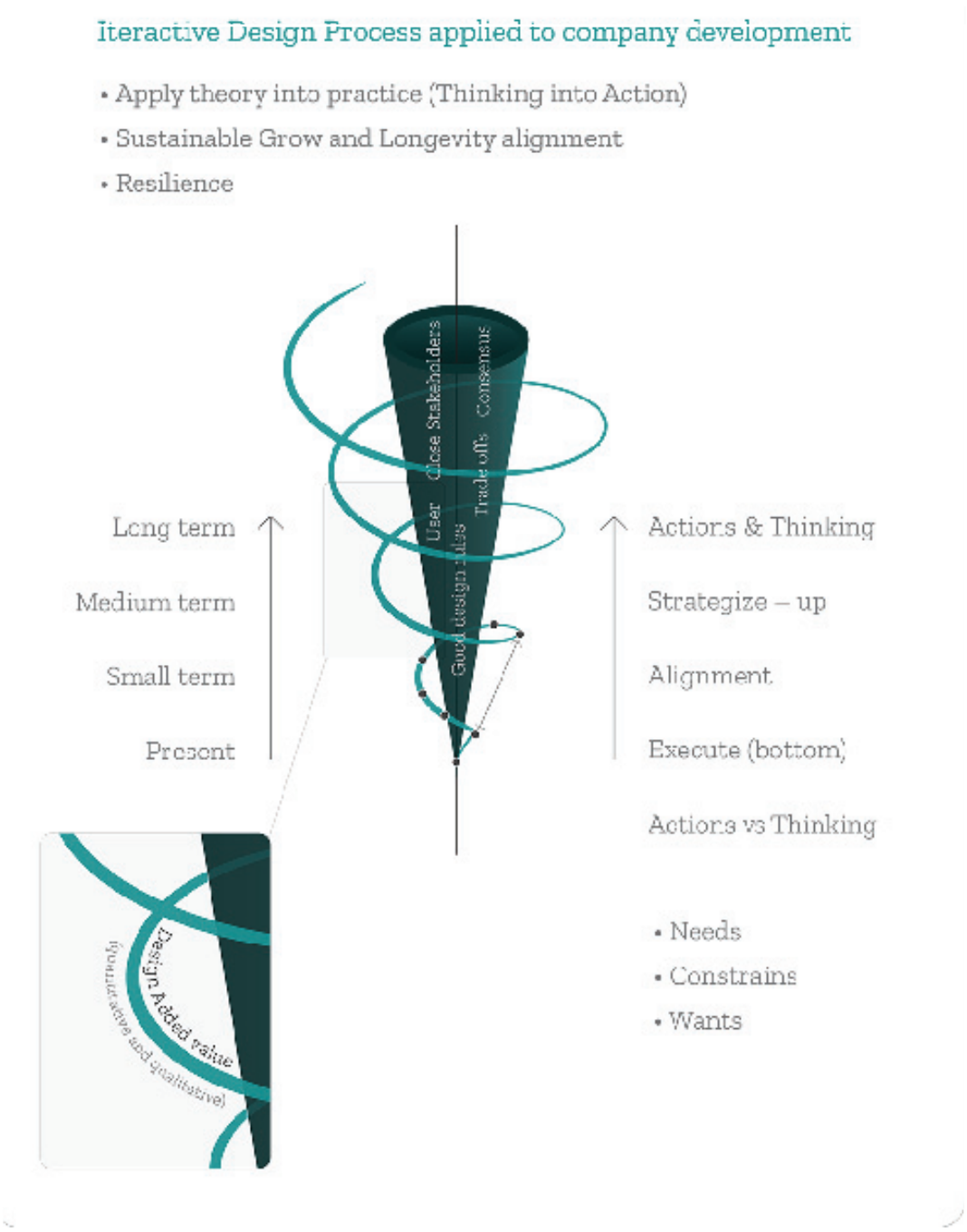


Figure 48: The Athena Model perspective view focusing in the sporal.
Adapted from hand drawn drafts

A profound reflection and thinking process was conducted from the included theory and its alignment with the values of Sustainable Growth and Longevity.

As can be seen in the Figure 48, the model presents the importance of thinking through time (vertical) and the design process. Intrinsic in the model, but not visible, are the need to include and answer the users; to include the constraints; to identify the growth stages with the decision levels and their development; and also the created benefits and added value.

4.03 Experts' Interviews - Evaluation and Consultation

At this stage of the model development, the importance of having external inputs was identified, separate to the researcher and close peers.

The evaluation of the model concept stage, through the experts' consultation, would allow further development. Other communication opportunities arose, and these dissemination moments were also significant to gather inputs to this stage.

Introductory note to the interviews

The preliminary model was presented to experts in individual interviews, performed in Portuguese, and audio-recorded[55].

Several original and supporting documents are presented in annexes 18, 19, 20, and 21[56] , as well as the interview-related files, answers, evaluation, and findings (e.g. the interview structure, the answer analysis matrix, and the selections of relevant parts of the answers).

The interviews were invaluable for the research development. The experts' availability, generosity, and knowledge sharing must be highlighted, and the researcher's gratitude must be mentioned.

None of the experts knew the research project in depth, and none of them knew the Athena Model at all. The experts' consultation had two main focusses: one of them was to evaluate the presented model (version 1.1), and the other was to receive their professional opinions and insights[57].

55 The original working documents are in Portuguese. Only the selected data is translated.

56 From the interviews and the interviewed experts, certain elements are available for consultation: the recorded audio of the interviews, and the permissions in image files. The referenced annexes are:
. Annex 18 - Experts' Interviews - Answers Transcription per Expert (pt)
. Annex 19 - Experts' Interviews - Authorization and Questions (pt)
. Annex 20 - Experts' Interviews - Files table and Selected Answers Transcriptions per Question (eng)
. Annex 21 - Experts' Interviews - Experts' Biographies and Data (pt/eng)

57 The appropriate ones would be included the in the model's development and future versions.

The selected experts were very kind in participating in the interviews and their resumed biographies or curriculum vitae are presented in annex 21. They had different backgrounds and work histories, representing different professions, broad areas of expertise (e.g. design, economics, and management), and other professional characteristics, as it is briefly displayed in the following list:

. students and researchers at various levels;
. entrepreneurs and company owners;
. experts in business and entrepreneurial ecosystems;
. expertise consultants for the Portuguese and other governments;
. freelancers and full-time employees.

The experts were interviewed in the following order (name and initials): Susana Couto (SC), Carlos Duarte (CD), Augusto Ribeiro (AR), António Cruz Rodrigues (ACR), Fernando Mendes (FM), Américo Mateus (AM), Filipa Pias (FP), and Paulo Nunes (PN).

Every interview followed a similar structure: after a brief presentation of the research by the researcher, permissions were requested, and the questions were presented. The recording began when the interview started with the model presentation, supported by slides (available in annex 17[58]). The presentation and discussion of the Athena Model took the most significant part of the interview. After the discussion, and acting as a summary, the questions were again presented and finally answered.

The primary objective of the specialist's appointments was to test the preliminary Athena Model, its abilities (content and shape), and to evaluate it. The simple presentation of the model was an effort to include the information in a simplified way, allowing different readings and outputs from the experts.

The questions covered the model evaluation and its potential, its inspirational power for service companies, improvement recommendations, dissemination guidelines, practical application advice, and strength and weakness analysis. In the questions area there was an open space for free writing on other relevant observations.

58 Annex 17 - Experts' Interviews - Support Presentation (pt)

After the interviews, the recordings were carefully listened to and transcribed. A selection and grouping of the relevant parts of the transcriptions, followed by their translation, was the natural development.

Presentation of the Answer Data and Relevant Samples

The summary of the answers to the quantitative questions is as follows:

A.a) - Model evaluation, 79% (3.95 values, in a 1 to 5 scale);

B.a) - Model potentiality evaluation, 85% (4.25 values, in a 1 to 5 scale);

C.a) - Model as inspiration for service companies, 87.5% (7 out of 8 were in agreement).

From all the questionnaire answers, some parts were selected. These citations are presented in the same order as the interviews initial structure.

A.a) - Model evaluation

A.a) 79% (3.95 values, in a 1 to 5 scale).

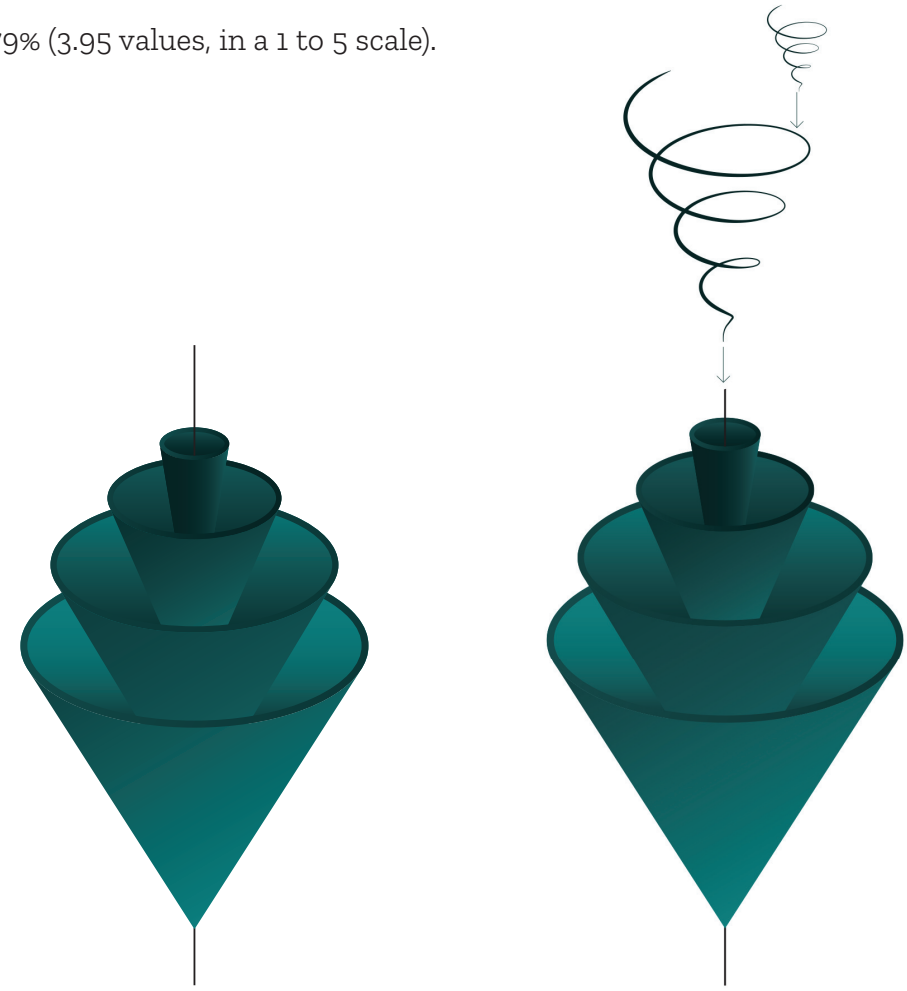


Figure 49: The Athena Model exploded perspective view of the four cones and the primary and secondary spirals

A.b) - Model evaluation

1 - SC "Consistent with the growth and longevity of the SME."

2 - CD "This will result in what? In a tool? This is what you still lack (...) it has to be usable, you have to get in there anything that can be manipulated, that has some data."

3 - AR "The model is constructive, it is oriented to a positive thing, and soon it is a good model, and well-founded in principles; some might not have folded, if they knew of a model (...) it is more than the simplification of a set of theories that have existed for years, that everyone knows but that no one uses. What is the appropriate indicator for this effect? How is this indicator used? As forms of application, sequences, all these are the tool put into practice. If these indicators are well-defined for that case, (...) precise indicators, it is enough to accompany them and know their evolution."

4 - ACR "I think there is a lot to do in design with design management in the true sense. Which is: what is the way to incorporate the advantages of strategic design? Much more than an inspiration, this is for the big ones to show them what they should have done, and for the little ones to show them what they should do and what they are going to get (...) an abstraction of change (linear, recursive or reverse-action) that somehow explains how they should be triggered. It is to provoke situations in a company, an essential course in the academy, which is to construct theories, practice these theories in academia, introduce these theories outside the academy, and then retrieve them for the cycle to close. It is this cycle that is there. There's a positive correlation between increased acceptance of facts and results. Today, companies are already saturated with talk, and they complain that already there have been a lot of people inside companies to put post-its on the walls. What happens to a company or range of companies, what is the best way to get there? It is not possible to arrive there without presenting facts. As a pedagogical application, in a second moment, the best way to get out of the overlapping moment is to bring companies into it, to do those actions. Everyone benefits. It can always be applied at all stages of business growth."

5 - FM "What is built so far, is well constructed and justified step by step, but we must go further."

6 - AM "To be a template has to be replicable and usable. From the theoretical point of view, it is a graphic and communication question that one perceives well... At present, there is a lack of better model application outlines because the user must be able to adapt it and/or feed it with new data or ideas. The model has two dimensions, one technique and the other empirical/pedagogical."

7 - FP "The model represents a process of development; it is not a linear process, but an organic process that allows to be expressed whether it has a solid structure, the development, and what is happening throughout, with a view to a Sustainable Development."

8 - PN "It is a theoretical model."

B.a) - Evaluation of the potential of the model

B.a) 85% (4.25 values, in a 1 to 5 scale).

B.b) - Evaluation of the potential of the model

1 - SC "By using a model that gives them an overview of how they are and how they want to move forward, what decisions to take, and how to measure various strategies, various ideas, and various external inputs, and that value creation strategies will then grow more."

2 - CD "I think it has potential, within the assumptions that I said before."

3 - AR "I agree with the template. The company is not an abstract thing; it is that person (...) who is curious, as intellectual curiosity exists in the entrepreneur. At the other extreme, we have the businessman who reacts *'je sais tout, il ne faut pas'*; this is a huge range of personalities. If this guy knows everything, it depends on the moment when this approach is made. I think this is good, it is giving corporate quality to the companies' nucleus."

4 - ACR "In abstraction, it is 5. The idea. I'm not being nice".

5 - FM "The current stage, with some more indications for what can be done, has an important value for the growth of service companies."

6 - AM "The model is clearly a model to stress-test the company ... it allows verification, in space and time, of the behaviour of a company or of an idea, using a series of parameters that can be adjusted or cause changes in the ecosystem that revolves around that company or that idea, but that is in the future, must have predictability and anticipation."

8 - PN "(...) an entrepreneur, at first, does not think about the process that will follow for the development of that company. The potential of this model may be there."

C.a) - Model as inspiration for service companies

C.a) 87.5% (7 yes out of 8).

C.b) - Model as inspiration for service companies

1 - SC "Any model, that allows critical thinking, an analysis of creative processes, tools for applying creativity, continuous improvement, and Strategic Design, is important and inspiring for companies."

2 - CD "It can be, obviously."

3 - AR "I have to address the human importance of companies as being the central link of a company that is a human being that has a team with them. How do you sell this idea to the team? Without doing this, it does not happen. There must be incentives to ensure that the team gets into the boat and rows properly, you have to orchestrate this. The conductor will be for the better or worse, he needs to be active; from a certain point they start to withdraw and everybody knows what they have to do. This is what a company is, business is what this is. The importance of human resources: the importance of doing things and of who does them."

4 - ACR "Of course, you can."

5 - FM "It must allow companies to see what results (they will achieve) from the launch of new products or any external influences."

6 - AM "Yes, it can be an inspiration according to what I said earlier."

7 - FP "(...) companies and the designers themselves have to realise how much they can have when using the model, which will require a great deal of effort to convince them."

8 - PN "A company never exists or is created, because of a model. In companies at risk, the model can function as a support tool."

D.a) - Improvement recommendations

1 - SC "Text description of the various phases of the various drawings."

2 - CD "Regarding the improvement of the model, I would only refer to the question of practical application (...) of the model itself. I think you are still going to have to work on this a little bit. My point is (...) the question of practical application is open. We should think a little about the 'how'."

3 - AR "The improvement of the model is in Human Resources."

4 - ACR "Introduction of 'un-blockers' in the model, coincidences, ok let's think about it. It is abstraction and easily perceived; then it contains a point, a deviation, a variation that is strategically adequate."

5 - FM "Technically the model, to be applied in entrepreneurial ecosystems,

must allow companies to perceive what results from the launch of new products or from any external influences. There is pedagogic potential... one looks at the model, and one realises that one has to do other things (to change the effects)"

6 - AM "(...) getting to the detail means demonstrating how deformation is anticipated and how deformation reacts. How can we have predefined deformation response tools that will quickly allow the deformation to return to the average position? Focus on intersections and action/reaction; predictive and descriptive; reactions to the impact of the action. Modelling within a stage of growth, and in this phase modelling one or two examples, and the creation of tools linked to the intersection between the possible internal/external impact/reaction on the company growth model; (...) defining one or two tools; validating through a case of action/reaction; and action research of a small case; and noticing the effects that these proposed tools have. Hence, we can draw a set of lessons, which could be: thinking tools at all stages "

7 - FP "As for the improvement of the model, it will have to be applied to a company that is being born and to another that is at risk to perceive the difficulties they feel and the way they interact with them (difficulties). "

8 - PN "The improvement of the model entails finding objectives for each step and for its dissemination."

D.b) - Divulgation recommendations

1 - SC "In terms of communication, present a session with small and medium-sized enterprises and request some inputs. They can be start-ups, companies in difficulty or in recovery."

2 - CD "Regarding the disclosure, my suggestion is a design and creativity focus, (...) *Clube dos Criativos*, here in IADE (...) Obviously, within the dynamics that are happening today within the area of the digital economy, start-ups, this is a perfectly applicable model (...). Obviously, the doctorate is, in general, a disclosure. Therefore, to extrapolate it out of academia is one of the aspects."

3 - AR "Disclosure in business associations."

4 - ACR "The best way to get the model out is in action. At every cost, it must be a demonstration. It must do two types of action: one, during a morning, that has a very theoretical character but it has an element of practicality that often leads to reflect on ... to an action that aims to diagnose strategies, I would say a few days."

5 - FM "With the proposed developments, the model is perfectly capable of being

communicated (in entrepreneurial ecosystems)."

6 - AM "The dissemination of the model must be done within the entrepreneurial ecosystems ... it is all about speed."

7 - FP "(...) entrepreneurs."

8 - PN "(...) its dissemination, from the educational point of view, to the institutions that encourage the creation of new companies and start-ups."

D.c) - Practical application recommendations

1 - SC "Practical application: select a few SMEs to test the model."

2 - CD "You can turn it into a tool, an analysis tool, a decision support tool if you want. Obviously, the doctorate is, in general, a disclosure. Therefore, to extrapolate it out of academia is one of the aspects."

3 - AR "The practical application of the model mixes the application of networks, which is another Ph.D. thesis. The networks have a huge resource in savings (...) the brand, ultralow prices in advertising, buying in scale that gives other conditions. These factors have an important representation in numbers and results. The practical application of the model can enter into the domain of knowledge and know-how. This model is open to demonstrations, demonstration actions to entrepreneurs of a sector (...). Presentation of results, replicas that can be taken by other companies. This is the practical application of the model. For those who want to do something 'in certain conditions', there is the question of human resources. There is (...) the contradiction that is making an analysis of micro-phenomena for a very diverse range of companies (...)"

4 - ACR "(...) to develop a specific work with companies: make a diagnosis, simulated in the previous action that captivated them, and then there is something that goes to an activation, to make the results tangible."

5 - FM "It is possible to demonstrate that it has practical applicability and, as is good in science, it remains a model and others can contribute to its finalisation and evolution."

6 - AM "The model has to be applied in cities... The country is a macro-structure that cannot keep up with the speed of the city, just as the city cannot keep up with the speed of a company and it does not keep pace with an entrepreneur (...)"

7 - FP "Have training and information, but there will be many difficulties in applying the model as it is defined; it must have some incentive to use it. The model has to be deconstructed so that it can be used and applied."

8 - PN "(...) the support tool that forces the manager to think about his/her company and what he/she is doing with it."

E.a) - Strengths

1 - SC "Application of the creative process in the strategy and management of the company. Enhance internal capacity to innovate and attract more customers. Creation of new models and projects with external inputs."

2 - CD "The strengths are a vision of sustainability and management for a company."

3 - AR "Strong points: There are two concepts that are sub-adjacent to this thesis: this facilitates one thing that I witness as marvel that is the concept of quality, in the sense of ISOs (norms from the International Organization for Standardization). There is nothing more 'bacteriologically pure' in a company. There is a lot of false quality (...). Another issue that is fundamental and that is beyond quality is progress, the progression that is evidenced in this principle. This is dynamic, and has phases, pinch-points, and shocks, but it is always moving (You may) explore demonstration forms, regardless of its academic basis."

4 - ACR "Strengths: simplicity, we are in a world of simplicity ..."

5 - FM "Strengths: Connecting the issues and management of an organisation, and the intersection with strategic design, which it is clear. Also, the issue of visualisation is clear; the model is easily identifiable due to its infographic expression. What you have shown is a point-to-point evolution of finding two intersecting things. It is an evolutionary design process, with time-mapping of the growth that takes place within an organisation."

6 - AM "Strengths: the innovative character and the potential for dissemination."

7 - FP "Represents a process of development. It is not a linear process, but an organic process that allows expression of whether it has a solid structure, of development, and of what is happening."

8 - PN "The strength of this model is the potential for the development of a support tool that forces the manager to think about his/her company and what he/she is doing with it."

E.b) - Weaknesses

1 - SC "The results expected (...) are not quantified, and the durability and use of the model in practice: what is the use? Is it for a period or is it a continuous use? In what period should it be applied? How to use the tool and what data to enter afterwards?"

2 - CD "(...) development and practical application."

3 - AR "Is the model so standardised? (...) In such a diverse universe that normally

happens, the applicability? It is not so applicable... But you said it is going to be adjusted. Another thing is the expected results, a cause-and-effect relationship of these things (which is what makes it better and why)."

4 - ACR "You do not have it for now. It may be what I have presented for the improvement of the model that is what we put in the way objectively, what triggers everything and brings everything..."

5 - FM "Weaknesses: the complexity of the model - if it is too complex, it is not usable. So, it has to be simplified."

6 - AM "Less positive points are solution drivers. The need to go to the operational component and 'tooling', that is, we are in the concept, and I think the model needs at least a strand or two to get to the operational, showing its practical applicability through tools."

7 - FP "It needs to be more practical (less theoretical). You have to explain the benefits to users."

8 - PN "Needs further development."

F - Other relevant observations

1 - SC "An analysis of the specifics of each activity sector should be made. It should be tried to benchmark with other existing models, and check if there is any possibility of joint use and how to evaluate the degree of effectiveness of the model."

2 - CD "Keywords: emergent behaviours, economic cycles, cooperation, mutual aid, the principle of minimum action, simplicity and complexity, complex versus complicated."

3 - AR "This is an important corner to fold: the doctorate is the recognition of that seal (the model). From there: 'I did it, but this can be done in a company'. You have an audience of interest to capture. It is done, the seal has been given, and we are going to start developing with it (...) it is important to have a PhD. You have two aspects: the business, that is the market, and the school side (education) that is another. For education, it needs to be easier, simpler, to (make them) realise, (it is a) less risky (way to test things)."

4 - ACR "The only observation is: how do you talk about 'services' so much when this applies to everything? It is no longer vague, it is more useful, and it has a much greater breadth of accomplishment, which is a strong point. I am troubled by the word 'service' that is (negatively) loaded."

5 - FM "These more scientific models, such as the one you are building, need to be very clear on the points of differentiation of the other 'stories' that walk around;

and I think the path you are building may be important in this component of 'separating the wheat from the chaff' with academic knowledge and scientific knowledge, that is built (by you) and not bought from others. One of the relevant components is to have scientific character and, therefore, I think it is important to (develop) some operational and practical component."
6 - AM "You need more or less detail in the description of the model and (from the operational point of view) how it is done and what it does."

From the interviews, several findings could be identified.

The presentation of the findings is structured as follows:

. the Athena Model;
. the model evolution;
. the model´s applications;
. the model´s benefits;
. advice on the model's design;
. evolution from the model to a future tool;
. future tool design;
. dissemination of the model.

The Athena Model

From the presented hand-drawn drafts, the experts identified and understood the Athena Model as a theoretical, conceptual, and graphical model. The Athena Model had the characteristics to be potentially applied to "any" case. They identified it as the result of academic and scientific knowledge, incorporating much knowledge and being "more than a set of existing theories". The model was determined to be following the standard scientific cycle, from reality to abstraction, and then back to reality (through its dissemination and future use). It was unanimous that design knowledge, methodologies, and tools were used to design the model and were incorporated into it. Design Thinking, Design Process, Design Management, Design Strategy, and Design Benefits were easily identified, especially by design experts. The spiral process embeds the Design Process.

The model's coherence and consistency with the business world and companies were seen by the experts, who have also seen its cause-and-effect properties.
At an extreme, some experts have realised the relationships created by the model and some companies or situations, and several questions (e.g. "if the owners knew

the model, would those companies have had that end?") address company disappearance cases from the crisis period and the past.

The majority of the experts had the opinion that the model concept was well-constructed, justified, and it was understandable. The model's simplicity makes it easily identifiable, and its infographic expression permits a clear visualisation. Version 1.1 of the model had good graphical and communication abilities and potential, and favoured the visualisation of time (e.g. past, present, and future). The model also represented an organic development process. The model can help companies to achieve better business development, sustainability, and company longevity, contributing to global sustainable development values. The model corresponds to the fundamental characteristics of conceptual and theoretical model development: it arose from a real problem that was processed theoretically ending in a new product which was returned to its real origins to be used. The model is so inclusive that, in theory, it can be applied to all cases (not only to service companies).

As a scientific model, the Athena Model "remains a model and others can contribute to its evolution". The developed Athena Model can be the creation base for new studies and works.

The Model Evolution

Some of the experts identified that the model should be developed to be used as a sort of a template (replicable and usable), and the detail and description levels should be deep with the potential to be explored by different users with different needs.

A more developed version of the model should be tested with a set of selected SMEs: the users should be embodied in the model design process (test, develop, etc.).

All the experts pinpointed that, to generate new model versions, the presented preliminary version needed graphic design development.

The Model´s Applications

Almost all the experts recognised that the model has technical, empirical, and pedagogical applications.

One expert in particular mentioned and underlined that the Athena Model should

be applied in cities, which have more manageable scale and speed properties and relationships.

The Model´s Benefits

Several experts mentioned that value-creation in companies, including in service companies, would be optimised by knowledge and use of the model. With the model's centre and reinforcement in "the core person of the company", the model knowledge and use would result in more corporate quality in the company as a whole, and definitely in the company nucleus.

The lack of vision about general company processes, the need for continuous improvement, and inadequate critical thinking were identified by some experts as knowledge commonly missing in entrepreneurs. The limited or total lack of knowledge of creativity (e.g. process, analysis, tools) and design were also referred to. It was stated by several experts that the model presents clear arguments (e.g. the company development process), reducing their knowledge gap in those subjects and enhancing the internal capacity to innovate and attract more customers.

One of the experts pointed out that, for companies in crisis, the model could inspire a transformation, and could work as a change support tool. However, these same experts also affirmed that "there is no danger that any individual wants to become an entrepreneur and to create their own company just by being introduced to the model and its knowledge".

However, it was mentioned that it may be important that the model is taught, particularly due to its ability to aid visualisation of the development process and cause-and-effect relationships over time.

Advice on the Model's Design

On this subject, the experts have mentioned:

- "The doctorate is the recognition that seals the model". So, immediately after the academic approval, the model should evolve in education and market directions. An investment should be made in dissemination and, later on, in development and use of a tool.
- "Scientific models (...) need to be very clear on their points of differentiation."
- The focus should be on human resources. With a real effort into explaining the benefits to the users, it is possible to conquer the company core. After that, it is necessary to orchestrate the whole process: present the model to the team, give them incentives, and allow them to follow and use it.

Evolution from the Model to a Future Tool

After approval by academia, the model must be actionable, through development of a tool that, later on, can be applied to real-world situations. This tool should be designed based on the model and in its further mathematically developed version. It should be very practical and user-friendly. With the tool, it will be possible to understand the effects of a wide range of causes.

Knowledge of the model and the tool can avoid the continuation of negative situations within companies; and allows anticipation, verification, and predictability of actions and behaviours in time and space.

About the question of scale and speed, the tool should be applied at the city-scale. The scale of the entrepreneur is very fast but very small; the company-scale is a little larger and less fast, but the city allows its use in a number of businesses, has a slower rhythm, and provides a sample of its application across the whole country.

Future Tool Design

On this field, the experts have suggested:

. The model and the tool must be benchmarked against similar and dissimilar ones.

. The tool design must be developed after this important step, raising the areas where there is a strong differentiation and including the good parts of the other models and theories.

. The tool should permit analyses by company sector. It must be "open to 'emergent behaviours', economic cycles, cooperation, mutual aid, the principle of minimum action, simplicity and complexity, complex versus complicated."

. The tool must evaluate the effectiveness of its use.

Use of the tool in a proactive way can lead to the better use of small business networks. For example, having determined a need using the tool, and therefore needing to find a partner for a particular service or activity, it would be possible to develop a second project, linked to the first model and tool. Together, they can stimulate and support these networks between companies, facilitating the management of networks of small-sized service or production businesses.

Dissemination of the Model

For its dissemination and use, it needs to be communicated through information and training sessions, and in the case of companies there should be a promotion strategy, so that their owners feel motivated to allocate time to understand and apply the model. That is to say that it is conceivable that the sessions will be both informative and productive work. For example, for students or companies, they could consist of a theoretical part which explains the model and how it works and, afterwards, there would be practical exercises concerning real cases of their own companies or other situations, which are fundamental:

. to education: in universities and research centres (*Clube dos Criativos*, IADE), in other formal educational institutions, and at other levels;

. to business: entrepreneurial and start-up organisations; in the entrepreneurial ecosystem; with start-up promoters and supporters; and business associations. Sessions with small and medium-sized enterprises can be theoretical and practical, with real exercises, demonstrations, and actions specific to the sector.

4.03. 01 Other Inputs Raised During Dissemination Events

Via Criativa

The researcher was invited to present the research project and the model in a workshop of the *Via Criativa* project's first international meeting. The presentation was adapted to the fine points of the *Via Criativa* project, the international audience, and the specifics of the Alentejo region.

This intersection of local examples and an international audience gave very interesting results that reinforced the research project's pertinence, and the partial findings obtained from the questionnaire and the case study. The theoretical model was successfully applied to different real cases with positive reactions from the public.

Regarding *Via Criativa*, their services are connected with traditional production activities, their development, improvement, and employment creation affecting the quality of life of the population, the social, economic, and cultural life of the region. *Via Criativa* uses design as a connector and integrator of people with several different facets (e.g. age and experience), and also improves the

synergies between institutions and people to obtain better results. Connecting design and local development favours the population and its sustainability. Introducing innovation to local traditions and businesses, increasing the design and business literacy of the population, and introducing them to the connection with academia is important for this and other associations, and to similar local development organisations and partnerships.

23rd PubhD Lisbon

The researcher was invited to present the research project and the model to the 23rd PubhD de Lisboa, an international initiative that started in England, promoted by young researchers that wanted to share their research projects. Each session has three presentations from different scientific areas and authors. The presentation order is defined according to the presenters in the most logical order. The sequence is one presentation, a discussion period with the audience on that research, and a short break. It repeats this cycle for each project and, at the end, there is an opportunity for discussion of all the research projects and their connections and differences with anyone who wants to participate. This science dissemination shares research projects and encourages discussion of and between them, usually creating unexpected results.

In the session, after a presentation on psychology and use of decision-making, and before a theoretical presentation on design philosophy and ethics issues, this research project and the model were presented, and a wrap-up of the three themes was made. As the first research project, the academic development was born from real questions and needs of contemporary society, and it is to be expected that the research work's outcomes will be implemented in society with positive results.

In this 23rd PubhD session, the discussion of the model developed through the theories of natural evolution, systems, and design presented in the model. The discussion also approached psychology (for example regarding the model's dissemination to different audiences) and decision-making by companies' core policy and decision-makers, and the expected and achieved results. It was also highlighted that the model could impact the strategy of companies, be implemented as strategic, thus influencing the sustainability and longevity of the companies and their ecosystems.

4.03.02 Summary of the Findings of the Experts' Interviews and Dissemination Events

The model was designed through unifying several theories and models in a comprehensive way, that makes them easy to understand, relate to, and remember by the users. The model is understandable, and allows good visibility of the addressed company and community problems.

It shows the contained design, business, and company knowledge, but also in management and strategy, and permits approaches to all the decision levels of companies. It combines several theories and models that, after being understood, can be used in real life. Applying the model in companies can increase their Sustainable Growth and Longevity, thus impacting social and economic welfare.

Conceptually and theoretically, the Athena Model can be applied in many company stages and situations in any evolving system, not only in service companies. One of the Athena Model's benefits is related to identification, and it can be a decision supporter to the company strategy. It can be applied in the field, directly in small-sized and traditional community businesses. It allows the fast visualisation and intelligibility of the contents. It can be used to shake up the present *status quo*, to influence decision-making, and to develop the private benefits of traditional and family businesses. Through the simulation of cause-and-effect phenomena, it can reinforce a more Sustainable Growth and Longevity of local businesses and thus regional sustainable development.

The model is easy to understand and use by local business owners and companies; it is a design integrator, promotes literacy in business and corporate knowledge and design, and brings academic knowledge to the population. The model promotes the link of complex theoretical information to the individual. The knowledge transfer between academia and 'the real world' is enhanced by changing the communication style to that of the model, which favours knowledge acquisition and comprehension. It is also important for local development and innovation, being an inspiration to create new businesses, informing and inciting the younger generations, and also attracting and retaining the population of new and old businesses.

It was advised that the design of the new model version should focus on further evolution in contents, support, and graphic design; the Athena Design & Company Model version 1.2.

The model dissemination should be done in business associations, start-ups, entrepreneurial organisations, academia and research centres, and to other education levels through schools. Institutions like IAPMEI should be contacted. Dissemination to academia should promote multidisciplinary interest, teamwork, and further development.

Regional and business associations for local development, and smaller groups such as those with traditional and handicraft knowledge and know-how and regional and green products should also be included.

For the future research and development of the design of Athena Design & Company Model version 1.2, the need to design of a mathematical version of the model was pointed out. From that development it will be possible to develop the tool for the end-users.

The tool must be usable, with several parameters and specifications from the different knowledge areas, which implicates a co-design process between the users and a multidisciplinary team. It must be simple, and show cause-and-effect relationships visually, by its changing shape but also with deeper information whether numerical or graphical.

4.04 The Athena Design & Company Model, version 1.2

4.04.01 Inputs Integration and Further Developments

During the model development and the experts' interviews, some paradigms and questions arose, such as:

. Business support activities and other specialised functions are mainly performed by the entrepreneur. Sharing costs, business support activities, and other experts and consultants can be a less expensive and more achievable way of obtaining them.

. The majority of companies start by being micro-sized businesses, the most fragile and sensitive. Is it possible to influence their structure and shape such that they are more resistant from their beginning? With these changes, can the dissolution and bankruptcy numbers assume a positive change?

. Is it possible to influence companies to increase their competitiveness from the start?

. With increasing lifetime, size, and productivity, are companies better prepared to focus and pursue Sustainable Growth and Longevity?

. With better support and overcoming initial insecurities, is it possible to focus on company efficiency, continuity, development, and quality?

. Is it possible to influence entrepreneurs and decision-makers through collaboration, cooperation or association, to transform them into companies with stronger-structures?

. Is it possible that influencing the company's central person (entrepreneur, owner, manager, leader) can change and improve the company´s mind-set and culture, raising investments in design and its benefits?

. Is it possible that, if the model is known and understood, it can be remembered through a referential charm?

Keeping the core principles of the Athena Model version 1.1, further research and work was conducted, including pertinent inputs from experts, natural research developments, and overcoming new questions resulting of the previous stages.

It was evident that through design potential (Strategic Design, Service Design, Design Thinking, Design Processes, Design Strategies, Design Methods, Design Tools, Specific Areas of Design, and Design Benefits) the desired benefits could be related with Sustainable Growth and Longevity, and thus with global economic and social welfare.

Athena Design & Company Model, version 1.2, was developed from the data and findings collected. Several tables and tools were developed to simplify and structure the information to be included in the model, and some theory was revisited to give a stronger foundation to the Athena Model and its presentation.

Athena Model version 1.2 is the one that is presented in detail in this document. It is to be noted that the mentioned tool has never been part of this research. The tool design and development are referenced in the future research and developments, as an anticipated future continuation of this research project.

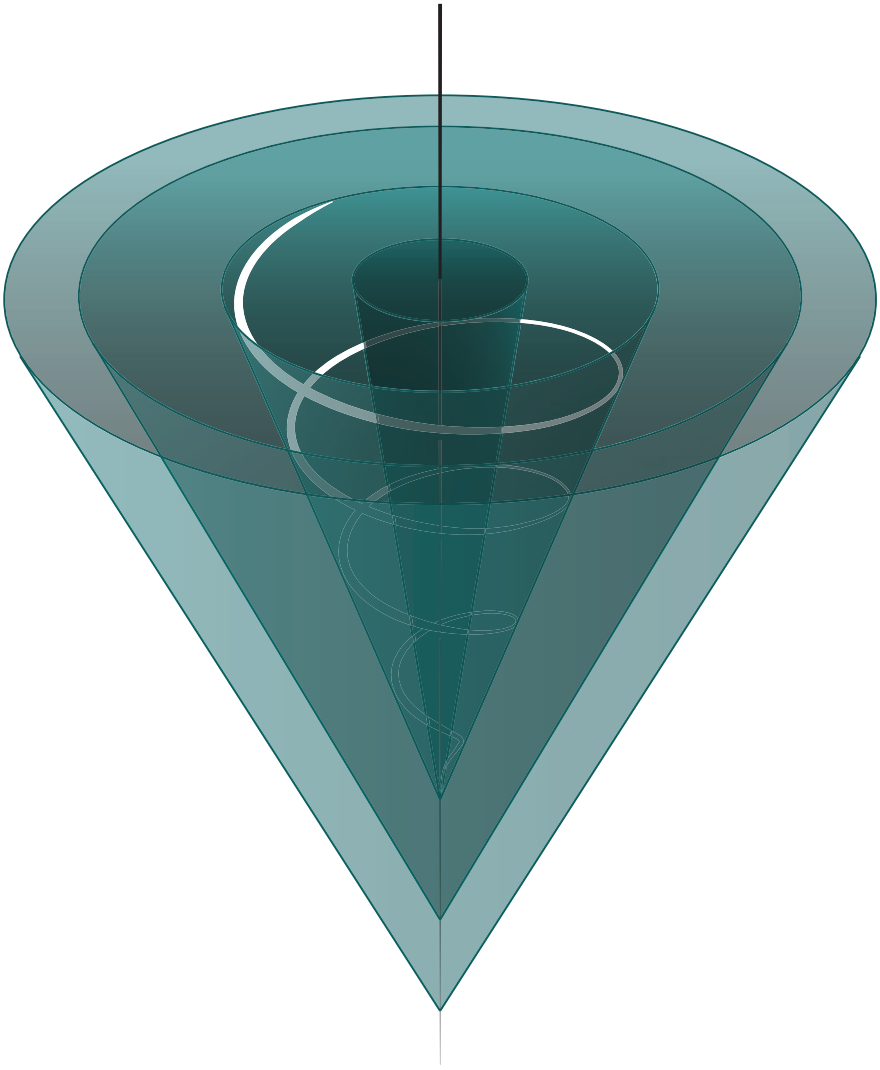


Figure 50: The Athena Model transparent perspective view

4.04.02 Description of the Athena Design & Company Model

As has been referred to before, the model transforms implicit information and knowledge into explicit, ordered, memorable, and usable knowledge. It was developed knowing that the procedural memory is the most stable and that the visual memory is considered the most important one, and the most exploited in the contemporary world.

The model contents are defined and contained, as a representation of reality. However, blurred and faded contents, borders, and frontiers do not belong to world reality. Direction, instead of a strict definition, is a feature well-defined since the beginning of this research project.

The Athena Model Components

Synthetically, one can say that the model has one axis, four cones, and one spiral. The cones are nested inside one another. The model develops through time, which is represented by the upward evolution. Time is strictly correlated with companies' development stages.

The main model areas are the company, the company development process, and the context it is in. The company (organisation) embodies the axis, the first cone, and the second cone. The spiral represents the development process of the company. The context holds the third cone and the fourth cone.

The company (organisation) is represented by the axis and the two central cones:

. the axis is the essence, the primary structure of the company from its foundation. It represents the first and most fundamental structure of all, and also the individual or individuals (nuclear team) that thought of, created, and invested in the company, their system of beliefs and leadership. It represents the core essence of the company, where the strategic decisions are taken; it contains the initial system and processes of the company. It is the spine of the company. Later, the axis strengthens, and incorporates the company board;

. the first cone, the primary one, represents the company evolution, the intrinsic elements that include the first members of the next team stage (new elements, employees/workers); it is composed by the surrounding parts, e.g. the supportive areas of the company including ICT, HR, sales, and financial support;

. the second cone represents the internal part of the company, which is the one created according to evolutionary needs, e.g. other team workers and company enlargement; shareholders, competitors, and other players; technological evolution, laws, and rules; and market changes in the business area. It contains the borderline between the company and the context.
The first two cones are fundamentally based on the belief system of the creators, defining the leadership, the strategy, and the other core themes of a company. They define the company's assets, liabilities, systems, and processes.

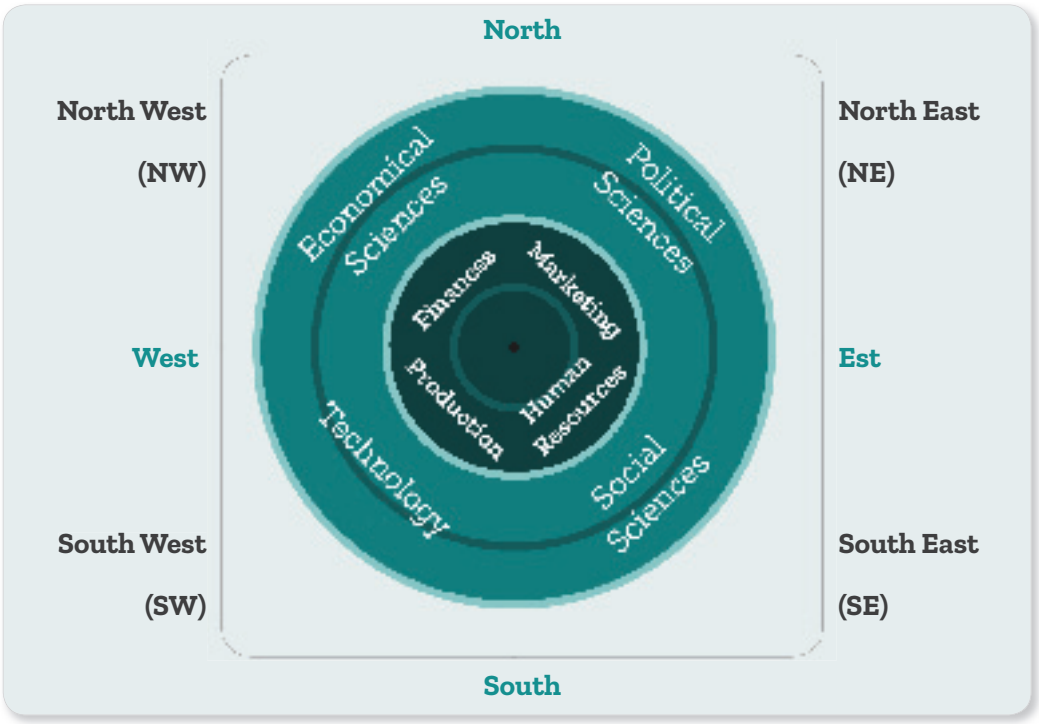


Figure 51: The Athena Model, the company and the context areas and their subjects

The spiral represents the development process of the company, and it is the structure that keeps together and holds the company boundaries, like a company "rib-cage".

The spiral is an adaptation of the developing process of companies and the Design Process basics, explored in the Design Process section. The commonly-outlined cyclical scheme from the first phase (the problem) to

the end (the solution) is an iterative process with progression and regression moments. Between the beginning and the end phases, several can be included covering the research, analyses, syntheses, creativity, concepts, development, tests, and market launch, usually ending back where it began.

For the Athena Model, the process was adapted from existing spiral-shaped processes. The beginning of the process starts on the vertical vector, and it accompanies the progress of time, evolving upwards from that moment.

The spiral is the basis for the smaller spirals that arise through time as the development processes of the company's products and services. They can start with a client's new desire or be based on previous processes' loose ends or ideas.

The context in which the company sits is represented by the third and fourth cones:
. the third cone is the extrinsic cone, the nearest to the company. It symbolises all the stakeholders, from users and clients to suppliers and retailers; it also includes all the partners, competitors, and the market, and all the other company proximity factors;
. the fourth cone is the external context including all the macro scale subjects either national or international.
The context includes the extrinsic cone that contains the external people who establish contact with the company; and the external environment cone that covers all the macro factors, which are beyond the control of but influence the company.

Table 27: The Athena Model, six components and some characteristics

	The company			The Process	The context	
Name	Axis (essence)	Intrinsic area	Internal area	Spiral (process)	Extrinsic area	External area
Element	Core spine (board)	1st cone	2nd cone	Rib cage (all the Processes)	3rd cone	4th cone
Scale	Nano (to Macro)	Micro	Micro & Medium	From Nano to Macro	Medium & Macro	Macro

Deepening the Included Data

The Axis

This structure represents the company spine from the beginning, the individual, entrepreneur, and investor. As was found in the literature and in the data collection tools (it is evident in the questionnaires), it is very common that companies are an individual project, which later on includes other individuals. Accordingly, the personality, thinking processes, mind-sets, and value systems are reflected in the company from its early stages: resilience, obsession, delayed gratification, and an ability to live in ambiguity are typical characteristics.

The entrepreneurs´ knowledge, skills, and abilities are also relevant and influential in the company's creation, development, and core, which result from the know-how and knowledge background such as training areas and previous professional experience.

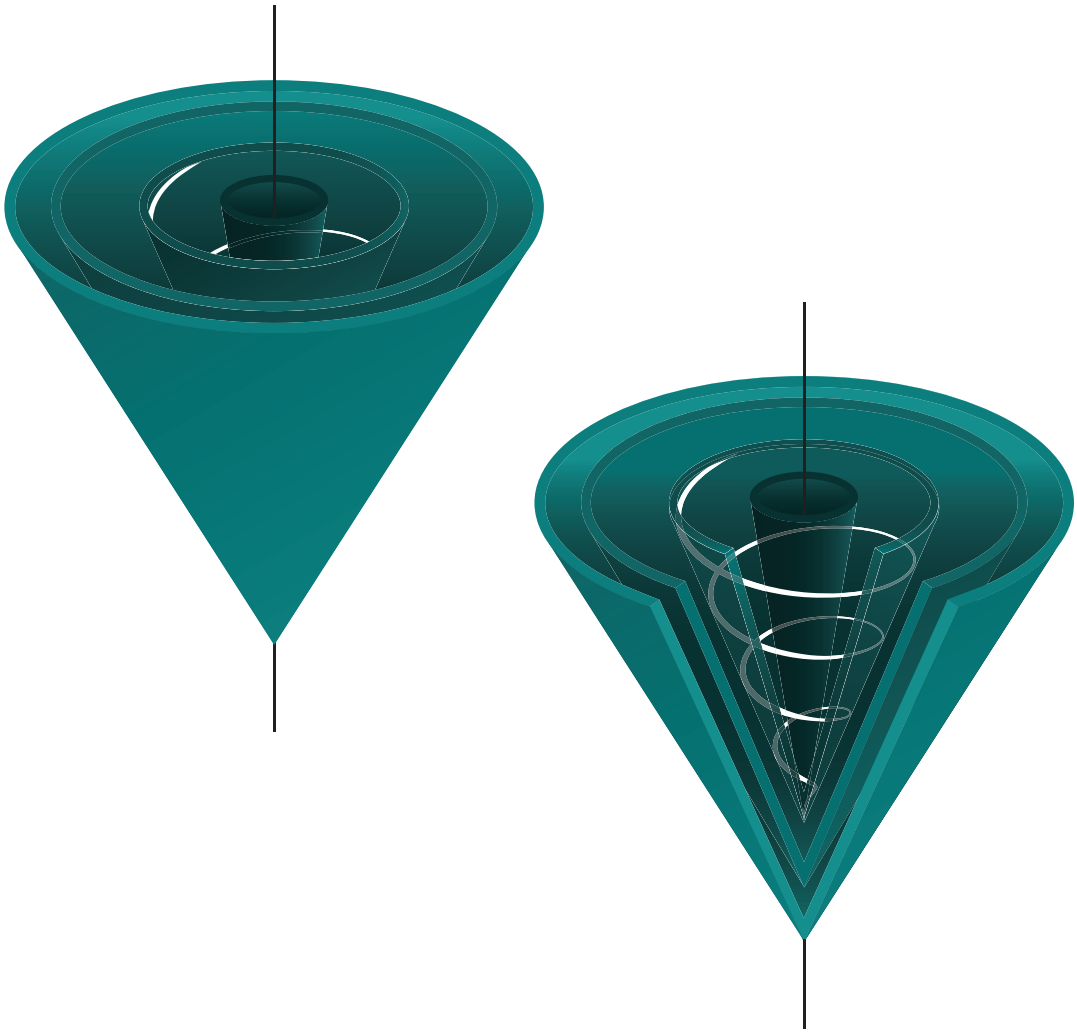


Figure 52: The Athena Model perspectives

The cones

Just considering the cones, the Athena Model is a structure divided by four concentric cones. The perspectives presenteWd in Figure 52 allow a better understanding of the constituent parts and the Figure 51, Figure 53 and Figure 54.

Using simple geographic references, one can consider that the model is divided into four quadrants, by the North-South (N-S) and the East-West (E-W) vectors. Each of the four areas North East (NE), North West (NW), South East (SE), and South West (SW) hold a specific area of the company or the context, as it is visible in the following table.

Table 28: The Athena Model, the company and the context areas and subjects

		The company		The context	
	Name	Intrinsic area	Internal area	Extrinsic area	External area
	Figure	1st cone	2nd cone	3rd cone	4th cone
		Functional themes		Disciplines/Sciences	
Subjects	North East (NE)	Marketing/Sales		Political Sciences	
	North West (NW)	Finances		Economical Sciences	
	South East (SE)	Human Resources		Social Sciences	
	South West (SW)	Production		Technologies	

The functional areas and disciplines can be sub-divided into sub-areas according to their specifics. Keeping the graphical coherence, they can be seen in the following figure as being divided into new four sub-areas, four new concentric circles that represent concentric areas of the external cone.

For the case of the political studies, the selected sub-areas could be: political finances, political economy, geopolitics, and political law (according to some specific disciplines), or others to be selected.

Figure 53: The Athena Model, the company subjects (functional themes)

As an example, and according to the standard classification, the company's functional areas (first and second cones) can include the subjects presented in the Figure 53.

Table 29: The Athena Model, the company and the context areas subjects

Company	What you believe	System of beliefs	
	Strategy and leadership	Your will	
	System and Process	What you do	Core work enabling System (ICT, HR, Financial)
	Assets and liability	What you have	(Financial Capital, Market, Human, Social, Technology, Capital)
Context	The extended environment	Who helps you	Customers, Suppliers, Partners, Shareholders
	The external environment	Influencers	Economic, Political, Technological, Knowledge, Social

Figure 54: The Athena Model, the context subjects (disciplines/sciences)

Other models explore the circular shape as an attempt to aggregate systems into whole-system synthesised models.

Lawrence Miller, a specialist in Change Processes, leadership, management, strategy, and lean specialisation, focussing on an individual perspective, suggested in 2011 a division and structure for the company and the environment, adapted for the Athena Model, as follows:

As an example, and according to current knowledge, the contextual areas (third and fourth cones) can include the subjects and related complex information, as is exemplified in the Figure 54.

The spiral

This curved line represents the company evolution, its developing process, but also, the company "rib-cage" that keeps the company together.

The central spiral is the basis for the smaller spirals that are conceived on it through time. The smaller spirals represent the development processes of the company products and services, presented by the following figure.

The Spiral is the Design Process

Generically speaking and ignoring smaller differences, the different processes and adaptations of the Design Process or the Design Thinking process have the same core values and direction, and those are the key features to consider for the development of the conceptual and theoretical Athena Design & Company Model.

Design Thinking was defined as a methodology for innovation, and has been deeply explored and studied by several authors. For the matter at hand, the model was developed using the Design Thinking of Tim Brown: the three spaces (Inspiration, Ideation and Implementation) and the five process steps (empathy, define, ideate, prototype, and test). Both the processes can be overlapped by the spiral.

Figure 55: The Athena Model, the design process progress

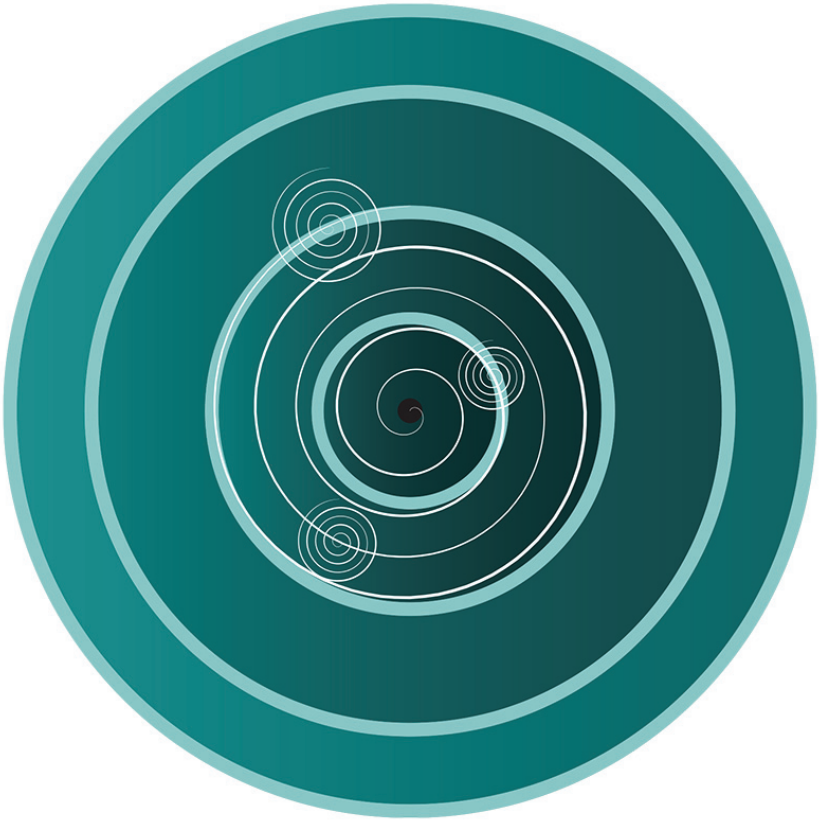


Figure 55: The Athena Model, top view, the main design process and the secondary ones through time

The development models cover several steps, ordered in a standard order. From the brief and keeping the client and the user in the central stage, research is performed, and the development of ideas starts. From the decisions taken after this step, the development continues in a more defined direction, and the detail definition is also implemented. Several moments of prototyping, simulation, approval, and redefining are completed. The final documentation, specifications, and communication are finished and delivered. After the delivery, the internal evaluation and report are undertaken in a learning and knowledge-fixing moment. Feeding the ideas box and thinking about proactive changes for the future is also included at this moment.

The evolution of the model can be seen from a couple of different perspectives: compositional and evolving over time, as presented in the following two figures.

4.04.03 Time-Scale Relationship

An important question presented in the model is addressed with the time-scale relationship: the system's size interferes with the time and pace. An unnatural pace has arisen from globalisation, information systems and technological developments. Other nations, primarily in very specific technological areas and with their own entrepreneurial ecosystems, have very fast rhythms.

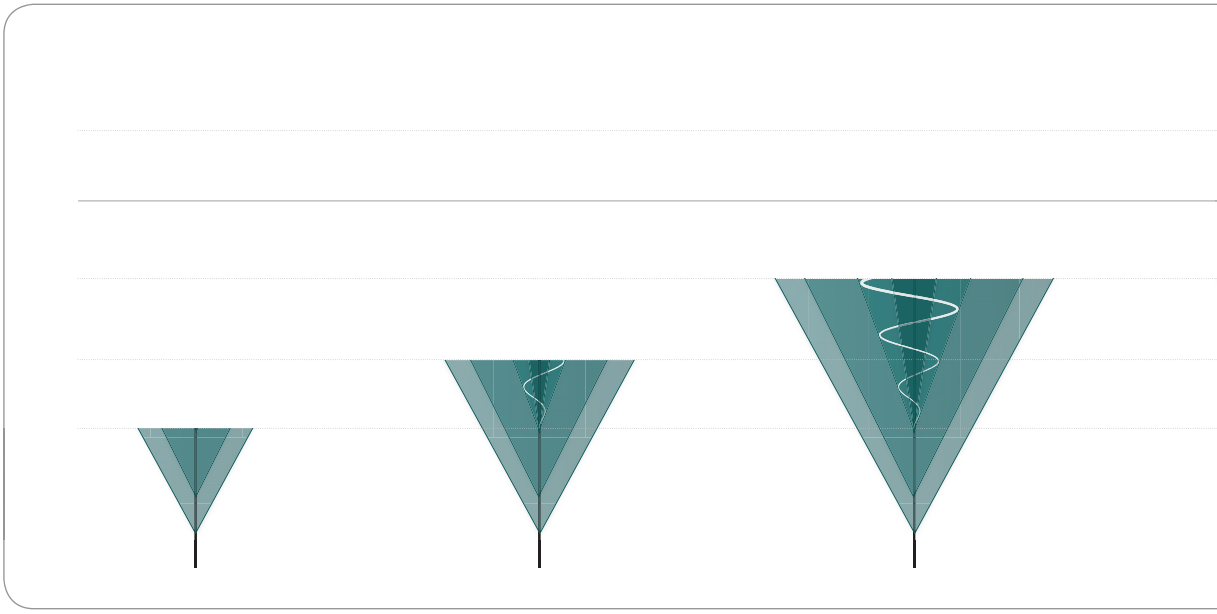


Figure 57: The Athena Model, the evolution through time and the relationship with the company life-cycle stages

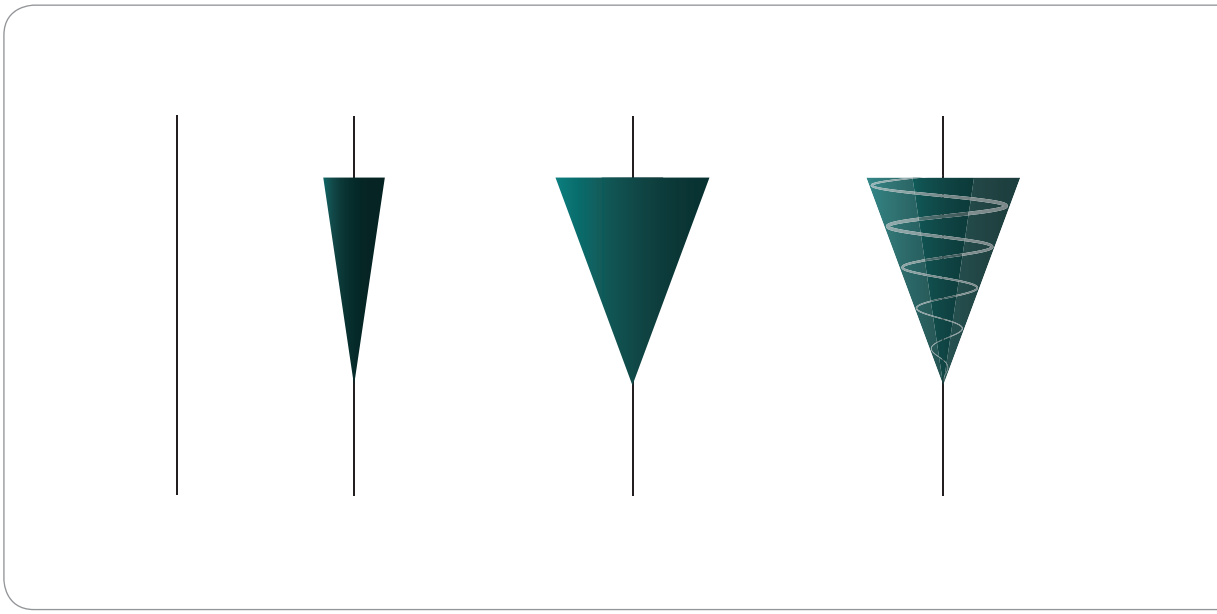
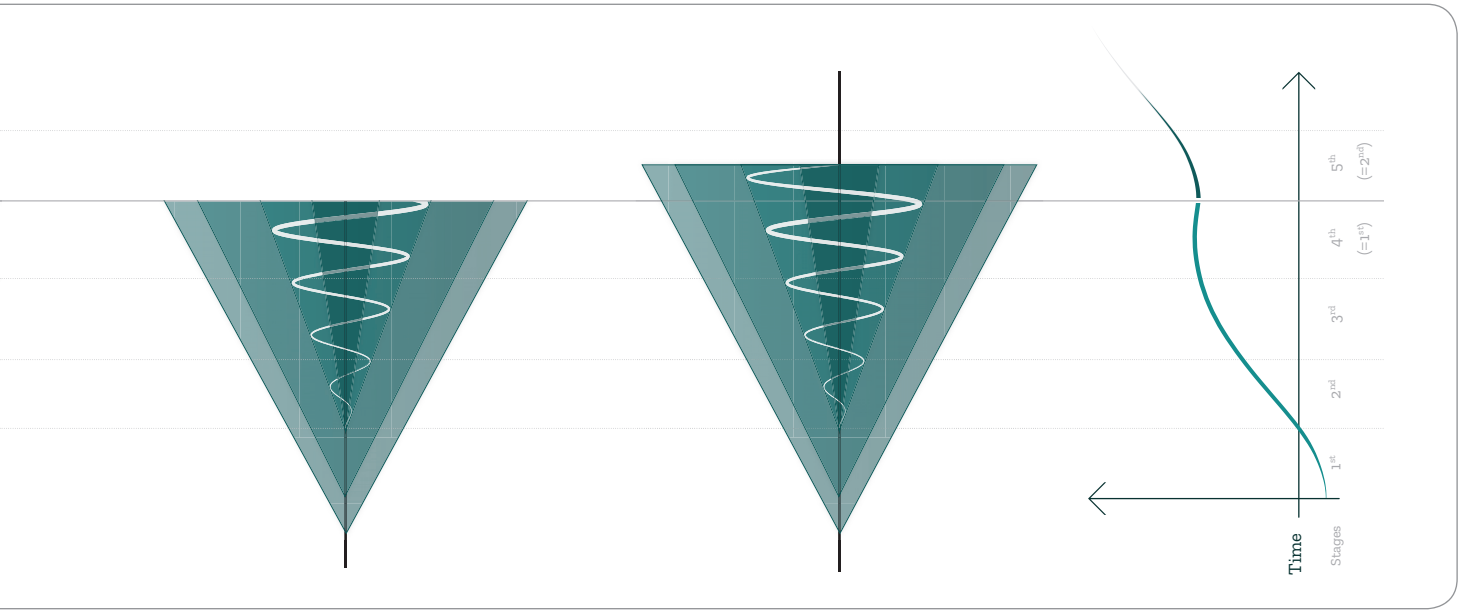
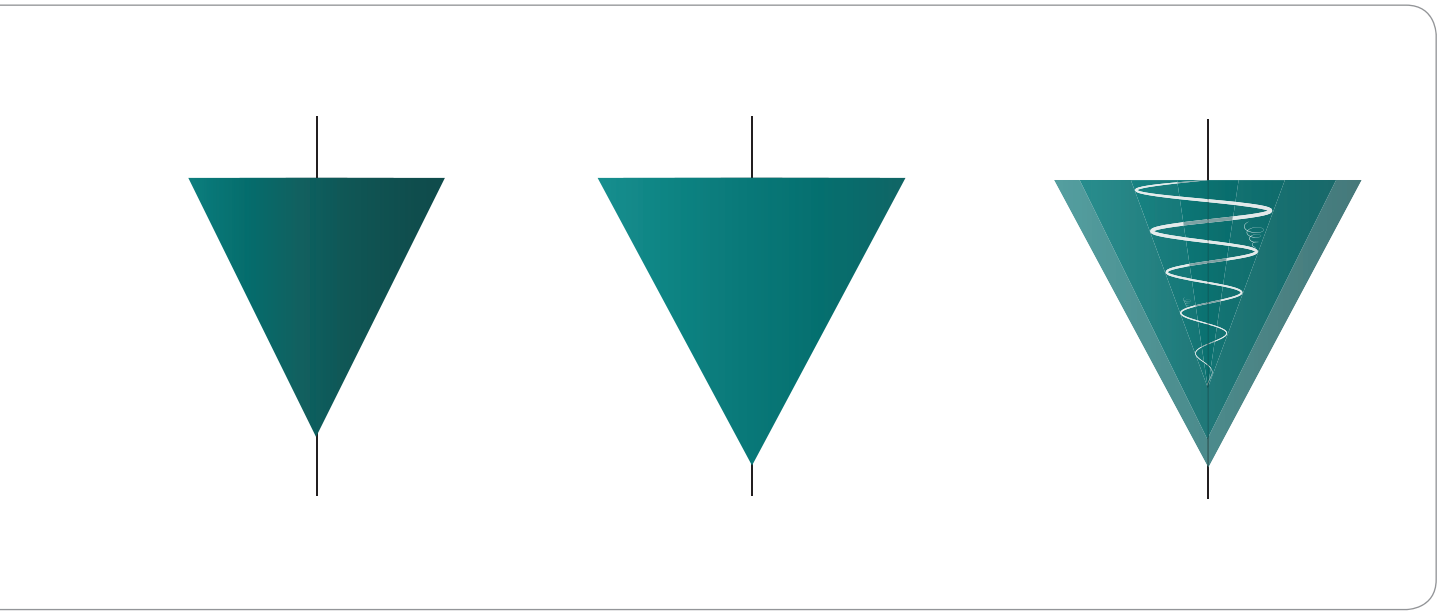


Figure 58: The Athena Model, the components

The so-called "success-cases" presented by the media are turned to as the "leading examples to follow". However, they belong to different countries and realities where failing is a common step for success, and almost an explicit step for the development and growth of the individual and the company. However, Portugal has its own cultural and social background. Even though the country has been evolving a lot and very fast, particularly in recent years, its specific characteristics do not allow an immediate and direct adaptation of the international models, methods, tools, processes, and cases.





As a Wrap-Up,

The Athena Design & Company Model is:

. created from the literature review and the status of Portuguese service SMEs;
. end-user oriented;
. easy to understand (simplification of complexity);
. easy to use;
. for a wider number of Portuguese companies (SMEs, service activities);
. for a wide set of specifics (e.g. companies´ life-cycle stages, economic activities);
. built open to be adaptable and scalable;
. built to be taught to the community;
. built to be presented to the scientific community.

Regarding design, the Athena Design & Company Model was designed with:

. Strategic Design;
. Service Design;
. Design Thinking;
. Design value creation;
. Design Methods;
. Design Tools;
. Different specific areas of design.

Figure 59: The Athena Charm logotype, horizontal version

Figure 60: The Athena Model logotype, horizontal version

4.04.04 Future Developments

Follow the iterative process itself to develop the model further: initially with a generic approach, into a digital, intuitive, and easy-to-use tool to present to a selected company association or similar; then, prepare the model to be tested in a small group of selected companies. In a following stage, considering the specifics discovered, develop it in a convergent, defined path and refine it. And repeat.

The Athena Design & Company Model and the Athena Design & Company Charm (and the future Athena Design & Company Tool) are important knowledge that must be shared with the community. The dissemination and communication must be developed (the use of the graphical manual in Annex 24[59] is crucial) adapted to the specifics of each learning and training market. Creating adapted presentations for the different presentation cases is essential.

The training and dissemination for local associations and local development projects (e.g. events, workshops) seems to be an important way to apply and develop this project in this direction, to be applied and used by the less favoured population in cities, but also in the countryside, increasing their value-creation potential.

Connecting design and local development for favouring the population and improving and increasing their potential for profit sustainability and their characteristics of resilience is important. It is also crucial to generate innovation from local traditions and local resources, meeting population needs.

59 Annex 24 - Communication Manual, for the Thesis and for Future Developments, examples

For local associations, training and increasing the literacy of the population (e.g. design and business) is very important. They are important connectors between academia and these "real-life" people and businesses.

4.04.05 Preliminary Conclusions

The Athena Design & Company Model, version 1.2 includes the contributions from the experts' interviews, the obtained contributions from the dissemination moments, and the developments suggested by the jury.

Knowledge and application of the model can improve companies and their commercialised products, contributing to their pursuit of Sustainable Growth and Longevity. In a wider perspective, its value can also be included in the national and global Sustainable Development objectives.

The doctoral exam, in which the doctoral dissertation and the Athena Design & Company Model version 1.2 is defended and evaluated, is the cornerstone for the next research developments, already suggested in this document.

The next deeper development stages, new research projects, must include the design of the Athena Design & Company Model, version 1.2.maths, the design of the Athena Design & Company Tool and the educational and dissemination supports of the Athena Design & Company Model, the Athena Design & Company Charm, and the Athena Design & Company Tool.

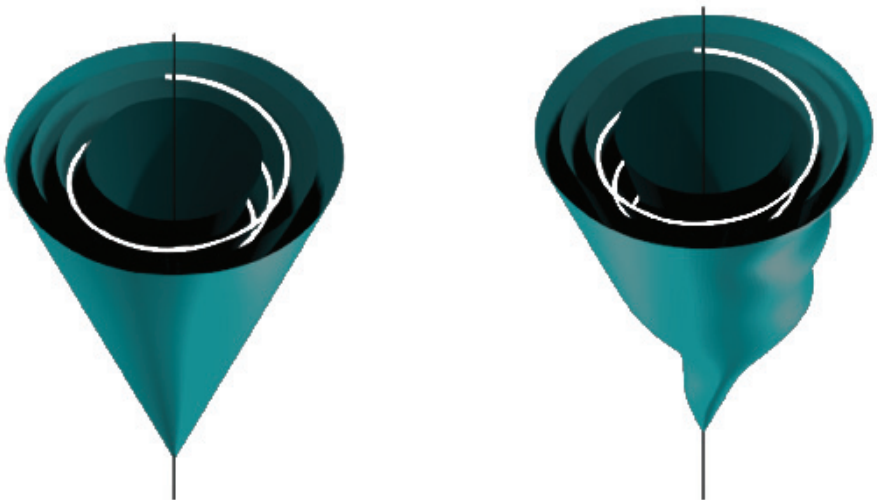


Figure 61 The Athena Model, 3D Models, the Model and one company simulation

Chapter Summary

The previous part of this research was essential to sustain and verify the current reality of the use of design in Portuguese micro and SMEs. The conditions of Portuguese and European SMEs are reported as very similar in certain respects. It was also critical to know and confirm that different fields of knowledge have intensely developed these subjects with theories and models. They are specific and profound, but they are not much used. Knowledge is not integrated at all levels.

In a "fast-food" society, where everything is delivered and used quickly, it is hard to present sophisticated information coherently and consistently. The use of intricate knowledge and refined tools can be sporadic, abandoned, or not used continuously, which do not allow verification of their effects over time, or a continuous improvement changes approach.

Design knowledge has been developing quickly, and design is reclaiming its importance in value-creation in companies. Design's holistic and strategic assets are not only important for companies, but also to address the problems from the community and wider spheres. Significant proof of design's benefits was found, in quality but also in quantity, and in design's value-creation ability.

The comparison of the literature review of existing data with the Portuguese SME studies presents consistent results that confirm that the situation of Portuguese micro and SMEs is similar to the existing data on Portugal and other countries.

There is a bridge missing between the SMEs (the critical creators of employment and value), the existing real-world data, the available knowledge of design and other areas, and the development community.

The Athena Design & Company Model was designed for micro and SMEs, and it is a contribution to addressing this problem. The theoretical, conceptual, and graphical model was designed to incorporate and link together the accumulated knowledge.

The Athena Design & Company Model is communicative, allows a natural understanding of the complexity as a whole, is user-oriented, and shows the design development process, introducing different design areas with it.

The way it has been considered and designed articulates significant amounts of complex existing theory and data, and also current needs. Its shape and design can be smoothly recorded in the users' minds; it can even be memorised by the designed Athena Design & Company Charm.

The ability to be retained is considerable through its usability in the real world, allowing the user to stand up for, collaborate with, and systematically persevere in the use of the model.

The experts' advice was needed to evaluate the contents and detailed areas, their presentation, and the user experience.

Maintaining the main principles of version 1.1, re-designing it through the suggested changes and new information, version 1.2 of the Athena Design & Company Model was designed. The inputs, recommendations, and suggestions were incorporated into this version through its improvement, refinement, and development.

The Athena Design & Company Model, version 1.2 is more advanced and refined, updated, and ready for further dissemination and real-world use. As a theoretical, conceptual, and graphical model, one can envisage that other models (e.g. mathematical), refined versions, and sub-products (e.g. tools), will be developed from it, further presented in the Future Research and Developments sub-chapter.

The fourth chapter included the study and design process of the Athena Design & Company Model through different evolutionary stages including the concept ideation, experts' evaluation, refinements, and proposed future developments and resulting sub-products.

Its design process was the result of systematic and deliberate information research and of its application through imagination into a model that was an

initiative of the researcher. The incremental innovation process, translating an idea into a service that creates value, was attained by the Athena Model that is replicable, and satisfies specific needs and expectations of SMEs. Consequently, it promotes the satisfaction of their clients' needs and expectations.

Some significant issues emerged from the Athena Design & Company Model's design and the research methodology and process. Some of the main findings and topics of this chapter important for the research development are:

. the problems addressed by this research are relevant in contemporary society;
. the Athena Model responds to several needs and expectations of contemporary Portuguese SMEs;
. the research process and methodology created the Athena Model following a design and innovation process;
. the Athena Model is a conceptual, theoretical, and graphical model;
. the Athena Model focusses on business and design knowledge aligned for typical problems of SMEs and entrepreneurs;
. at its core, the Athena Model references time and the strategy, tactics, and operations triad. Through time, it is possible to simulate reality and an understanding of the predictive cause-and-effect and effect-and-cause relationships;
. the Athena Model design is oriented for the end-users. Its use by SMEs can increase their value-creation and their achievements in Sustainable Growth and Longevity, thus positively affecting the community and global Sustainable Developments Goals;
. the developed model, the knowledge generated, and the answering of the research questions, validation of the hypothesis, and achieved objectives are the main contributions of the research for the community and academia.

The research thesis and the Athena Design & Company Model are the primary results of the research to encourage continuous change and improvement in SMEs' Sustainable Growth and Longevity. Likewise, knowledge of the relationship between design and companies, and the importance of their value-creation and results can influence their attitude and performance with regards to regional and national politics, and also the achievability of international Sustainable Development Goals.

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5th Chapter
Conclusions

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Conclusions

In this chapter, the gathered findings and the previous partial conclusions will be described according to the successive stages of the research. They will be cross-referenced to arrive at the final observations presented here. For example, it is possible to verify the way in which the questionnaires have shown the company owners' profile, their company philosophy, and the integration of design. Some potential limitations were sought and found at the beginning of this research, some of which impacted the research, and some unexpected ones were also encountered. It was difficult to manage the information in knowledge areas that were not the primary specialism of the researcher, not only the amount but also the quality of the data sources and of the data itself. It was especially hard to understand some specialist subjects, namely from the economic area.

This research is intended to contribute to a better understanding of the micro and SMEs situation in Portugal, considering the country's past, present, and future-specific factors; and concerning culture, society, and the economy. It should also contribute to the dissemination and use of the accumulated knowledge presented in the document and the Athena Design & Company Model. Furthermore, their use can contribute to overcoming difficulties and in forward-thinking and value-creation, lifting companies out of survival mode. As a way to enable people to visualise the inconsistencies in companies and their ecosystems, showing that imperfection and uncertainty are very common factors, it is also possible to simulate, define strategies, and take proactive steps according to the desired effects on the companies. It is a small step from the above lessons and actions to value-creation and improving companies' abilities in Sustainable Growth and Longevity. The next goal, much broader, is to follow the direction of the global objectives on Sustainable Development, through company and community contributions.

5.01 Following the Methodology Path

Following the methodological steps, several findings and provisional conclusions were gained through the research, influencing the consequent steps and the whole research. The results of this research were drawn from these various findings and partial conclusions, their differences, similarities, interfaces, and intersections.

A consistent desire since the beginning of the research was following the intention to enrich the addressed problem area with practical and theoretical results. One believes that the Athena Model, the accomplished knowledge, the conclusions, and the future research developments and recommendations are the main group of contributions of this research to knowledge. Further on, one believes that this research has the potential to influence and pragmatically change Portuguese micro and SMEs: future, new and stablished companies. Firstly in their strategies and knowledge integration, secondly through implementation (e.g. being used as a guide in their moments of change and downward life-cycle stages) thus resulting in better economic and social revenues. One can believe that knowledge, thinking, planning, and strategizing can also have a positive effect, avoiding the loss of resources of companies that can fold too soon (e.g. as a result of misplaced strategy, planning, and thinking).

It is demonstrated in the literature that partnership companies and societies are more grounded and more impervious to misfortune through time, negative context, or downward stages of the economic cycle.

It is notable that small-sized partnership companies have more positive results than sole proprietor companies, with a proportion close to 80% as opposed to 20% surviving in the period 2004-2015. The companies studied through questionnaires likewise have attributes that strengthen the statistical data: the most significant part of the respondents have aptitudes, skills, training or education in several different activities. However, in contradiction to the data previously stated, almost every company, being those that excel, was created by one single entrepreneur. As companies resistant to the descending phases of the cycle, they have kept their size in employee numbers, and some of them have held or built up their exports. In some cases, their business markets are mostly based

on exports and international clients, complying with the directives on investing in bigger and more diversified markets.

Similar to other European countries, the Portuguese culture, society, and population were not very well-known for their speed and proactivity. This is also true of traditional family business owners, a big share of Portuguese micro and SMEs. Speed is an extremely important factor (e.g. technology, products, and markets developments) that can be the life or death of a company. The change from an individualistic approach to a partnerships paradigm is also important. Continuous change, strategic thinking, and positive and proactive mind-sets can be important for these companies to have a development in Sustainable Growth and Longevity, instead of staying in the survival mode or in the "maintaining the family" one.

Several studies, programs, and investments are currently being made in Europe, like Horizon 2020, and all over the world to increase countries' entrepreneurial and start-up ecosystems. The ease of communicating the existing programs and funds needs to be enhanced, as does the openness required to listen, understand, and have the will to apply different plans to achieve alternative results. Both required efforts rapidly need to be bridged and catalysed.

According to the research, design has positive impacts: through Strategic Design, Service Design, Design Thinking, Design Process, design methods, and design tools, it is possible to increase the power and added value of companies and their services. The greater benefits created come from deeper and wider design intervention and early-stage process integration.

Portugal needs design integration at all levels. However, increasing the impact within companies raises society to better levels. Later on, it will be necessary to go further, with the inclusion of design in organisations, governments, and politics, pursuing better external examples and more significant results.

The model was designed, evaluated, and the inputs were integrated into Athena Design & Company Model, version 1.2, as is presented in detail in the following paragraphs. With regards to the model, it may be concluded that the theoretical, conceptual, and graphical Athena Model has been redesigned and refined from the experts' evaluation of the previous version.

From the presented knowledge it is possible to state that Portuguese micro and SMEs have specific characteristics with regards to the amount of single-employee companies, the most fragile ones according to the literature. Portuguese businesses are not traditionally known for their fast pace, even at a time when the rate of global change is speeding up.

Thus, this model and the future research developments can create real change in those companies, and consequently in the communities in which they belong and later on in their bigger contexts.

5.02 The Research Questions, Hypothesis and Objectives Status

The subsequent steps of the research Methodology were to answer the initial Research Questions, and verify the Hypothesis and achievement of the Objectives.

5.02.01 Research Questions Answers

Answering the initial research questions as follows was the next step of the developed research Methodology.

Question 1

Which are the primary contributors to competitiveness and quality of life for Portugal and other European Union countries?

The majority of the Portuguese population and economic activity are based in Lisbon and Oporto, making them the dominant centres for economics, society, culture, and politics, but even so being highly centralised on the capital.

Private companies are the main sustainers of the national economy. Almost every company is an SME, which create nearly three-fifths of GDP and four-fifths of employment. Large companies, by contrast, provide two-fifths of GDP with only one-fifth of job creation, making them significantly more productive with a preeminent economic impact. However, these ratios show that, even though SMEs are less productive, they have a significant presence for the population as a whole.

Large companies have higher levels of business literacy, expertise, and differentiation than smaller companies. However, close to four out of five Portuguese companies are family businesses, and more than three out of five are micro businesses, which employ over two out of five of all private employees. Over two out of five of all companies have a single owner. So, most Portuguese companies are family-based micro and SMEs, in single ownership, active in the service sector, and selling to small markets.

Companies in the service sector create almost four-fifths of GDP and provide over three-fifths of employment, and are predominantly based in Lisbon and its metropolitan area. The predominant Portuguese exports are related to tourism, travel, and transport activities, and they are a fundamental contributor to the national economy.

Commonly, companies have similar characteristics and behaviour, but they can differ slightly, according to the country's overall character.

Historical factors still have a strong influence in Portugal, as do the European and Latin character. The crisis had a significant effect on Western countries' economy and society. Portugal and the other countries under the financial support programmes suffered a greater impact due to their unsustainable situation, and the imposed rules raised strong repercussions for their populations.

Compared to the European Union, Portugal has some significant distinct features. The country has a highly centralised economy and population, recovering from a period of profound recession. The large proportion of companies is in single ownership and the service sector is strongly based in tourism-related services. Favouring exports, Portugal has excellent relationships with several countries, even outside of the EU.

European Union countries are also typically based economically and socially on family businesses and SMEs, with the service sector being the main contributor to the creation of GDP and employment, as is the case in developed countries globally.

Supplementary Question 1.1

Is it possible to identify specific sub-sectors that are attainable for the research and have good expectations for growth and returns?

Private companies were not the primary focus of the financial support rules of the 2011 - 2014 Stability Program. However, these companies were also under its influence, and they were deeply affected by it. Several European and national programs have been created focussed on the recovery and development of Portugal and its economy. The principal areas of focus were technological development and innovation. The promotion of the attractiveness of the country, encouraging foreign direct investment, expansion of the start-up ecosystem, and boosting exports were also targeted. Financial support and training to develop knowledge in the required areas were provided. The presented fields were identified by the programs in select groups of Portuguese enterprises as areas for investment with generous expectations for growth and returns, corroborating their potential to the Portuguese economy. These select companies can have rapid financial impacts and generate effective value-creation activities.

Portuguese companies in general typically have a need for literacy and knowledge in business, strategy, and design. However, raising their base level can result in a broader contribution to job creation and GDP, with a significant overall impact on the country, impacting monetary distribution, employment, and the population's living conditions and wellbeing.

Service-sector micro and SMEs, with export potential and needing improvement in their knowledge, in particular of business, strategy, and design, were identified as the sub-sector to study, through existing data and new research into their present situations.

Question 2

The ratio between new companies and those that fail is high. What are the main reasons for this?

Companies generally have a similar evolution curve that usually ends before three years of age. The failure rate is directly related to age and size, so micro companies are more vulnerable and have substantial risk.

Micro and SMEs have lower levels of literacy and specialisation than bigger companies, and bad management and poor strategy have been identified as two of the most common causes of company failure.

Low knowledge-intensity product and service offerings and a lack of differentiation have been acknowledged as common causes of limited value creation and frequent difficulties. Small markets have also been identified as a critical factor, specifically for small countries and developing economies.

The most critical reasons for company failure are the limited amount of knowledge in management; financial mismanagement leading to debt; weak business planning; and a lack of adaptation to contextual change. The typical processes of failure have also been identified, such as start-ups with a deficient management structure, young companies with precipitous growth, or mature companies lacking in innovation. All this data was obtained through studies predicting insolvency in existing companies.

It has been proven that the investment and integration of design in companies can lead to good value-creation and return ratios, and encourage growth. However, in general, design is used marginally and sporadically due to a lack of resources and gaps in knowledge. Apart from the most common branding, communication, advertising, and e-commerce activities, limited understanding and use of the methodologies and tools of design is directly related to unawareness of its potential impacts and benefits. The knowledge gaps include how to integrate and apply design strategically to gain its benefits. Areas such as Service Design and Strategic Design, in particular, can support the functioning and development of companies.

High levels of trust in social support, low levels of aspiration, and a lack of business and managerial training and knowledge were some of the factors identified in the less-entrepreneurial Portuguese business spirit, and which are reflected in the lower ability to create, grow, and develop companies.

The Portuguese entrepreneurial character, which is risk-averse, focussed on stability, averse to change, and has low mobility features, can also be found in other European countries.

The economic crisis impacted Portuguese companies profoundly. They suffered funding restrictions and instability, leading to stress, and a lack of vision and forward-thinking. Low budgets and high taxes led them into "survival mode" and a negative mind-set, focussing on low-value activities and tighter margins to address market conditions.

Some of the difficult areas and ways to manage them have been identified. Excluding companies that are created to intentionally have a short life, there is a relationship between age and lifecycle stage. The end of the last phase is the most difficult one, so a prior strategic approach to counterbalance it is the best option.

The study of the best areas in which to act should be made before the business development and the company creation, avoiding the creation of businesses that are not planned and prepared for existing and future markets.

The small size of the companies and the low experience in businesses are also identified as critical factors for failure. To face this reality, prevention through knowledge reinforcement in the designated areas and preventing financial problems are essential steps.

The vital and nuclear structure of the company is the entrepreneur that has the primary responsibility and most arduous work in a young company. These individuals should reinforce their characteristics, knowledge, and skills, identify the reasons for failure to avoid, and prevent critical situations, which are more common in the younger and less prepared, but have devastating effects wherever they occur.

Small companies can be focused on their world, and do not have a global vision of the system as a whole and systemic influences. However, contextual influences and chain reactions can cause giant snowball effects. To face them, they need to be understood. Taking advantage of the knowledge and of the companies light weight and adaptability, it is possible to create some new options and alternatives.

Supplementary Question 2.01

Which are the main factors that differentiate companies that overcome the first three-year cycle?

In addition to the reasons identified, the results of the questionnaire showed that decision-makers in the companies investigated had strong intrinsic personal characteristics such as resilience, effort, adaptability, and a positive mind-set. They had a broad education and training, and drew on previous and on-going research into their main areas of interest such as markets, technology, or other specific business support areas. These companies have knowledge of business and use strategy consistently. They also bring in information and tools from different fields to enhance their performance as companies and as distinctive businesses.

As a result, on the tactical level, their businesses demonstrated strong planning; management (and crisis management); strategy and strategic thinking; both a micro and macro view; analysis of investments and risks; and they had a proactive vision, quick reactions, and effective actions. They tended to offer more specific services, and they invested in their structure (both material and immaterial assets) with a strategic perspective.

These companies showed some awareness of the potential of design, as well as knowledge, use, and integration of its principles, methodologies, and tools. This awareness included the use of design in specific areas like branding, communication, advertising, and sales. Service Design and Strategic Design were also identified, albeit only some of the principles and only in sporadic use. Their impacts and benefits and their potential for evaluation were recognised; however, a lack of resources was emphasised as a factor for the limited use.

Companies are, by their nature, built very much in the image of the core team, which is their most crucial element. They are based on research, innovation, a focus on quality, and use of some design knowledge. Strategic thinking enables them to take preventive, proactive action; to invest and pursue Sustainable Growth and Longevity; and to have knowledge-based responses to contextual change.

The factors identified in the studied companies are mostly in accordance with existing studies. The experienced companies are based on the team and the users; economic sustainability; the company and the business; their technological circumstances; and good relationships with stakeholders and the market. They had a special focus on the evolution of their context, as they were aware of its crucial role to small-sized organisations. The effort put into strategy was particularly strong during the crisis, in which a decision to contract or expand could put all previous gains in the business and the company's value at risk. Even if only intuitively, they use design knowledge or principles in developing their company and business, and in design-specific areas to address branding, communication, and sales requirements as a communication bridge between the company and the environment.

Question 3

Is it possible to improve companies' situations through business, strategy, and design knowledge?

Several of the reasons for company failure are related to lack of knowledge in these areas, which have been independently studied and researched in depth, through which a direct ratio between investment value and results has been obtained.

Existing theories and models have proven that enhancing integration and use of business knowledge, strategy, and design increases companies' performance and longevity. These models and support programs have a deep structure, and their application has had positive results, proving a relationship between knowledge of these areas and its application.

There is a direct relationship between companies' sustainable growth and longevity, their decision-makers' literacy in strategy, design, and business, and their application of that knowledge.

Through an effort to support and develop these skills and knowledge and their application, it is feasible to increase companies' overall levels of expertise. Thus, through interventions for decision-makers, it is possible to raise companies' performance and, consequently, improve their situation.

Supplementary Question 3.01

Is it possible to use design to reduce the gap between the academic and businesses spheres, increasing knowledge transfer and their performance and returns?

It is possible to design a model that, working as a bi-directional knowledge bridge between academia and companies, can reduce the gap that currently limits knowledge transfer. Academic and business spheres have potential to develop, grow, and increase returns, and their conjunction can lead to greater performance and impact.

Design has good image and communication characteristics and abilities, enabling effective connections between different spheres. It can be used to present various types of complex information, relationships, and systems in a concise and comprehensible manner, to broad or to specialist audiences.

Focussing on the users' receptivity, skills, and degree of knowledge, design can provide an efficient bridge for communication and knowledge transfer between different areas of expertise.

The business world is characterised by a strong focus on solutions, closely related to a profound concern for the ratio of time and money. This is easily identified in the need for specific and achievable results and comprehensible predictions. Traditionally, the decision-makers of micro and small enterprises identify themselves very closely with their companies. Adaptability and openness are very important to run a business, and decision-makers either know what their deficiencies are, and act accordingly, or they will face them sooner or later. They do not have time for long presentation sessions with vague discussions; for complex information with no apparent immediate usefulness; for infinite spreadsheets of unintelligible data; to follow incomplete or contradictory instructions; or to complete continuous or regular checks and reports with no visible or directly connected definite objective.

In theory, it is possible to use design to interconnect the academic and business spheres. Design can simplify, communicate, and present difficult data, allowing better understanding of the information, and thus knowledge creation. Through the abilities of design to find and connect common terminology, concepts, and platforms, it is possible to improve communication and knowledge transfer between the spheres. When both areas depend on each other, this connectivity seems crucial for the better development of their independent performance and returns, but also to their joint effectiveness, revenues, and progress.

Graphical representation and interactivity are effective communication features, appreciated by users who want quick understanding and interactive simulations.

The Athena Design and Company Model is an objective way to address and support companies' important questions, needs, and aspirations. Fast apprehension, personalization of theory to the company-specific situation and reality, simulation, and remote use are compelling features for active businesspeople.

The interactive visualisation encourages and promotes the users' discovery, knowledge transfer, and critical thinking. Its use allows comprehension, understanding, application, and improvement of knowledge. The increase in returns and company-related data allow better evaluation, from the returns on investment to the overall performance of the business.

The Athena Model incorporates all the mentioned knowledge and introduces it to companies in their own design process as represented in the model. Through its visualisation abilities and interactivity, it is possible to simulate different states of the same company at the same moment. The simulation allows for diagnosis (portrait and "x-ray" of the present), anticipation (the continuous evolution, and the natural cause-and-effect phenomenon), prevention (avoidance of undesirable effects), and prediction (the effect-and-cause phenomenon). Through this potential, it can become easier for companies to understand the importance of strategy and analysis of possible options: to take decisions, act accordingly, and reduce or avoid risks and failing areas. It also makes it possible to understand that there is a systemic and systematic perspective and a high probability that the combined benefits are greater than the sum of the three independent parts (knowledge of business, strategy, and design).

Companies' outputs are the first knowledge transfer from the private sector to academia, thus enabling the tracking of their adoption, evolution, and achievements from using the model.

The first effects should be the appropriate adaptation of the model to the users' needs, specifically through the future development of a tool that will permit a deeper understanding and better use of knowledge in practice.

Deeply exploiting the tool's abilities will achieve more detailed results, which in continuous use will create data that permits tracking of the use of the tool, the evolution of companies and businesses, and the gains in value, returns, and performance achieved. So, it will be possible to simulate different company outcomes, exploring the most detailed simulation features; to strategise, take decisions, and act accordingly, to achieve real cumulative and compound results, which is the second stage of knowledge transfer.

The gathered data and records form a new knowledge transfer to academia, which can be studied to track the adoption, evolution, and achievements, individually and collectively, resulting in new knowledge, reports and further developments. In the medium and long-term, this third transfer will enable understanding and study of the use of the process, companies' evolution, changing evaluation parameters, and confirmation of the benefits achieved. Through this, it is possible to gain a better understanding and knowledge of companies' situation, needs, and aspirations, allowing the creation of new and better strategies and tools to innovate and improve companies' performance.

It was possible to design a model that connects business, strategy, and design knowledge and can share and promote the implementation and enhancement of continuous improvement, development, and value creation. The joint beneficial results can influence the economy, employment, and knowledge. The use of design can affect companies and academia, but also create data that can support strategic and political decisions, therefore benefitting the population's wellbeing, through the country's development, and ultimately affecting the global sustainability goals.

After answering the Questions, it was possible to verify the Hypothesis as follows.

5.02.02 Hypothesis Verification

It is possible to create a design-based and user-oriented model illustrating service SMEs' common evolution and processes and the benefits of design (Design Thinking, Strategic Design, Service Design; its integration into companies' different decision levels; and its use in various company activities), in order to increase company decision-makers' knowledge and awareness of design.

Through design, it was possible to create a user-oriented model that illustrates service SMEs' natural evolution and processes. This theoretical model also shows the benefits of design. It was intended to increase knowledge and awareness of design, businesses, and strategy. Experts were of the opinion that an understanding of the model could improve knowledge and awareness of the subjects presented. Thus, the model can be a reference for decision-makers and companies, particularly to the decision-makers of existing young companies and of those yet to be created.

The hypothesis further states that with this model it is possible to explain and teach design concepts such as Design Thinking and Service Design and give an overview of the system as a whole. It can also be shown that the integration of design into companies at their different decision levels can be communicated, namely through Strategic Design, and its implementation and use can influence various types of company activities and processes. The model and this research include the concepts of Design Thinking, Service Design, Strategic Design, and System Design, which are embedded in the model. The model was designed knowing that company decision-makers are the primary influencers of their companies. The model was specifically designed to increase their literacy and knowledge of the areas of business, strategy, and design, and their importance for the business' performance and future.

5.02.03 Objectives Status

The next step of the Methodology was to verify whether the primary and secondary Objectives of the research were achieved.

Primary Objectives

The achievement status of the Primary Objectives can be verified in the following list, followed by their written justification.

Table 30: The Research Primary Objectives and status

Status	Primary Objectives
V	**Objective 1** Through design, develop a model that synthesises relevant knowledge of businesses, strategy, and design for company decision-makers' learning, memorisation, identification, and use.
V	**Objective 2** Through the model, build a bi-directional knowledge bridge between the field of academia, theoretical knowledge, and global Sustainable Development Goals, and that of micro and SMEs' practical know-how and sustainable growth and longevity.

Objective 1

Through design, develop a model that synthesises relevant knowledge of businesses, strategy, and design for company decision-makers' learning, memorisation, identification, and use.

The common characteristics and needs of micro and SMEs were identified through this research.

The key players of micro and SMEs are the companies' decision-makers; they are the leaders, strategists, and most important influencers.

The user-centred design of the Athena Design & Company Model included business, strategy, and design knowledge (considered relevant to fulfil some of the identified weaknesses and gaps in the companies). The Athena Model was designed to facilitate its identification, learning, memorisation, and use, and thus knowledge of the Athena Model and its contents.

Objective 2

Through the model, build a bi-directional knowledge bridge between the field of academia, theoretical knowledge, and global Sustainable Development Goals, and that of micro and SMEs' practical know-how and sustainable growth and longevity.

The two presented spheres have different characteristics which are often difficult to reconcile. However, it is understood that design can articulate and bridge different and specialised circles.

The Athena Design & Company Model can bridge academic knowledge and companies' know-how and practice, and through its use can influence them independently and in conjunction, such as in the visualisation of the relationships between cause and effect, and between their specific needs, problems, and aspirations; and higher commitments, issues, and goals.

Companies operate in a particular sphere, with a detailed and distinctive vision of the elements and partnerships with shareholders, and with a focus on know-how, action, and accomplishment. The academic sphere is characterised by a system vision; systemic relationships, networks, and connections: different approaches, focus on theory, thinking, studying, understanding, discovery, and on knowledge-creation.

Through design, these two spheres can be bridged, influencing and being influenced by each other, thus creating measurable change and innovation in companies, knowledge, and theory.

The model has been identified as a necessary step for the future development of a tool that can bridge the two spheres in a more functional way, thus connecting them in a deeper manner.

Secondary Objectives

The achievement status of the Secondary Objectives can be verified in the following list, followed by their written justification.

Table 31: The Research Secondary & Supplementary Objectives and status

Status	Secondary & Supplementary Objectives
V	**Objective 3** Study and characterise Portuguese micro and SMEs, their importance to the national economy, their most demanding life-cycle stages, their major problems, needs and aspirations, and contextual threats.
V	**. Supplementary Objective 3.1** . Compare these Portuguese facts to those of other nations and groups of countries.
V	**Objective 4** Study Portuguese service-sector micro and SMEs that have an exceptional character in two groups (experienced, and young companies), characterise them, and identify their shared and contrasting characteristics.
V	**Objective 5** Study design-specific subjects like Design Thinking, Service Design, Strategic Design, and the impact and value-creation potential of design in SMEs, other companies, and countries.
V	**Objective 6** Identify possible contributions of design to Portuguese service-sector micro and SMEs.
V	**. Supplementary Objective 6.1** .Identify routes for companies to follow towards enhanced Sustainable Growth and Longevity.

Objective 3

Study and characterise Portuguese micro and SMEs, their importance to the national economy, their most demanding life-cycle stages, their major problems, needs and aspirations, and contextual threats.

Through the research, it was possible to understand the companies' situation and context, through the study of existing information, and through companies' direct inputs.

It was possible to identify that almost all Portuguese companies are micro and SMEs, providing the most significant share of employment and GDP, and the services economic sector is the one that stands out.

Companies generally have similar development processes with specific stages; and changes, transitions between phases, and the riskier stages are commonly identified as the most difficult moments.

The key problems, needs, and aspirations were also identified, and the most significant are related to knowledge, structure, and financial support, which are essential requirements for their foundations, sustainable development, and to achieve their ambitions.

Instability and fast changes in contexts are identified as difficult, notably for younger and smaller businesses, which are less resistant and resilient, thus perishing more frequently.

Supplementary Objective 3.1

Compare these Portuguese facts to those of other nations and groups of countries.

The majority of Portuguese companies are aligned with European Union enterprises and with those of the developed countries. Thus, they are also aligned in their importance to the national economy and wellbeing, and in their characteristics, most demanding life periods, problems, needs, aspirations, and relationships with their context.

The most significant differences were related to the context of the national crisis and character.

Objective 4

Study Portuguese service-sector micro and SMEs that have an exceptional character in two groups (experienced, and young companies), characterise them, and identify their shared and contrasting characteristics.

After the literature review, a survey by inquiry and a case study were performed to develop a better knowledge of the real situation of Portuguese companies and of those that stand out. The gathered data allowed the creation of a combined set of features and a comparison of their similarities and differences.

Two groups of Portuguese service-sector micro and SMEs were researched due to their exceptional character. The older companies (experienced) were studied through the questionnaire, and the younger companies through the case study. The first ones stood out due to their age and positive life-stage. The second ones had already been selected for their innovative character and growth potential and were further narrowed down due to the specifics of their business differentiation. From the performed studies, it was possible to collect data and focus on four main issues: the companies; their constraints; the core person or persons; and the importance of design for the companies and businesses. It was then possible to verify the shared and contrasting features and to understand how some of them are important to their outstanding performance.

The experienced companies have gone through the economic crisis and completed the whole of the common company development life-cycle, and were in a progressive life-stage at the moment of answering. The young companies are in the first development stages of the normal company life-cycle.

Both groups have good education levels and training, but the experienced ones are mature and have more know-how. The younger companies have more programs, support, tools, and methodologies available than the experienced ones had at the same stage.

Older companies are more stable and secure and have proven their ability to overcome several difficult stages. The young ones were still trying to create, grow, and develop their companies at a naturally more uncertain life-stage and in an unstable and insecure context.

All the owners and decision-makers followed the market needs and potential of their temporal context. The younger companies studied to respond to the current needs of the market and the identified growth areas. Most of them are offering digital services or selling through e-commerce, and many are oriented to tourism-related activities. The older companies had the same attitude in their early life, and so have more established businesses, not so dependent on ICT, but still entirely adapted to the digital world.

The older companies have regular or loyal clients, and they want to keep them and then expand their market and exports. The young ones are trying to conquer their first clients and to keep them, and in some cases to focus on international or even global markets. Digital services have a unique feature related to speed and adaptation, and the remote ones can be characterised by having less loyal but larger markets.

In both groups, some companies were created through the natural entrepreneurial skills of their owners. The young companies were also influenced by the entrepreneurial trend or as a reaction to the difficult situation in the job market.

The constraints in the initial development stages were similar in both groups: financially lean; based on a core individual or small team; a strong foundation in the owner and their personal effort; and having the natural insecurities of change and the unknown.

They were actively researching and finding information about their businesses, similar companies, and markets. This began in the initial stages (pre-launch and launch) of their companies but then continuing with that tendency.

Both groups of owners are characterised by having a positive mind-set and future-oriented thinking, by being creators that are solution-focused.

There are some differences in knowledge of business, companies, and design, but both groups' backgrounds are exemplary. However, the number of insights available has grown very fast, and new companies are immersed in information, methodologies, and tools for use in their specific developmental stages. The number of support services, programs, and training has also increased dramatically.

With regard to design knowledge and use, they both understand and use the best-identified design specialities related with branding, communication, advertising, e-commerce, and digital presence. These last two are prominent in the younger companies due to their specific services with substantial presence in the digital world, e-commerce, and social media. The experienced companies use design principles occasionally, applying them tacitly according to their own particular needs, which can mean mostly sporadically and when they are absolutely necessary. The younger companies have used design knowledge since their initial business development, through planning tools for example, thus including design at their core from their founding, and regularly throughout their development. The integration of design exists, but the younger companies use it more because of the bigger presence in the digital world, use of e-commerce, and relative importance of social media to their particular services and digital markets.

Existing knowledge about the studied subject was reinforced by this research. Consequently, it is possible to identify specific characteristics that these companies have in common, thus their relevance for the creation of innovation-based service companies, and for their sustainable growth and longevity.

Objective 5

Study design-specific subjects like Design Thinking, Service Design, Strategic Design, and the impact and value-creation potential of design in SMEs, other companies, and countries.

The literature review had a special focus on the impact and value-creation potential of design. It was possible to research and obtain knowledge from the existing literature in the areas referred to: the Design Thinking methodology and its impact on companies and their innovation processes; Service Design which, as a natural evolution from product design, is specific to companies in the services economic sector and their performance; and Strategic Design as the last level of integration of design in companies and their decision levels, impacting the companies and their products as a whole. Through the study of parameters and metrics, it is possible to evaluate the impact and value-creation of design in companies, in businesses models, and in their outputs, thus on its effects on companies' performance and growth.

With a special focus on the impact and value-creation potential of design in SMEs, the impact on the countries' economies was also explored for the study and the generation of results.

Objective 6

Identify possible contributions of design to Portuguese service-sector micro and SMEs.

After studying the national situation and that of companies, and achieving a deeper design knowledge, it was possible to identify several deficiencies which can be influenced through and with design. Some of the most significant were the companies' lack of knowledge of business, strategy, and design; and the lack of use of design-specific knowledge, principles, methods, processes, and tools, which are relevant creators and supporters of business performance.

Through design, and in response to companies' identified deficiencies, needs, aspirations, and potential, it was possible to develop the Athena Model. The user-centred model includes several identified subjects and bridges theoretical knowledge with practice and know-how. Use of the model can contribute to companies' better performance and evolution, thus generating a greater contribution to communities' wellbeing and the national economy.

Supplementary Objective 6.1

Identify routes for companies to follow towards enhanced Sustainable Growth and Longevity.

Several companies aim for Sustainable Growth and Longevity. Giving companies a stronger foundation to follow that goal is one of the objectives for the design of the Athena Model. Some of the improvement routes that the model identifies and proposes are those concerning the dynamic development, continuous knowledge creation, and sustained development processes.

Ensuring a more structured development, and preventing avoidable risks and distortions of reality, are some of the identified advantages and potential achievements of companies through the continuous use of the model and the knowledge it contains.

It is not possible to ensure equal treatment and prevent the undue distortions of competition and the context. However, they can be minimised through developing literacy and knowledge in deficient areas in the majority of companies, which sustain the population and increase wellbeing through their resulting higher performance levels.

Through pursuing their own Sustainable Growth and Longevity, companies are supplying the country and, consequently, they are also contributing to the global Sustainable Development Goals.

Following the Research Methodology, in this chapter it has been shown that the Research Questions have been answered, the Hypothesis was verified, and the Objectives were achieved.

5.03 Following the Model Design Process

It is intended that this model is used to innovate, to improve, to pursue, to correct, to defend, and to sustain businesses and companies; but It is also intended that the model itself can be innovated, improved, pursued, corrected, defended, and be further developed from the model presented in this dissertation thesis.

In contrast to the design-related issues that have been presented as easy-to-use panaceas, the Athena Model promotes Strategic Design integration throughout the Design Process, with a systemic width and openness. The theoretical model, however, also assumes a tactical position bridging the theoretical, academic, and strategic with the operational real-world needs of sole proprietor and of partnership companies.

This research focusses on the early identification and adoption by companies of the model. The sooner the model identification is completed, and the model is used, the better the results that will be achieved. An early adoption of the model, generates better change results when compared with the common results realised in the typical evolution of companies.

As part of this researcher's ideology, if all those involved contribute to a greater and broader objective, the better it will be achieved. Sustainable Growth and Longevity is considered an important objective for companies, thus promoting global Sustainable Development. The researcher's ideology is engaged with diverse and influential institutions and small and local community administration.

It was important to create a 3D model to synthesise all the collected information and to transform ambiguous knowledge into an accessible and understandable form, following the universal desire to create order out of chaos.

If on the one hand, the Athena Model can be represented in two-dimensional graphics, thus presenting limited and synthesized information which is easy to understand and memorise, on the other hand, the three-dimensional visualisation gives volume and therefore a more systemic view and a more global and holistic character, of a larger amount of information.

The model itself has been presented on multiple occasions and has been easily understood. As to the shape, several times the expression "tornado" was used when the individuals were reflecting on the model. Some of them have also agreed that the model tested itself in its Design Process through the use of its own contents (e.g. Design Process, User-Centred Design).

5.04 Future Research Development and Recommendations

All the experts have pointed out that the model has potential in the theoretical, practical and educational areas. It was also suggested by the experts that, following approval by academia, the theoretical model should be the base for a digital tool, co-designed by a multidisciplinary team, to be used adaptively, presenting companies' current and foreseeable status.

It is possible that, from the Athena Model and with its use and appropriation, some evolution proposals will be developed, as models with different details, or as tools created using the model as a stepping-stone.

From the conceptual, graphical model several others can be developed, such as a mathematical model.

The simulation is to be developed afterwards "in the field" with companies, with a user-centred design approach. The tool can operationalise the simulation, becoming more narrowly defined and appropriate to different companies and contexts.

Summarizing, the theoretical, conceptual and graphical model will lead to future developments:

. the theoretical model should have several derivative versions (e.g. mathematical);
. the communication of the model will develop its awareness, knowledge, and use, namely through the Athena Design & Company Charm.

The communication must be:

. adapted to the audiences and the primary purpose of the communication;
. consistent with educational and operational developments, presentation, and application.
. the model must be developed into a tool; the tool can have several derivatives adapted to different needs, and must be developed into different versions.

The Athena Design & Company Models, Charm, and Tools will influence:

. the creation of direct and indirect benefits in the companies that use the model, their communities, and society;
. the rates of unsuccessful companies (new and existing ones), the Portuguese economy, and society.

5.04.01 Digital Tool

The digital tool should allow the user to insert and modify the parameters of the company, verify their interactions, and establish relationships among them. Through the visualisation outputs, the tool should present a simulation of the company's situation, but also through changing the parameters visualise their potential effects on the company and business, allowing users to simulate scenarios and test potential results.

Through the foreseeable design process of the tool, several functions may be included in the tool, such as possible modes and setups:

a) modes according to the user's desired outcomes and objectives:

. portrait mode;

. diagnosis mode;

. cause-and-effect simulation mode;

. effect-and-cause simulation mode.

b) presentation modes:

. visualisation mode;

. numerical mode.

The tool should have the potential to support decision-makers to understand the company's general context, to take correct and faster decisions, to be proactive, and to foresee potential outcomes.

The approval of the thesis and the academic approval of Athena Design & Company Model, version 1.2 will prepare for the further development and design of an easy-access and useful set of tools, based on the Athena Model and adapted to be used in practice by dissimilar companies, whether by development stage, size, or activity area.

For the development of the tool, further research in different areas will be needed to sustain and design further knowledge, model and tool versions, deeper details and parameter definitions. User-Centred Design, tests, and diverse presentations will require development, for the general public and differentiated businesses and companies.

For the development of the Athena Design & Company Tool from the Athena Model, a multi-disciplinary team is needed, working on the various facets of the tool. For the first moments of development, one can be sure that it will be a draft without all the information available, and that different people will have different responsibilities for information gathering and knowledge creation.

For future development of the consequent tool, the following items present some suggestions for the requirements in multidisciplinary knowledge and functional areas:

. Marketing/Sales;
. Finances;
. Human Resources;
. Production (ICT);
. Design (UX);
. Innovation and R&D.

Following an iterative process, the model will evolve initially from a generic approach into a digital, intuitive, and easy-to-use tool to present to a selected company association or similar. Then, the tool must be prepared for testing by a small group of selected companies. Following on from that, it is time to take the identified specifics and details, and develop the tool on a convergent, specific path and refine it. And repeat.

It is foreseeable that the design research techniques used and presented in this research will be used in the future development. However, it is to be expected that others will also be used in the Design Process stages:

. Discover: interference/structural analysis, design fiction, dialogic design, future workshop (foresight), lead user research, make tools (generative research), megatrend analysis, nominal group technique, personas development (tools and model presentation for different users), observation (in use), role-playing (participatory workshops), user needs mapping, and wildcards for foresight;
. Define: appreciative inquiry, Delphi, essays, focus groups, scenario planning and foresight, stakeholder matrix, storyboarding;
. Conceptualize: business model canvas, cognitive work analysis (mental model elicitation), design games, multi-criteria analysis, needs assessment, use-case analysis;
. Design: cognitive walkthrough analysis (mental model elicitation), PICTIVE standards and guidelines;
. Implement: quality assurance testing, usability testing;
. Evaluate: ABA or ABAB Design[60], instrumenting, longitudinal studies, and program evaluation.

60 ABA is a design research technique. It involves having participant(s) engage in a baseline experience state, followed by a new state, and then they revert to the original baseline state. There are limitations to this technique, as participants may or may not be able to revert entirely to the initial state. The ABAB repeats the second state.

For the model development, the researcher tried to simplify the information and to show the most relevant in a clear way. Allowing people to check supporting information is also an intention that may be specially implemented during the tool's creation. The researcher also intended that, from the clear information the model and the tool present, users can understand what they should or could do to increase company performance. The aim in developing the tool is that it is easy for the users to see, to understand, to simulate and then to take action in their own companies.

Direct and indirect benefits will be generated in the companies that use the tool, in their communities, and in society. For example, the rate of unsuccessful companies (new and existing) will be influenced, and the Portuguese economy will be affected.

Design work and support is indispensable for the design of the tool. The Athena Design & Company Tool could be very interesting and helpful for micro and SME owners, in the short and longer-term. It can also help people who are thinking of starting their own companies to understand the most important and critical elements that dictate the company's development.

5.04.02 Dissemination, Presentations, Education, and Training

Educational and operational developments, presentations, and applications must be consistent and coherent, keeping the different users at the core of the presentations.

The dissemination and implementation can achieve design use in companies, designers, and other markets' training and education programs.

Design education in schools, universities, and other knowledge centres, through other physical and digital resources, and by diverse means, can create better design knowledge, design use, and designers.

Knowledge is not closed anymore, it is available to all the world, it has been democratised; therefore, higher literacy and education levels can and must be achieved. Important characteristics are needed for the new society's straightforward development (e.g. adaptation to the fast changes, selection abilities to manage the myriad data). However, they must be based on the values of coherency, consistency, and integrity, and focus on developed critical thinking abilities.

One of the most convincing topics cold be the potential to predict and avoid insolvencies. The financial ratios used to predict insolvencies are one of the proposals of the tool, using the models that were developed for large companies and adapting them for small companies. In that sense, instead of only using the theoretical models in companies that are already in trouble, they can also use the tool to predict if they will have problems, and they can project to avoid such profound decreasing stages. Selecting and using one of the existing mathematical models in the tool's development can create a really valuable contribution to companies, in the sense of simulation, prognosis of viability, and allowing an understanding of the various actions required for the desired results in the companies.

5.05 Final Thoughts

It is necessary to decrease the wide socio-economic gap (between the higher and lower strata) characteristic of unbalanced countries. More knowledge, more creativity, more design, more critical thinking, and more strategic thinking can increase quality of life and happiness. These may be supported, assisted, and encouraged by the contribution of this research and its consequent and systemic results.

Following the researcher's initial desire and intention to support improvement and continuous change, it is, then, possible to make a real contribution to global Sustainable Development.

General Bibliographic References
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DOUTORAMENTO EM DESIGN

Teresa Isabel Santa Maria Magalhães de Serpa

TESE ESPECIALMENTE ELABORADA PARA A OBTENÇÃO DO GRAU DE DOUTOR EM DESIGN

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