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Context, Enablers and Results

A Performance Measurement Framework for Service Sectors

Luis Filipe Vasconcelos e Sousa Minnemann Baptista

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Context, Enablers and Results

A Performance Measurement Framework for Service Sectors

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Luís Minnemann

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Professor Drª Maria Conceição Portela and Professor Dr. Rui Sousa

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To my parents and family, who have always supported me full heartedly during the realization of this project.

To my dear friend Ricardo Valente Pereira, for always been there in my times of need, despite been across half the world.

Resumo

O objetivo deste trabalho é desenvolver uma nova *framework* específica para a avaliação do desempenho de setores de serviços que permita avaliar a evolução do desempenho do setor bem como comparar o desempenho das empresas, não só face à performance média do setor, mas também a outras empresas a operar no mesmo setor.

Foi realizada uma revisão da literatura existente sobre avaliação de desempenho e da análise de 14 *frameworks*, e de cada dimensão abordada em cada um, foram identificadas as dimensões comuns de avaliação de desempenho.

Como resultado, a *Context, Enablers and Results framework* é apresentada como novo modelo para a avaliação de desempenho para os setores de serviços.

Palavras-chave: Framework de Avaliação de Desempenho; Setor de Serviços; Indicadores de Desempenho; Dimensões de Desempenho;

Abstract

The main objective of this work is to develop a new specific framework for the performance measurement of service sectors which allows the assessment of the sector performance as well as to enable companies' comparison, not only against the average sector performance, but also to other companies operating in the same sector.

A review of the performance measurement existing literature was made and from the analysis of 14 frameworks and each dimension addressed on each, common performance measurement dimensions were identified.

As a result, the Context, Enablers and Results frameworks is proposed as a new model for the performance measurement for service sectors.

Keywords: Performance Measurement Framework; Service Sector; Performance Indicators; Performance Dimensions;

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Introduction

Currently, more and more countries are turning the focus of their economies from products to services. What we verified in the existing literature of performance measurement is that, although the topic has attracted great interest in the last few decades (Taticchi et al., 2010), the existing frameworks not only do not consider the specificity of services, but also no exclusive or oriented framework for service sectors has been proposed. The currently existing frameworks can be classified into two groups by level of scope, (i) organization performance measurement, and (ii) country performance measurement, leaving a gap for sector performance measurement frameworks.

Our objective with this thesis is, by taking advantage of the identified gap in performance measurement literature, to propose the design of a new framework specific for the measurement of the performance of service sectors, the Context, Enabler and Result (CER) framework.

To achieve our aim, first of all, we undertake a literature review of the concept of performance measurement and its relevance, the existing models and their respective advantages and disadvantages. We analyze if there is an existing eligible framework that is adaptable or if there is the need to create and propose a new framework. After that, we verify the dimensions and reality that a model should contemplate by analyzing existing frameworks in order to identify the main common dimensions across the reviewed frameworks and performing an overview of all dimensions identified. Finally, we propose Context, Enablers and Results framework, a new performance measurement framework for service sectors, and exemplify its use in the Portuguese retail sector of supermarkets and hypermarkets. We conclude this work with the presentation of our findings, as well as, the identification of limitations possible future research.

Chapter 1: Literature Review

1.1 Performance Measurement: definition and relevance

The concept of performance measurement has been discussed for a long time and its relevance in management has been long debated and reviewed in the existing literature. When trying to grasp the concept of performance measurement, researchers can not agree on a single definition (Franco-Santos et al., 2007). Neely et al., (1995) defines it as "the process of quantifying the efficiency and effectiveness of actions", while Otley, (1999) takes an accounting perspective and considers it a "system that provides the information that is intended to be useful to managers in performing their jobs and to assist organizations in developing and maintaining viable patterns of behavior". Many other authors have proposed different definitions (Gates, (1999),Bititci et al., (1997), Bourne et al., (2003), Maisel, (2001), McGee, (1992), Lebas, (1995), Forza & Salvador, (2000), Atkinson, (1998)).

We will consider Bourne et al., (2003) definition of performance measurement system as "the use of a multi-dimentional set of performance measures for the planning and management of a business".

The relevance of performance measurement in management has been long debated and reviewed in the existing literature. Not only has performance measures been recognized as an integral part of the planning and control cycle (Barnard, 1962), but also most basic methods used to manage big business today were already been used by 1910 (Chandler, 1977, p.417). While Garvin, (1993) believes you cannot manage something if you cannot measure it, Lebas, (1995) goes further and negates the existence of management without performance measurement. Research also indicates that, the use of balanced performance measurement systems as the basis for management increases organization

performance (Lingle & Schiemann, 1996). Work in performance measurement area has grown over time, to adjust changes in the performance measurement needs of the business, and has drawn great interest in the last 20 years (Taticchi et al., 2010).

1.2 Performance Measurement Frameworks

1.2.1 Organizational Performance Frameworks

With the growth of literature showing the relevance of performance measurement in management, some authors proposed frameworks to assist managers to measure performance inside their organizations.

The Performance Measurement Matrix (PMM) was proposed by (Keegan, Eiler, & Jones, 1989), and assisted managers into categorizing performance measures, as seen in Figure 1, into either, internal or external, and non-cost and cost.

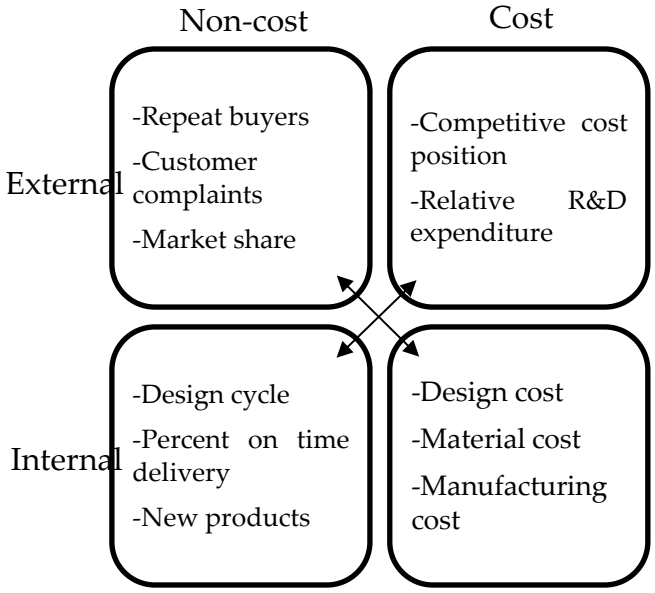


Figure 1: Performance Measurement Matrix adapted from Keegan, Eiler, & Jones, 1989

While the simplicity of this framework allows to accommodate any measure of performance (A. Neely et al., 1995), it does not establish a link between the different performance dimensions (A. Neely et al., 2000).

The Strategic Measurement Analysis and Reporting Technique (SMART) proposed by (Lynch & Cross, 1991) is a system that explains the link between different hierarchical levels of the organization.

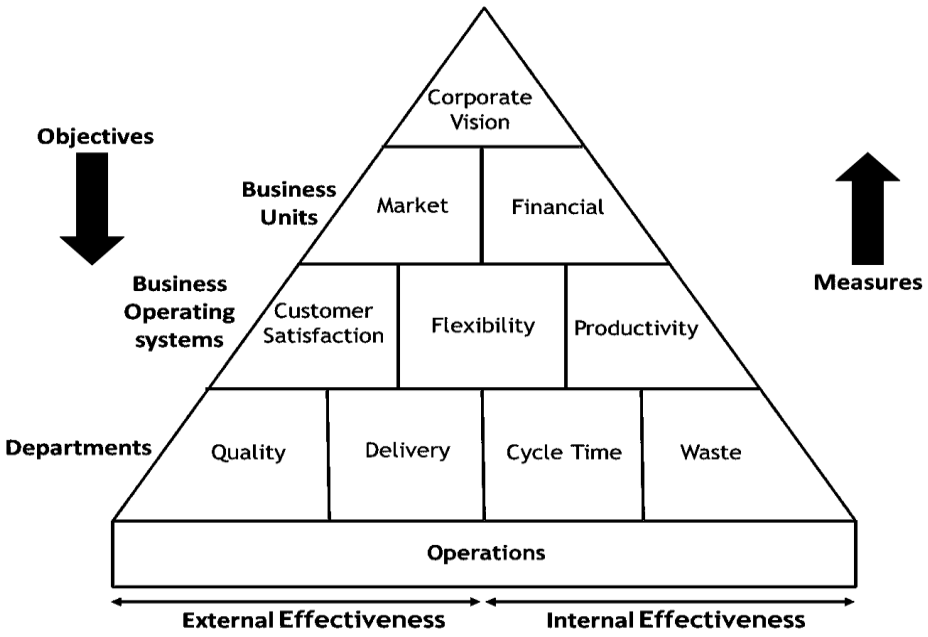


Figure 2: SMART framework adapted from Lynch & Cross, 1991

The model (Figure 2) shows that, the actions needed to achieve the corporate vision, can be cascaded down through several levels:

- Level 1: at the top of organization is the corporate vision through which the organization describes how it will achieve long-term success;
- Level 2: This level focuses on the achievements of the organization critical success factors in market related measures and financial measures;
- Level 3: the marketing and financial strategies set in the previews level must be linked to the aim of customer satisfaction;
- Level 4: the status of the former level can be monitored using the lower level departmental indicators of quality, delivery, cycle time and waste.

While on the left hand side of the pyramid are the measures which have an external focus, and which are mainly non-financial, on the right hand side are the measures focused on the internal efficiency of the organization being these mainly financial.

Lynch & Cross (1991) propose measures relating to business operating systems. As the organization operates at different levels and each level has different focus it is important that these different levels support each other. They propose that customer satisfaction, flexibility and productivity are the driving forces in which company objectives are based on. They suggest that these forces can be monitored by key performance indicators (KPI), which can be derived from lower level measures of quality, cycle time, delivery and waste. They propose measuring performance through KPI across nine dimensions: market, financial, customer satisfaction, flexibility, productivity, quality, delivery, cycle time and waste while the corporate vision is implemented by those responsible for the strategic direction of the organization.

The Balanced Scorecard (BSC) framework was presented by (Kaplan & Norton, 1992) as a way for top managers to gather a view of their business. The model translates the organization objectives and strategy into a set of performance indicators across four perspectives, shown in Figure 3:

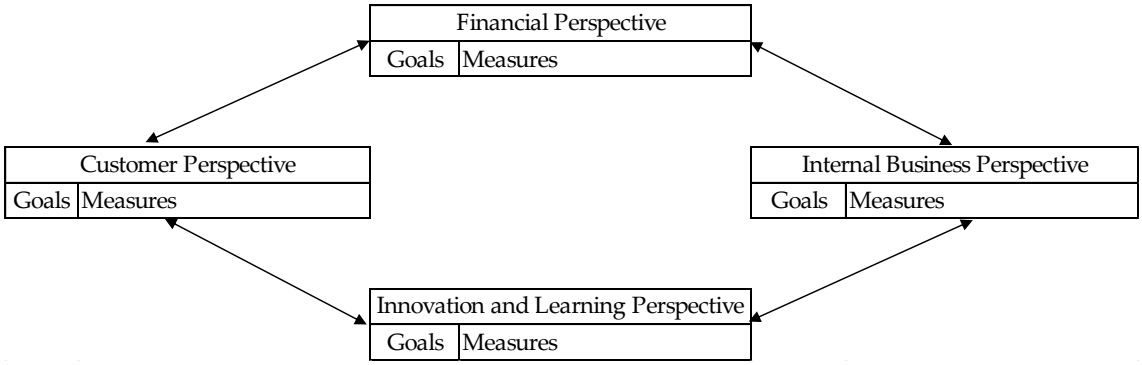


Figure 3: Balanced Scorecard framework adapted from Kaplan & Norton, 1992

- Customer perspective: "How do customers see us?", this perspective is evaluated by using direct and indirect measures. While direct measures

involve surveying customers and gathering their opinions, indirect measures analyzes customers without involving them directly in the process;

- Internal process perspective: “What must we excel at?”, the measures are linked to the organization business processes, which are defined by the key processes the company must excel in to achieve a competitive advantage;
- Learning and growth perspective: “Can we continue to improve and create value?”, reflects the company ability to continually develop improvements and adding value using continuous learning.
- Financial perspective: “How do we look to shareholders?”, the financial perspective reflects the organization ability to make profits, it reveals if the organization strategy, implementation and execution are contributing to improvement.

In this framework, the performance measurement is done, after the management set the objectives, by using KPIs in each dimension and comparing performance with those established objectives. By assessing the KPI, managers can assess the current performance of the organization on that subject, allowing them to identify if the activities need improvement or are within the parameters to reach the settled objective.

The Performance Prism framework (PRISM) was created by (Neely et al., 2001) with the aim to be more flexible and offer a wider or narrow focus, in agreement with the organization needs. It is a three-dimensional model, as shown in Figure 4, with the purpose of measuring the performance of the entire organization, where each side corresponds to a specific area of analysis.

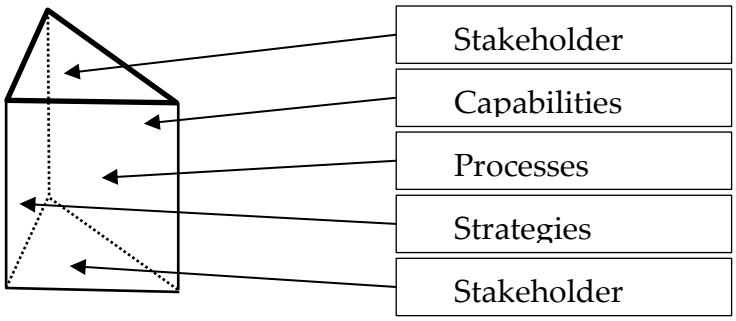


Figure 4: Prism Model adapted from Neely, Adams, & Crowe, 2001

- Stakeholder satisfaction: who are the key stakeholders and what do they want or need?
- Stakeholder contribution: What does the organization want and need from their stakeholders?
- Strategies: what are the strategies that the organization must apply to satisfy not only stakeholder's wants and needs but their requirement also?
- Processes: what processes need to be applied by the organization to execute its strategy?
- Capabilities: what capabilities are needed to implement to allow the organization to operate their processes more effectively and efficiently?

The Performance Prism tries to demonstrate that, to survive in the complex world, not only there is a need for executives to understand the needs from all stakeholders, but also their strategies, processes and capabilities need to be linked and aligned, in order to satisfy those same needs and deliver value to their stakeholders (Neely et al., 2001).

The Performance Prism is a framework, which can be used by management teams to identify key questions that are needed to be addressed when managing their business. After these issues are identified, goals can be settled and measured, similarly to the BSC model, by KPIs.

The Oslo Manual (OCDE/EUROSTAT, 2005) framework was co-developed by the Eurostat and the OECD and covers the dimension innovation in the business

enterprise sector. Dealing with innovation at the firm level, it covers four types of innovation: product, process, organizational and marketing.

The Manual defines a set of guidelines for collection and interpretation of innovation based on the following characteristics: innovation in the firm, linkages with other firms and public research institutions, the institutional framework in which firms operate, and the role of demand (Figure 5).

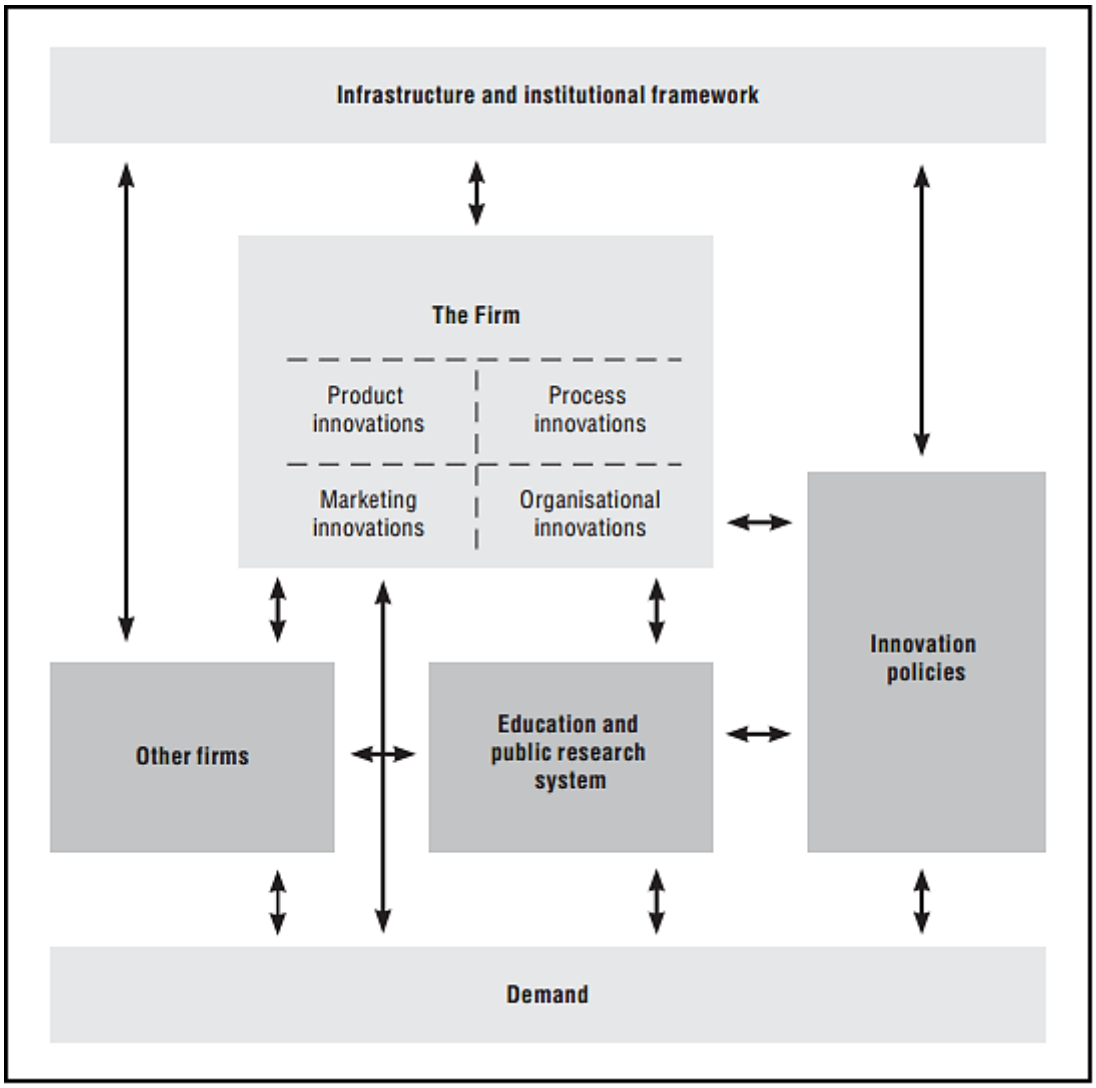


Figure 5: The innovation measurement framework (OECD/EUROSTAT, 2005, p.34)

At the firm level, the innovation factors identified are: Research and Development, and Innovative activity. The environment determines the parameters within which the organizations operate. Those parameters can be:

- Basic educational system of population;
- Higher education system;
- Technical training system;
- Science and Research base;
- Shared codified knowledge;
- Innovation policies;
- Legislative and macroeconomic settings;
- Infrastructure (transport and telecommunication);
- Financial ease of access;
- Market accessibility;
- Industry Structure and competitive environment.

Developed by COTEC Portugal in 2017 (COTEC Portugal, 2017), the Innovation Scoring 2.0 (CIS) is an online tool for an organization performance measurement. The conceptual model, shown in Table 1, is composed of 5 dimensions (strategy, organization, processes of investigation, development and innovation (IDI), enhancers and impact) and 14 subdimensions of analysis.

Table 1: Dimensions and subdimensions of Innovation Scoring model (COTEC Innovation Scoring Support Manual, p.10)

A. Strategy	B. Organization	C. Processes IDI	D. Enhancers	E. Impact
A1. Context Analysis	B1. Structure and Governance	C1. Generation and assessment of ideas	D1. External Relationships	E1. Market
A2. Strategic Planning	B2. Human Capital	C2. Project Management	D2. Financing	E2. Sustainability
A3. Culture and Leadership	B3. Organizational skills	C3. Intellectual Property Protection and Appreciation	D3. Knowledge Management	

The model includes 30 main questions distributed by the 14 subdimensions to measure the organization, each with its own ponderation.

The European Foundation for Quality Management (EFQM) (*http://www.efqm.org/the-efqm-excellence-model*) framework is an internationally recognized European quality award that allows the understanding of cause-effect relationship between what the organization is doing and its results. It provides a tool for assessing how effective is the organization in developing and delivering a stakeholder focused strategy, as the model is at its simplest level, a cause and effect diagram.

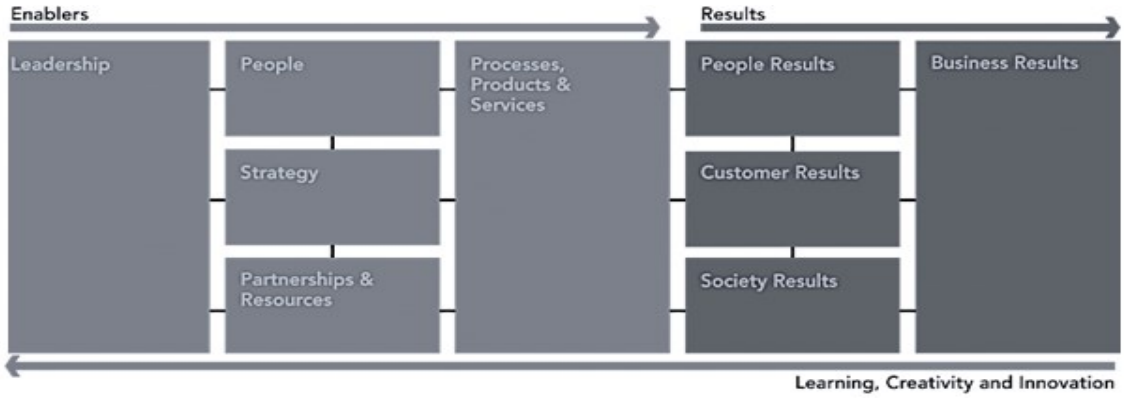


Figure 6: EFQM Excellence Model adapted from an overview of the EFQM Excellence model

The model (Figure 6) is based on nine criteria and these are split between 5 enablers and 4 results. The enabler criteria cover what the organization does and how it does it, while the results criteria cover what the organization achieves. The enablers are composed by leadership, people, strategy, partnerships & resources and processes, products & services. The results are composed of business results, people results, customer results and society results. In addition, the models show that learning, creativity and innovation helps improving the enablers, which leads to an improvement in the results.

Just like the PRISM framework, the EFQM framework assists management teams identify potential performance improvements, in this case in 9 perspectives. Once the potential improvement key points are identified, improvement is assessed by using KPIs. The data are collect using different tools as People and Customer Surveys, 360º Appraisal or Assessments.

The Malcolm Baldrige National Quality Award (Baldrige National Quality Program – www.quality.nist.gov) framework is the American counterpart of the EFQM quality award. Created in 1987 by the U.S Commerce Department as a standard of excellence to help U.S. organizations, the Malcolm framework can be used to help increase performance in any organization by providing a framework that helps to assess performance on a wide range of indicators: customer, product and service, financial, human resource, and operational. The criteria are built upon a set of interrelated core values embodied in seven linked categories (Figure 7).

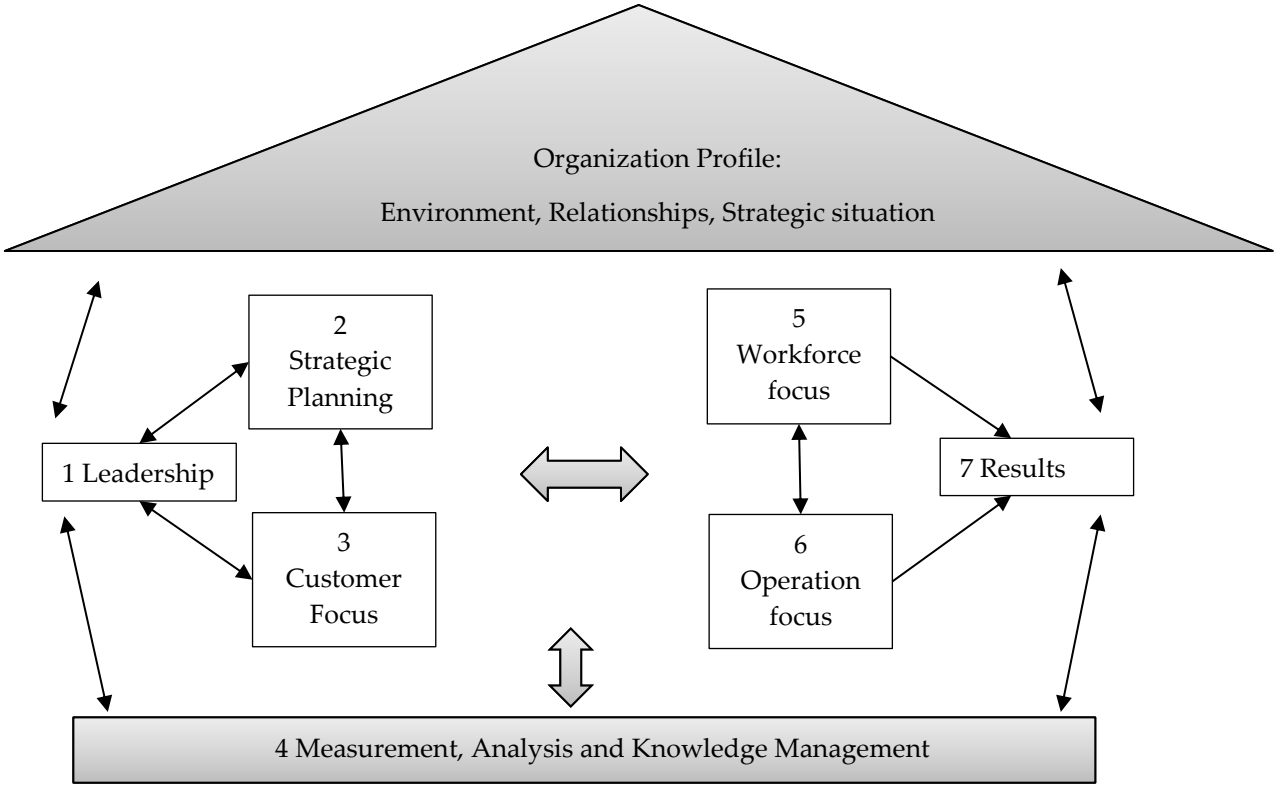


Figure 7: Malcolm Baldrige Model framework adapted from www.quality.nist.gov

The seven categories that make up the award criteria are:

- Leadership: examines how executives guide and sustain the organization and how the organization addresses governance, ethical, legal and community responsibilities;

- Strategic planning: examines how the organization sets strategic directions and how it determines and deploys key action plans;
- Customer focus: examines how the organization determines requirements and expectations of customers and markets, builds relationships with customers and acquires, satisfies, and retains customers.
- Measurement, analysis, and knowledge management: examines the management, the use, analysis and improvement of data and information to support key organization processes as well as how the organization reviews its performance;
- Workforce focus: examines how the organization behaves with all those actively involved in accomplishing the work of the organization and how the workforce is aligned with the organization objectives;
- Operation focus: examines aspects of how key production/delivery and support processes are designed, managed and improved.
- Results: examines the organization performance and improvement in the key business area as well as how it performs relative to competitors.

Despite being quality awards, both the EFQM and Malcolm frameworks are internationally recognized frameworks used by countless organizations to measure performance. While variations exist (Singapore Quality Award Model, Japan Quality Award Model, Canadian Business Award Model, Australian Business Excellence Framework), these models are all remarkably similar, and therefore to avoid redundancy, will not be explored.

Despite all work done, some of the literature has neglected the nature of services in performance measurement. Grassano & Savona (2014) conclude that "most of the literature has for long time studied services using analytical and empirical tools developed for analysis in the manufacturing sector, often without tailoring them on the peculiarities of services". But not all frameworks disregard this.

The Performance Measurement System for Service Industries (PMSSI), developed by (Fitzgerald et al., 1991), from the Chartered Institute of Management Accountants research project focused on service business in the UK. It recognizes the nature of services, as intangibility, perishability, heterogeneity and the implications this has for performance measurement. Based in operations management, service quality, marketing and accounting this model identifies across two categories six dimensions of performance, and for each dimension, it goes one step further by identifying KPIs. These dimensions and types of measures can be identified in the Table 2.

Table 2: Dimensions and measures of the Performance Measurement System for Service Industries adapted from Fitzgerald, Brignall, Johnston, & Silvestro, 1991

	Performance dimensions	Types of measures
Results	Competitiveness	Relative market share and position
	Financial Performance	Sales growth
		Measures of the customer base
		Profitability
		Liquidity
		Capital structure
		Market ratios
Determinants	Quality of service	Reliability, responsiveness, aesthetics/appearance, cleanliness/tidiness, comfort, friendliness, communication, courtesy, competence, access, availability, security
	Flexibility	Volume flexibility
		Delivery speed flexibility
		Specification flexibility
	Resource utilization	Productivity
		Efficiency
	Innovation	Performance of the innovation process
		Performance of individual innovators

Another framework adapted to the specificity of the services is the framework SERVQUAL, a service quality framework developed by Parasuraman et al., (1985, 1986, 1988, 1991, 1993, 1994) and Zeithaml et al., (1990) aiming at measuring the scale of quality in the service sectors. The model measures 5 aspects of service quality:

- Responsiveness – willingness to help customers and provide prompt service;
- Assurance – knowledge and courtesy of employees and their ability to convey trust and confidence;
- Tangibles – Appearance of physical facilities, equipment, personnel, and communication materials;
- Empathy – caring, individualized attention the firm provides its customers;
- Reliability – Ability to perform the promised service dependably and accurately.

The performance across the five dimensions can be measured through the SERVQUAL instrument, which is compiled by 22 statements (appendix 1). With the data compiled, managers can then measure quality performance improvement through KPIs previously established.

1.2.2 Country Performance Frameworks

While there is an identifiable increase tendency in the academic community to publish the topic of performance measurement in organizations (A. Neely, 2005), frameworks to measure performance in countries also start to be proposed.

The Global Innovation Index (GII), developed co-jointly by the Cornell University, INSEAD, and the World Intellectual Property Organization in 2007, ranks the countries and enables a comparinson in terms of innovation. It adopts the notion of innovation originally elaborated in the Oslo Manual *"An innovation*

is the implementation of a new or significantly improved product (good or service), a new process, a new marketing method, or a new organizational method in business practices, workplace organization, or external relations".

It is an evolving project that uses the previous editions incorporating newly available data. The 2016 edition model included 128 countries/economies. The model framework, presented in Figure 8, relies on two sub-indices, (i) the Innovation Input Sub-Index, which is built around the pillars Institution, Human capital and research, Infrastructure, Market sophistication and Business sophistication, and the (ii) Innovation Output Sub-Index, which is built around the pillars Knowledge and technology output and Creative output. Four measures are calculated (Johnson Cornell, INSEAD, & WIPO, 2016):

- Innovation Input Sub-Index: Five input pillars capture elements of the national economy that enable innovative activities (Institutions, Human capital and research, Infrastructure, Market sophistication, Business sophistication).
- Innovation Output Sub-Index: Innovation outputs are the results of innovative activities within the economy (Knowledge and technology outputs, and Creative outputs).
- The overall GII score is the simple average of the Input and Output Sub-Indices.
- The Innovation Efficiency Ratio is the ratio of the Output Sub-Index to the Input Sub- Index. It shows how much innovation output a given country is getting for its inputs.

Each pillar is divided into three sub-pillars, each of which is composed of individual indicators, for a total of 82 indicators (appendix 2).

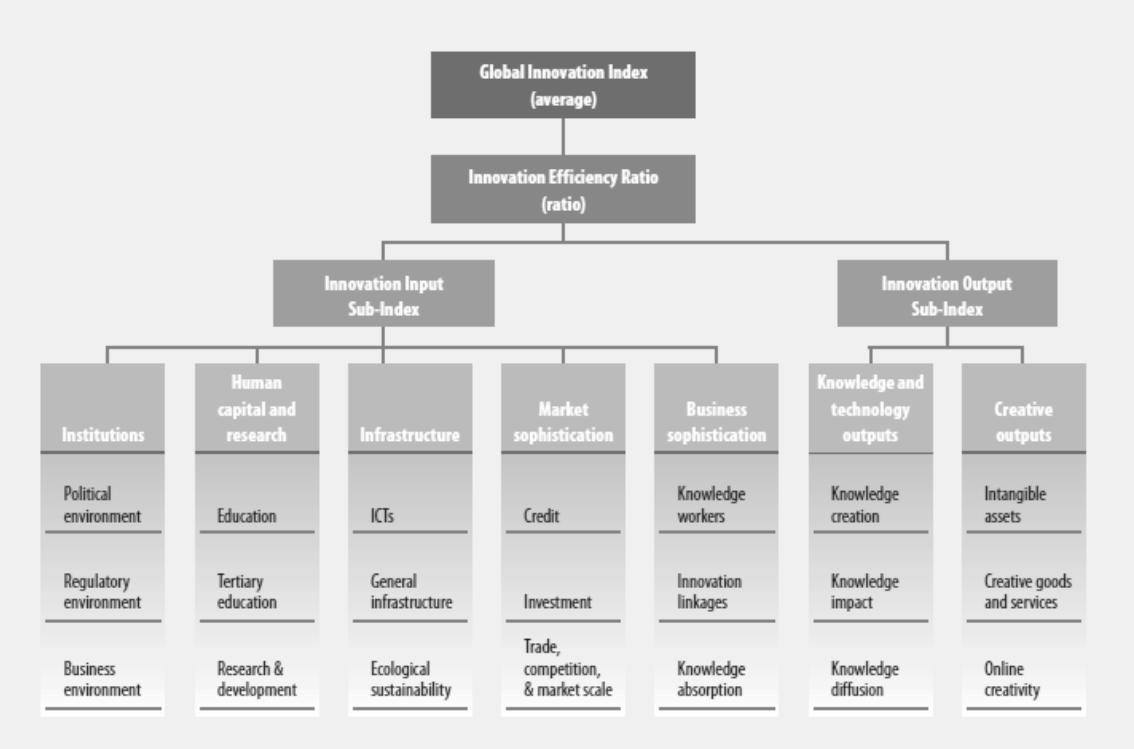


Figure 8: GII framework (Johnson Cornell et al., 2016)

Another country performance framework, the Global Competitiveness Report (Schwab, et al. 2016) is published annually by the World Economic Forum and assesses the country performance in terms of competitiveness. It measures 138 economies and is composed by 12 pillars, organized in three sub-indices, as shown in Figure 9: basic requirements, efficiency enhancers, and innovation and sophistication factors. The weight assigned to each sub-index depends on the stage of development of each subject economy. The rank is obtained by converting each indicator into a 1 to 7 scale.

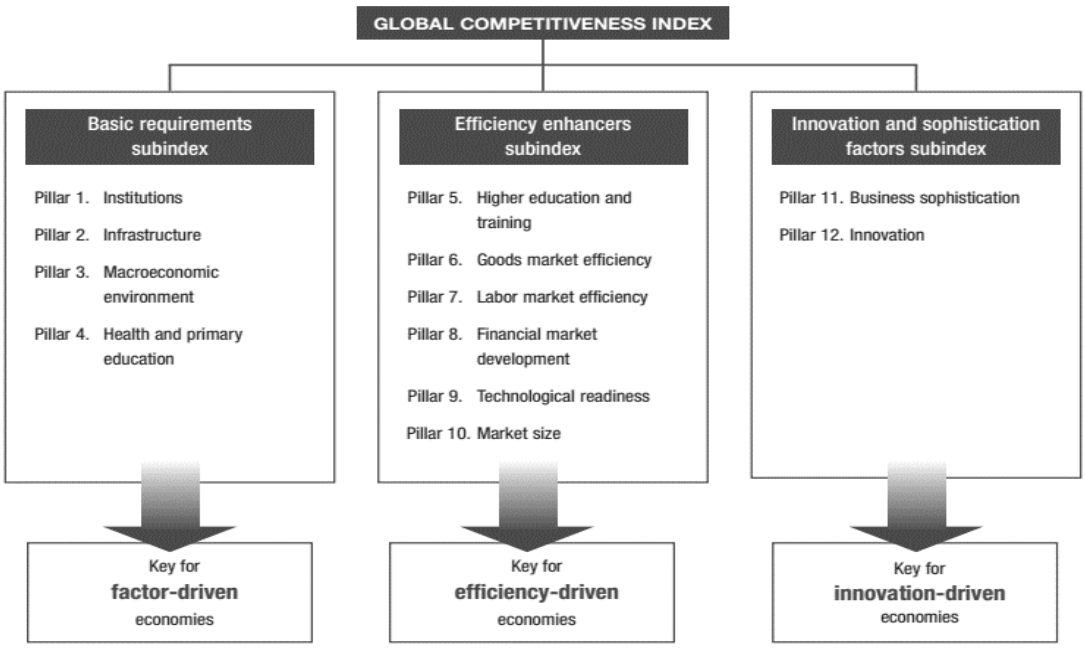


Figure 9:The Global Competitiveness Index framework

After that, the indicators are aggregated according to their corresponding pillar and an arithmetic mean is calculated, where each level is weighted to calculate the next level score, up until its aggregated into a final overall score. The economies are then ranked according to their respective overall individual scores.

The Global Competitiveness Report framework structure can be seen in appendix 3.

Developed in 2016 by the World State of Quality, the European Quality Scoreboard (EQS) (http://wsq.dps.uminho.pt/eqs_framework.html) aims to assess the performance of several dimensions related to quality, having the first edition evaluated 28 European Union countries.

The model uses up to date available data and is divided in two axes: enablers and results. Each axis is composed by 5 dimensions, making a total of 10 as presented in Table 3. Each dimension is assessed by more than one indicator, in a total of 21. A final score is calculated for each country considering the average

weight of the ranking position obtained by each country over the set of 21 indicators considered, which are presented in the following table:

Table 3: Dimensions and indicators of the EQS adapted from European Quality Scoreboard

Enablers		Results	
Dimensions	Indicators	Dimensions	Indicators
Organizations	ISO 9001 Certified Organizations	Competitiveness	Global Competitiveness Index
	Organizations Recognized by Quality Awards		Gross Domestic Product
Professionals	International Academy for Quality Members	Social Cohesion	Gini Index
	Qualified Quality Professionals		People at Risk of Poverty and Social Exclusion
Research	Indexed Quality Papers Published	Sustainability	Environmental Wellbeing Results
	Universities in International Research Rankings		Ecological Footprint
Education	Indexed Quality Papers Published	Innovation and Entrepreneurship	Global innovation Index
	Universities in International Research Rankings		Ease of Doing Business Results
Health	Healthy Life Expectancy	Satisfaction	Quality of Life
	At Birth Mortality Rates		Job Satisfaction
			Unemployment Rate

The European Innovation Scoreboard (EIS) is an annually published report by the European Union and provides a comparative analysis of innovation performance in EU countries, other European countries and regional neighbours. The measurement framework identifies four main types of groups and ten innovation dimensions, as seen on Figure 10.

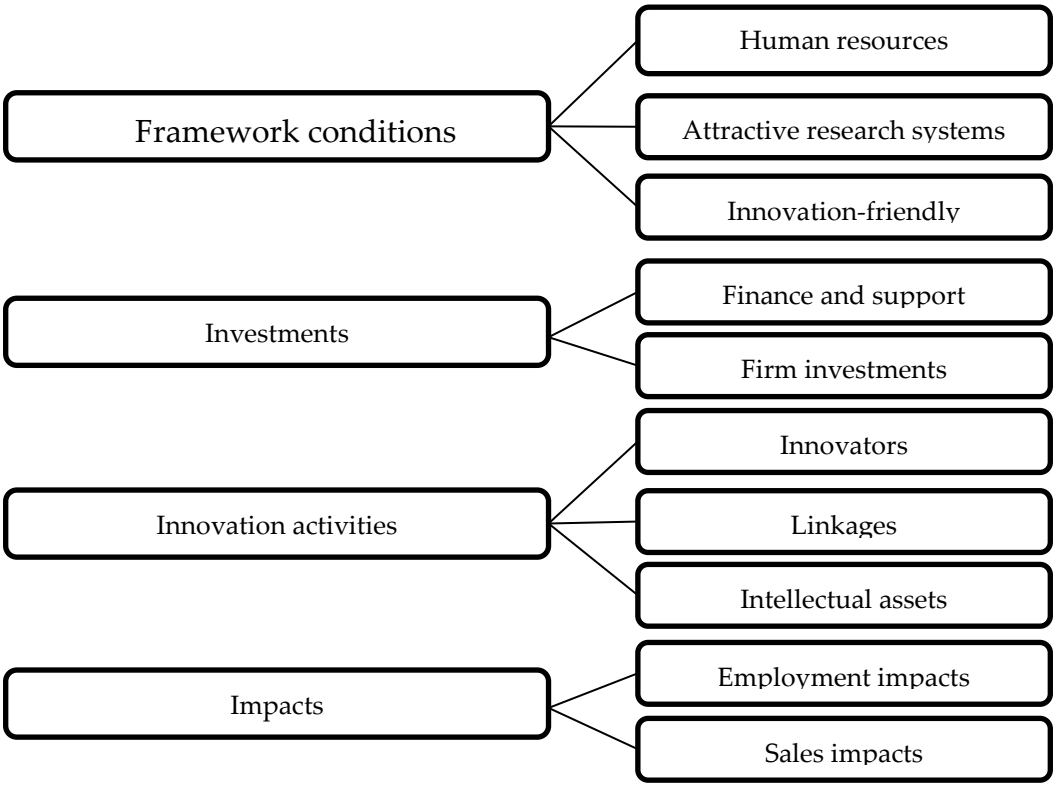


Figure 10: EIS measurement framework groups and dimensions (European Innovation Scoreboard 2017, p.8)

These 10 dimensions are measured through 27 different indicators, which are presented in appendix 4. The EIS measures the EU national innovation systems through an unweighted average of the 27 indicators.

1.2.3 Literature Review Summary

Despite the existence of many adaptations of frameworks for organizations in specific sectors, like education (Karathanos & Karathanos, 2005) or health care (Zelman et al., 2003), which can be explained by the diversity of the service industry, as Layton & Moore (1989) concluded "since the service industries themselves are a diverse group, indicators for different industries within the sector should be usefull". To our knowledge, no specific framework has been developed to measure sector performance, leaving a gap in the literature of performance measurement in terms of scope of analysis (organization, sector, country). The reviewed frameworks were organized in the following Table 4 according to the focus of measurement, organization or country. The

organization frameworks are frameworks that aim to help in the measurement of organizations performance, while the country frameworks aim to measure country performance.

Table 4: Literature review collected models

Organizational Performance Frameworks	Country Performance Frameworks
Performance Measurement Matrix (PMM)	Global Innovation Index (GII)
Strategic Measurement Analysis and Reporting Technique (SMART)	Global Competitiveness Report (GCR)
Balance Scorecard (BSC)	European Quality Scoreboard (EQS)
Performance Prism (Prism)	European Innovation Scoreboard 2015 (EIS)
OSLO Manual	
COTEC Innovation Scoring (CIS)	
European Foundation for Quality Management (EFQM)	
Malcolm Baldrige National Quality Award (Malcolm)	
Performance Measurement System for Service Industries (PMSSI)	
SERVQUAL	

Chapter 2: Frameworks Overview

In the previews chapter we reviewed different performance measurement frameworks used to measure organizations and countries' performance. As a first step, each framework category, criteria, dimensions and subdimensions was fully explored to understand what was measured in each framework. Despite the differences between them, some similarities, in terms of dimensions used, are consistent throughout the frameworks, with different frameworks analyzing the same dimensions but giving them different names (for example the dimension "market" analyzed by the SMART and CIS framework is named "competitiveness" in the PMSSI framework). In order to smooth the analysis and avoid redundancy, we decided to group those into common dimensions. All the thought behind the process is described in Annex 1.

We categorized dimensions into three major intertwined categories, as shown in Figure 11: Context, Enablers and Results. This separation of dimensions in categories is supported by the literature in the EFQM, Malcolm, PMSSI and EQS frameworks.

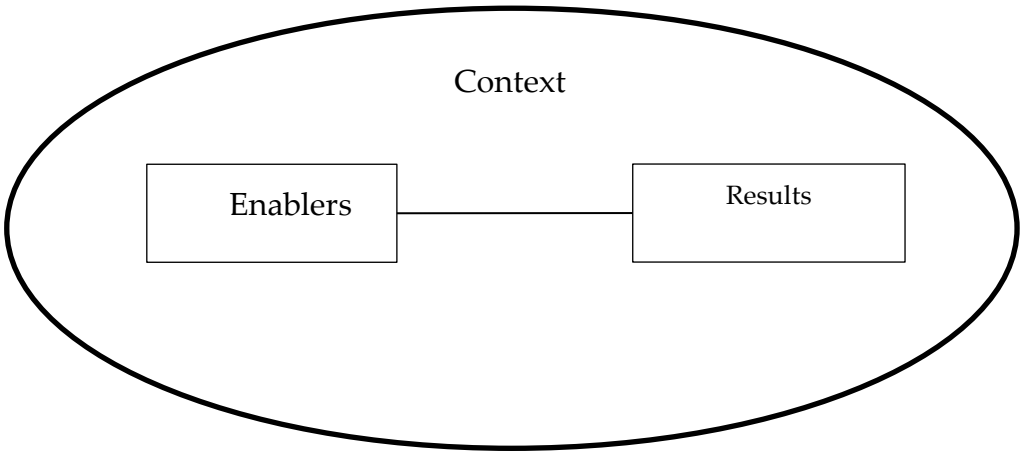


Figure 11: Grouped dimensions categories: context, enablers and results

2.1 Organizational Performance Frameworks Overview

According to Neely et al., (1997) it is important, for both the designer and the user, to define the measures themselves. In this line of reasoning it also becomes important to define the dimensions and categories. Starting with the analysis of the organizational performance frameworks, 14 dimensions of assessment were identified, defined and categorized. These dimensions are presented in Table 5.

Table 5: Organizational performance frameworks dimensions

Category	Dimensions/ Frameworks	SMART	BSC	Prism	Oslo Manual	CIS	EFQM	Malcolm	PMSSI	SERVQUAL	Total
Context	Context				X	X		X			3
Enablers	Capabilities		X	X		X	X	X			5
	Leadership					X	X	X			3
	Strategy	X		X		X	X	X			5
	Stakeholders			X			X	X			3
Results	Customer Satisfaction	X	X				X	X	X	X	6
	Efficiency	X	X						X		3
	Financial	X	X			X	X	X	X		6
	Innovation		X		X	X	X		X		5
	Market	X				X		X	X		4
	Processes	X	X	X		X	X	X	X		7
	Productivity	X	X						X		3
	Quality	X									1
	Sustainability					X		X			2
	Total	8	7	4	2	9	8	10	7	1	-

SMART- Strategic Measurement Analysis and Reporting Technique; BSC- Balance Scorecard; Prism- Performance Prism; CIS- COTEC Innovation Scoring; EFQM- European Foundation for Quality Management; Malcolm- Malcolm Baldrige National Quality Award; PMSSI- Performance Measurement System for Service Industries

The category Context can be defined as the category formed by the dimensions that are responsible for the measurement of the environment in which the object of assessment (organization, sector or country) is being evaluated. In this category, the only dimensions identified in the reviewed literature is the Context dimension itself. Proposed by the Oslo Manual, CIS and Malcolm frameworks, it tries to measure the environment in which the organization is settled. These

factors are outside of the range of action of the organization, but due to the high impact and influence in its performance, consideration must be taken upon.

The category Enablers can be defined as the category formed by the set of dimensions that empower the agent of assessment into achieving results. In the reviewed literature, several dimensions can be categorized as Enabler dimensions:

- The dimension Capabilities is proposed in the BSC, Prism, CIS, EFQM and Malcolm frameworks and measures the ability of the organization in using its workforce, know-how or skills and technology to achieve the organization goals. Capabilities can be defined as the set of workforce, know-how, skills and technology used by an organization in its productive process;
- The dimension Leadership, proposed in the CIS, EFQM and Malcolm frameworks, measures the performance of the leadership inside the organization, how management leads the organization and act as role values. Leadership can be defined as the ability of leading the organization;
- The dimension Strategy, proposed by the Prism, SMART, CIS, EFQM and Malcolm frameworks, measures how the organization plans and establishes its strategic directions. Strategy can be defined as the organization ability in implementing plans of action and implementing its mission and vision;
- The dimension Stakeholders, proposed by the Prism, EFQM and Malcolm frameworks, measures how the organization manages stakeholders, like external partnerships or suppliers, in order to support the operating process. Stakeholders can be defined as the group of entities with interest and/or concern in the organization.

The category Results can be defined as the category formed by the set of dimensions that assess the outcome of the agent. In the reviewed literature, several dimensions can be grouped into the results' dimension:

- The Customer Satisfaction dimension, proposed by the BSC, SMART, EFQM, Malcolm, PMSSI and SERVQUAL frameworks, tries to measure how customers perceive the goods and/or services acquired to the organization. Customer satisfaction can be defined as the degree of satisfaction of the provided goods and/or service of the organization by the customer;
- The Efficiency dimension, proposed in the BSC, SMART, PMSSI frameworks, measures the organization ability in utilizing its resource in its daily activity, comparing what was produced with what could have been produced with the same amount of resources. The efficiency dimension can be defined as the aptitude of the organization in functioning and producing in the best possible manner with the least waste of resources;
- The Financial dimension, proposed in the BSC, SMART, CIS, EFQM, Malcolm and PMSSI frameworks, measures the financial business results that the organization achieved, that is, the economic performance of the organization, in accounting terms;
- The Innovation dimension, proposed by the BSC, Oslo Manual, CIS, EFQM and PMSSI frameworks, measures the ability of the organization in generating new knowledge, translating an invention or idea into new product, service or process that creates value which the customer is willing to pay. Innovation dimension can be defined as the ability of the organization in generating new methods, ideas, products or processes;
- The Market dimension, proposed in the SMART, CIS, Malcolm and PMSSI frameworks, measures how the organization is doing in comparison to its

competitors. The market dimensions can be defined as the capacity of the organization in surpassing its competitors;

- The Process dimension, proposed in the BSC, Prism, SMART, EFQM, Malcolm and PMSSI frameworks, measures how the organization conducts its continuous actions or operations with the aim of producing their products and/or services. It includes parameters like flexibility, delivery or cycle time. The process dimension can be defined as the ability of the organization in conducting their production operations;
- The Productivity dimension, proposed by the BSC, SMART and PMSSI frameworks, measures how productive the organization is. In other words, it measures the division of average output per period by the total costs incurred or resources consumed in that same period. The productivity dimension can be defined as the effectiveness of the organization and its productive effort in terms of the rate of output it produces per unit of input it consumes;
- The dimension Quality, proposed in the SMART framework, is a measure of excellence or a state of being free of defects and/or deficiencies. This dimension is linked to the Customer Satisfaction dimension, since the number of defect an organization produces has a direct impact on their customer satisfaction. The quality dimension can be defined as the organization aptitude of producing to certain standards, conformance to requirements and freedom from defects;
- The sustainability dimension can be divided into the sub-dimensions social responsibility and environment sustainability. Social responsibility can be defined as the idea that business should balance profit-making activities with activities that benefit the society, while environment sustainability can be defined as the restructuration of the organization actions to avoid depletion of the natural resources and to maintain an

ecological balance. The sustainability dimension, proposed in the CIS and Malcolm frameworks, measures how the organization actions affect the society and environment in which the organization is inserted.

2.2 Country Performance Framework Overview

The same process of analysis, done to the organizational performance frameworks, was applied to the country performance frameworks. From the various frameworks analyzed, 15 dimensions of assessment were identified, defined and categorized. These dimensions are presented in Table 6.

Table 6: Country performance frameworks dimensions

Category	Dimensions/ Frameworks	GII	GCR	EQS	EIS	Total
Context	Internal Context	X	X			2
Enablers	Education	X	X	X		3
	Financing	X	X			2
	Health		X	X		2
	Infrastructure	X	X		X	3
	Investment	X			X	2
	Labour Market		X	X	X	3
	Market	X	X			2
	Research	X		X	X	3
Results	Competitiveness		X	X		2
	Innovation	X	X	X	X	4
	Quality			X		1
	Satisfaction			X		1
	Sustainability	X		X		
	Outputs			X	X	2
	Total	9	9	10	6	-

GII- Global Innovation Index; GCR- Global Competitiveness Report; EQS- European Quality Scoreboard; EIS- European Innovation Scoreboard

As previously defined, the category Context is formed by the dimensions that are responsible for the measure of the environment in which the agent of assessment is been evaluated. In this category, the only dimension identified in the reviewed literature is the Internal Context dimension. Measured by the GII

and GCR frameworks, it tries to measure the internal environment of the country, formed by the internal political, regulatory and business and economical environment.

The category Enablers can be defined as the category formed by the set of dimensions that empower the agent of assessment into achieving results. In the reviewed literature of country performance measurement, several dimensions, related to the country performance frameworks, can be categorized as enabler dimensions:

- The Education dimension, proposed in the GII, GCR, EQS and EIS frameworks, measures the level of education and training in the country, from education enrollment rate to school life expectancy or even expenditure on education. This dimension can be defined as the ability of the country in educating its citizens;
- The Financing dimension, proposed in the GII and GCR frameworks, measures the access to credit inside the country, from the ease of access to loans, to affordability of financial services and venture capital availability. This dimension can be defined as the capacity of financing entities inside the country;
- The Health dimension, proposed in the GCR and EQS frameworks, measures the health condition inside the country, from healthy life expectancy to infant mortality or HIV prevalence. This dimension can be defined as the state of health of the people living inside the country;
- The Infrastructure dimension, proposed in the GII, GCR and EIS frameworks, measures the access inside of the country to infastructures, like electricity, broadband, roads, and so on. This dimension can be defined as the state of infrastructures the country possesses;

- The Investment dimension, proposed in the GII and EIS frameworks, measures the investment captured. This dimension can be defined as the ability of the country of gathering investment;
- The Labour Market dimension, proposed in the GCR, EQS and EIS frameworks, measures the labour efficiency and employment impacts in the country. This dimension can be defined as the state of working force inside the country;
- The Market dimension, proposed in the GII and GCR frameworks, measures the trade, competition and market scale in the country. This dimension can be defined as the state of the market inside the country;
- The Research dimension, proposed in the GII, EQS and EIS frameworks, measures the research undertaken, from published papers and international scientific co-publications to number of researchers and gross expenditure on R&D. This dimension can be defined as the ability of the country to perform research.

The category Results can be defined as the category formed by the set of dimensions that assess the outcome of the agent. In the reviewed literature of country performance measurement, several dimensions can be categorized as results:

- The Competitiveness dimension, proposed in the GCR, and EQS frameworks, measures the set of institutions, policies and factors that determine the level of productivity of an economy. This dimension can be defined as the level of productivity of the country;
- The Innovation dimension, proposed in the GII, GCR, EQS and EIS frameworks, measures the ability of the country in generating new knowledge, technology or intellectual assets. This dimension can be defined as the ability of the country to innovate;

- The Quality dimension, proposed in the EQS framework, measures quality through several related dimensions. This dimension can be defined as the aptitude of the country to maintain certain standards and conformances;
- The Satisfaction dimension, proposed in the EQS framework, measures the satisfaction of the people living inside the country, like the quality of life or job satisfaction. This dimension can be defined as the degree of satisfaction of the country residents;
- The Sustainability dimension can be divided into the sub-dimensions social cohesion, proposed in the EQS framework, and environment sustainability, proposed in the GII and EQS frameworks. Social cohesion can be defined as the effort of the country in working toward the well being of all its citizens, while environment sustainability can be defined as the ability of the country to a certain level of environment performance and maintain its ecological footprint. The sustainability dimension can be defined as the ability of the country to grant a minimum level of well being to its citizens and environmental performance;
- The Outputs dimension, proposed in the EQS and EIS frameworks, measures outputs from the country, like gross domestic product or exports and sales.

2.3 Overview

As a result of the completed frameworks overview, some relevant findings emerge for the construction of our sector performance measurement framework. While some organization dimensions focus on the aspects of the organization (Stakeholders, Leadership, Strategies, Products and Services or Customer Satisfaction), they are not applicable once we broaden the analysis scope from

organizations to countries. This is a result of the change of the subject of measurement. This means, although some dimensions are used to measure performance independently of the level of scope, others are only applicable in specific levels, resulting in a need to adapt the dimensions when measuring performance. Despite this fact, other dimensions seem to be common across the various levels of scope, although they may be included into different categories (for example, the dimension Market exists in the organizational performance frameworks as a Result dimension but it's an Enabler dimension in the countryperformance frameworks). The Table 7 shows the dimensions used, across the organizational and country performance frameworks, organized.

Table 7: Organization and country frameworks dimensions comparison

	Organization Frameworks	Country Frameworks
Category	Dimensions	Dimensions
Context	Context	Internal Context
Enablers	Leadership	
	Strategy	
	Stakeholders	
	Capabilities	Labour Market
		Education
		Financing
		Health
		Infrastructure
		Investment
		Market
		Research
Results	Customer Satisfaction	Satisfaction
	Financial	Outputs
	Innovation	Innovation
	Market	
	Processes	
	Efficiency	
	Productivity	Competitiveness
	Quality	Quality
	Sustainability	Sustainability

When comparing the few service specific frameworks (PMSSI and SERVQUAL frameworks) with the other organization performance measurement frameworks, a distinction in the emphasis on the measurement of capabilities is also found. While the PMSSI framework emphasizes the utilization of the capabilities needed (through the use of measures in productivity and efficiency) the other frameworks emphasize the measure in the capabilities themselves. This might be explained due to the intangible nature of services.

While organization models try to grasp as many dimensions as possible to assess organization performance, country performance models try to explore to the fullest one specific dimension (innovation, quality or competitiveness). Despite measuring a single dimension, like innovation or quality, by analyzing the frameworks a better understanding of the components used to measure those dimensions was possible to achieve. Also, while organization frameworks analyse the organization internally, with information collected mainly inside the organization, performing benchmarking with themselves from period to period, country frameworks perform benchmark between a set of countries in the same period of time.

Finally, there seems to be a shift in the paradigm of the frameworks, and few of the most recent ones have been introducing sustainability as an additional dimension (COTEC Innovation Scoring, Malcolm, European Quality Scoreboard and Global Innovation Index).

Chapter 3: Proposing CER: a new framework

3.1 Framework Objective

The objective of the Context, Enabler and Result (CER) framework, developed in this thesis, is to elaborate a performance measurement tool that allows measuring and evaluating the performance of service sectors. This performance measurement is done across 11 different dimensions, allowing organizations to benchmark their performance within their operating sector.

When proposing this new framework, product of the reviewed literature, some considerations were made:

- Some dimensions are not applicable to all levels of scope;
- Other dimensions are applicable across different levels of scope but can be sorted into different categories;
- The number of dimensions can be subject of change depending on the level of scope. Even so, when analyzing a single dimenson multiple components can be analyzed to gather data;
- The type of data can be different, changing from time series data, (collected in organization frameworks - a collection of observations for a single entity over time), to cross-sectional data (collected in country frameworks - a collection of observations for multiple entities at a single point in time);
- Dimensions can have different importance in different service sectors, and therefore, different weights. For this thesis, we assume that they are of equal importance and contribution.

The framework allows the comparison between the sector average performance and the organizations performance, producing important information relating to the performance state in each of the different assessed

dimensions. In order to do it, the framework that is first presented in a broad way, is then adapted to the specificities of a certain service sector, which in this case, is the Portuguese retail sector of supermarkets and hypermarkets (classified according to the Portuguese CEA, classification of economic activity, 47111) was chosen and its performance analyzed.

3.2 Conceptual measurement framework

The CER framework is applied specifically to service sectors, calculating different variables across 11 dimensions imbedded in the 3 categories: context, enablers and results (Figure 12).

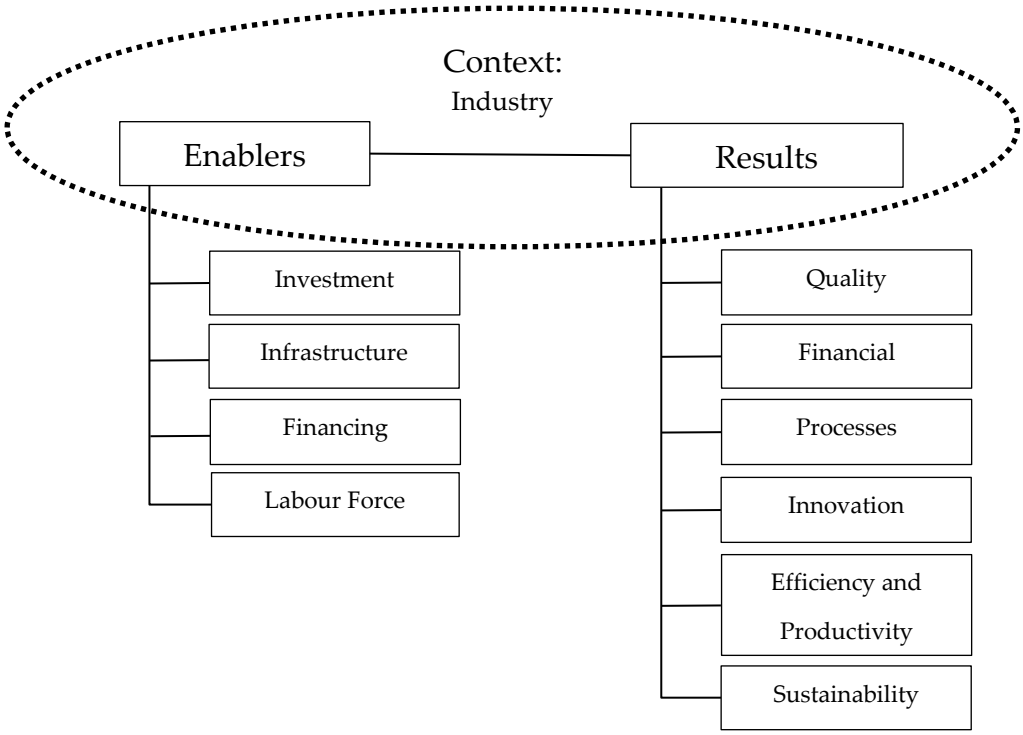


Figure 12: CER dimensions framework

Context

The category Context measures the dimension industry, which represents the internal environment of the sector. This is a specific dimension, unlike the others, since it is the only exogenous dimension in the framework. This means the indicators presented in this dimension are relative to the sector in question, and as such, are not managed by the companies. Despite that, it provides usefull information regarding the state of the sector. It is measured through the following 8 indicators:

- Number of companies: this indicator represents the total number of companies working in the specific sector during each year t:

$$Nº\ of\ companies\ t = total\ number\ of\ companies\ operating\ in\ the\ sector\ in\ t$$

- Entry of new companies: this indicator shows the variation (in %) of new companies that entered the sector each year in comparison to the previous year:

$$Entry\ of\ new\ companies = \frac{total\ number\ of\ new\ companies\ operating\ in\ the\ sector\ in\ t}{total\ number\ of\ companies\ operating\ in\ the\ sector\ in\ t-1} x100$$

- Exit of companies: this indicator shows the number of companies (in %) that ceased operations in the sector each year in comparison to the previous year:

$$Exit\ of\ new\ companies = \frac{total\ number\ of\ companies\ that\ ceased\ operations\ in\ the\ sector\ in\ t}{total\ number\ of\ companies\ operating\ in\ the\ sector\ in\ \ t-1} x100$$

- Sector weight: this indicator shows the weight of the sector for each year by using the ratio between the sector Gross Value Added (GVA) and the country Gross Domestic Product (GDP):

$$Sector\ Weight = \frac{Sector\ GVA\ in\ t}{GDP\ in\ t}$$

- Regulation: this is a binary indicator that gives the information if the sector is regulated by a third party, taking the value 1 if it is regulated or 0 if it is not;

- Capital intensity: this indicator represents if the sector is capital or labour intensive and one way of calculating it is through the ratio of fixed assets by labour. The higher the value, the more Capital intensive the sector is:

$$Capital\ Intensity = \frac{\sum Fixed\ assets\ per\ company\ of\ the\ sector\ in\ t}{\sum Personnel\ Cost\ per\ company\ of\ the\ sector\ in\ t}$$

- Employment rate: this indicator represents the percentage of people employed regarding the total active population;

$$Employment\ Rate = \frac{Total\ Sector\ Workforce\ Employed\ in\ t}{Economically\ Active\ Population\ in\ t}$$

- Dispersion of Earnings: this indicator represents how disperse are the earnings in the sector by measuring which % of companies in the sector hold 80% of the earnings. A high value on dispersion of earnings means the sector earnings are split across the companies in a more evenly way while a low value means few companies control most of the sector earnings.

By calculating these indicators, an understanding of the sector can be grasped since they reflect the competition of the industry: how many companies exist operating in the sector, if it is a stable or unstable sector with high entrance and/or exit of companies, if it is an important sector in the country economy, if it is regulated, if it is an intensive labour or capital sector as well as if there is too much dispersion in the earnings with few companies earning much of the sector or is spreaded across multiple companies.

Enablers

On the other way, the categories Enablers and Results are composed by dimensions and indicators in which organizations have direct control and effect.

The category Enablers is formed by a set of 4 dimensions that empower the organizations in the sector into achieving results:

1. Investment

The Investment dimension measures the degree of investment the sector has undergone, and it is measured through the following 2 indicators:

- Average gross expenditure on R&D: this indicator represents the average amount invested in research and development by each company in the sector and it is calculated by the ratio of the sum of the total gross expenditure on R&D of each company in the sector with the total number of companies in that sector:

$$Average\ gross\ expenditure\ on\ R\&D = \frac{\sum Gross\ Expenditure\ on\ R\&D\ of\ each\ company\ in\ t}{N^{\underline{o}}\ companies\ in\ t}$$

- Degree of investment: this indicator is calculated by the ratio of the sum of the total investment of each company in the sector with the sum of the net income of each company:

$$Degree\ of\ investment = \frac{\sum financial\ investment\ of\ each\ company\ in\ t}{\sum net\ income\ of\ each\ company\ in\ t}$$

2. Infrastructure

The Infrastructure dimension measures the number and state of the vital infrastructures in which the sector relies, and it is measured through these 7 indicators:

- Average number of point of sales per company: this indicator is calculated by the sum of total number of points of sales of each company in the sector divided by the total number of companies in that sector:

$$Avg\ nº\ of\ point\ of\ sales = \frac{\sum total\ number\ of\ point\ of\ sales\ per\ company\ operating\ in\ the\ sector\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average number of new points of sales per company: this indicator represents in average, how many new points of sales were created by each company and it is represented by the sum of total number of new points of sales of each company divided by the total number of companies in that sector:

$$Avg\ nº\ of\ new\ points\ of\ sale = \frac{\sum total\ number\ of\ new\ point\ of\ sales\ per\ company\ operating\ in\ the\ sector\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average number of closure of points of sale per company: this indicator represents in average, how many points of sale are closed by each company and it is represented by the sum of total number of closed points of sales of each company divided by the total number of companies in that sector:

$$Avg\ nº\ of\ closed\ points\ of\ sale = \frac{\sum total\ number\ of\ closed\ point\ of\ sales\ per\ company\ operating\ in\ the\ sector\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average size of physical points of sales per company: this indicator is calculated by the sum of the average size of physical points of sales (e.g. in square meters) of each company divided by the total number of companies in that sector;

$$Avg\ size\ of\ physical\ points\ of\ sales = \frac{\sum average\ size\ of\ physical\ points\ of\ sale\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average cost of m^2 per point of sales per company: this indicator is calculated by the sum of the average of the cost of m^2 per point of sale of each company divided by the total number of companies in that sector:

$$Avg\ cost\ of\ m^2\ per\ point\ of\ sales\ \ per\ company = \frac{\sum average\ cost\ of\ m^2\ per\ points\ of\ sale\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Online presence: this indicator represents the position of the sector towards the internet market and its calculated by the ratio of the sum of the total online sales of each company with the sum of the total sales of each company in that sector:

$$Online\ presence = \frac{\sum online\ sales\ per\ company\ in\ t}{\sum total\ sales\ per\ company\ in\ t}$$

- Average fleet size: this indicator represents the average number of vehicles in each company fleet and its value is obtained by the sum of each company's fleet of vehicles of the sector divided by the number of companies in that sector:

$$Avg\ fleet\ size = \frac{\sum company's fleet\ size\ of\ each\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

3. Financing

The Financing dimension measures the financing capability of the sector, and it is measured through these 3 proposed indicators:

a. Weight of Debt Service: this indicator represents the weight of the financial costs supported by the sector and it is calculated by the ratio of the sum of all the interested paid in the sector with the sum of the EBITDA of each company of that sector:

$$Weight\ of\ debt\ service = \frac{\sum interests\ paid\ per\ company\ in\ t}{\sum EBITDA\ per\ company\ in\ t} \times 100$$

b. Leverage: this indicator represents the weight of the debt of the sector and it is calculated by the ratio of the sum of the total debt of each company of the sector with the sum of the total assets value of each company of the that sector:

$$Leverage = \frac{\sum total\ debt\ per\ company\ \ in\ t}{\sum total\ assets\ per\ company\ in\ t} \times 100$$

c. Supplier Debt: this indicator represents how heavily the sector is allocating debt into suppliers shoulders, helping financing themselfs, and it is calculated by the ratio of the sum of total

suppliers debt of each company in the sector with the sum of the total net income of each company in that sector:

$$Supplier\ Debt = \frac{\sum total\ suppliers\ debt\ per\ company\ \ in\ t}{\sum total\ net\ income\ per\ company\ \ in\ t}$$

4. Labour Force

The Labour Force dimension aims to measures aspects of the labour practices in the sector through these 5 indicators:

d. Sector average wage: this indicator represents the average wage per year that is beeing paid to workers in the sector and it is obtained by the ratio of the sum of total wages per company in the sector with the sum of total number of workers per company in that sector:

$$Sector\ average\ wage = \frac{\sum total\ wages\ per\ company\ \ in\ t}{\sum total\ number\ of\ workers\ per\ company\ in\ t}$$

e. Customer serving staff: this indicator represents the percentage of the work force of each company that is in the front line interacting with the customer. A low value represents an heavy burocratic structure while a high value means that most of the work force is in contact with the customers. It is obtained by the ratio of the sum of the total number of staff working face to face with customers per company in the sector with the sum of the total number of workers per company in that sector:

$$Customer\ serving\ staff = \frac{\sum total\ \ number\ of\ staff\ working\ face\ to\ face\ with\ costumers\ per\ company\ in\ t}{\sum total\ number\ of\ workers\ per\ company\ \ in\ t}$$

f. Staff turnover: this indicator represents the percentage of workers who leave the company and are replaced. This represents the

difficulty of the sector in maintaining the workforce and is calculated by the ratio of the sum of the total number of workers that left the company per company with the sum of the total number of workers per company:

$$Staff\ turnover = \frac{\sum total\ \ number\ of\ workers\ that\ left\ the\ company\ per\ company\ in\ t}{\sum total\ number\ of\ workers\ per\ company\ in\ t} \text{x}100$$

g. Workers qualification: this indicator represents the percentage of the workforce in the sector that has tertiary education and it is calculated by the ratio of the sum of the total number of workers with tertiary education in each company in the sector with the sum of the total number of workers per company:

$$Workers\ qualification = \frac{\sum total\ \ number\ of\ workers\ with\ tertiary\ education\ in\ each\ company\ in\ t}{\sum total\ number\ of\ workers\ per\ company\ \ in\ t}$$

h. Average Staff training: this indicator represents the average investment by each company in the sector in staff training and the value its obtained through the ratio of the sum of total expenditure in staff training by each company with the total number of companies in that sector:

$$Avg\ staff\ training = \frac{\sum total\ expenditure\ in\ staff\ training\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

Results

The category Results is responsible for the assessment of the sector results through 6 dimensions: Quality, Financial, Processes, Innovation, Productivity and Efficiency and Sustainability.

1. Quality

The Quality dimension measures the quality in the sector through 2 subdimensions, Satisfaction and Standards.

1.1 The Satisfaction subdimension aims to measures the quality of the service through the customer experience through these 3 indicators:

- Customer satisfation: this indicator represents the overall satisfaction of the clients in the sector and it is measured through the ratio of the sum of the value of customer satisfaction of each company in the sector (assuming there is a common measurement framework of costumer satisfaction) with the total number of companies in the sector:

$$Customer\ satisfaction = \frac{\sum Customer\ satisfaction\ \ value\ per\ company\ in\ t}{N\º\ of\ companies\ in\ t}$$

- Average number of complaints: this indicator represents the average amount of compaints per company in the sector and it is calculated by the average of the sum of the total number complaints in each company in the sector with the total number of companies of the sector:

$$Avg\ number\ of\ complaints = \frac{\sum total\ number\ of\ complaints\ per\ company\ in\ t}{N\º\ of\ companies\ in\ t}$$

- Average rate of returns: this indicator represents the share of the sales that are returned in each company in the sector (when the sale is a product) and is obtained by the ratio of the sum of total number of returns per company in the sector with the sum of the total number of sales per company in that sector:

$$Avg\ rate\ of\ returns = \frac{\sum total\ number\ of\ returns\ per\ company\ in\ t}{\sum total\ number\ of\ sales\ per\ company\ \ in\ t}$$

1.2 The Standards subdimension aims to measure the sector aptitude to maintain certain standards and conformances:

- Average number of ISO 9001 Quality Certificates: this indicator represents the average number of ISO 9001 quality certificates each company possess in the sector and the value is obtained through the ratio of the sum of the total number of ISO 9001 Quality Certificates per company in the sector with the total number of companies in that sector:

$$Avg\ number\ of\ ISO\ 9001\ quality\ certificates = \frac{\sum total\ number\ of\ ISO\ 9001\ quality\ certificates\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average number of quality certified professionals: this indicator represents the quality of the working force of the sector by measuring the number of professionals with quality certificates like Kaizen or Six Sigma and it is calculated by the ratio of the sum of the total number of certified workers per company in the sector with the total number of companies in that sector:

$$Avg\ number\ of\ quality\ certified\ professionals = \frac{\sum total\ number\ of\ quality\ certified\ professionals\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average number of other Quality Certificates: this indicator represents the average number of other quality certificates each company possess in the sector and the value is obtained through the ratio of the sum of the total

number of other Quality Certificates per company in the sector with the total number of companies in that sector:

$$Avg\ number\ of\ ISO\ 9001\ quality\ certificates = \frac{\sum total\ number\ of\ other\ quality\ certificates\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

2. Financial

The Financial dimension measures the financial results obtained by the sector through the use of these 11 financial indicators:

- Return on assets: this indicator represents how profitable the companies in the sector are relative to their total assets and it is calculated by the ratio of the sum of the total of the net income per company of the sector with the sum of the total assets of each company in that sector:

$$Return\ on\ assets\ (RoA) = \frac{\sum total\ net\ income\ per\ company\ in\ t}{\sum total\ assets\ per\ company\ \ in\ t}$$

- Return on Equity: this indicator represents the sector profitability by revealing how much profit each company generates with the money invested in each company by their respective shareholders. It is calculated by the ratio of the sum of the total of the net income per company of the sector with the sum of the total of the shareholder's equity of each company in that sector:

$$Return\ on\ Equity\ (RoE) = \frac{\sum total\ net\ income\ per\ company\ \ in\ t}{\sum total\ shareholder's\ equity\ per\ company\ in\ t}$$

- Return on sales: this indicator evaluates the operational efficiency of companies in the sector. Also known as the operating profit margin, it is calculated by the ratio of the sum of the total net income (before interest and tax) of each company in the sector with the sum of the total value of sales per company in that sector:

$$Return\ on\ sales\ (ROS) = \frac{\sum total\ net\ income\ (before\ interest\ and\ tax) per\ company\ in\ t}{\sum total\ sales\ per\ company\ \ in\ t}$$

- Current ratio: this indicator measures the capacity of the company to pay short-term and long-term obligations and it is calculated by ratio of the sum of the total current assets of each company in the sector with the sum of the total current liabilities per company in that sector:

$$Current\ ratio = \frac{\sum total\ current\ assets\ per\ company\ \ in\ t}{\sum total\ current\ liabilities\ per\ company\ in\ t} \times 100$$

- Solvency rate: this indicator measures if the cash flow in the companies of the sector is sufficient for the short-term and long-term liabilities and its calculated by the ratio of the sum of total net income with depreciations of each company in the sector with the sum of short and long-term liabilities of each company in that sector:

$$Solvency\ rate = \frac{\sum(total\ net\ income\ per\ company + total\ depreciations\ per\ company) in\ t}{\sum(total\ short\ term\ liabilities\ per\ company + total\ long\ term\ liabilities\ per\ company) in\ t}$$

- Average EBITDA Variation: this indicator is used as a company financial performance indicator. It is calculated by the difference

of the sum of the EBITDA value of the present year of each company in the sector and the EBITDA of the previous year of each company of that sector, divided by the sum of the EBITDA value of the previous year of each company in the sector:

$$Av\ EBITDA\ variation = \frac{\sum EBITDA\ per\ company\ of\ the\ \ year\ t - \sum EBITDA\ per\ company\ of\ year\ t-1}{\sum EBITDA\ per\ company\ of\ year\ \ t-1} \times 100$$

- Average EBIT: this indicator represents the profitability of the companies in the sector and it is calculated by the difference of the sum of the EBIT value of the present year of each company in the sector and the EBIT of the previous year of each company of that sector, divided by the sum of the EBIT value of the previous year of each company in the sector:

$$Av\ EBIT\ variation = \frac{\sum EBIT\ per\ company\ in\ t - \sum EBIT\ per\ company\ in\ t-1}{\sum EBIT\ per\ company\ in\ t-1} \times 100$$

- Average collection period: this indicator represents the approximate amount of time in days that it takes, for the companies in the sector, to receive payments owed. It is calculated by the ratio of the sum of the total collection period of each company in the sector with the total number of companies in that sector:

$$Avg\ collection\ period = \frac{\sum total\ collection\ period\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average days payable outstanding: this indicator represents the approximate amount of time in days that it takes, for the companies in the sector, to pay its invoices from trade creditors. It is calculated by the ratio of the sum of the total of the days

payable outstanding of each company in the sector with the total number of companies in that sector:

$$Avg\ days\ payable\ outstanding = \frac{\sum total\ days\ payable\ outstanding\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average days sales of inventory: this indicator represents the approximate amount of time in days that it takes, for the companies in the sector, to turn its inventory into sales. It is calculated by the ratio of the sum of the total days sales of inventory of each company in the sector with the total number of companies in that sector:

$$Avg\ days\ sales\ of\ inventory = \frac{\sum total\ days\ sales\ of\ inventory\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Sales growth: this indicator represents the variation in the total sales of the companies in the sector and it is calculated by the difference of the sum of the total sales of the present year of each company in the sector and the total sales of the previous year of each company of that sector, divided by the sum of the total sales of the previous year of each company in the sector:

$$Sales\ growth = \frac{\sum total\ sales\ in\ t - \sum total\ sales\ in\ t-1}{\sum total\ sales\ in\ t-1} \times 100$$

3. Processes

The Processes dimension measures the results of the sector processes in their normal operation routine through these 7 indicators:

- Average number of visitors: this indicator represents the average number of visitors per company in each year in the sector and it is calculated by the sum of total number of visitors per company divided by the total number of companies in that sector:

$$Avg\ nº\ of\ visitors = \frac{\sum total\ number\ of\ visitors\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average Service Time: this indicator represents the average time each company in the sector takes to serve a customer and it is calculated through the ratio of the sum of the service time of each company in the sector with the total number of companies in that sector:

$$Avg\ service\ time = \frac{\sum service\ time\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average wait time: this indicator represents the average time per company in the sector that costumers have to wait to be served and it is calculated through the sum of the total waiting time per company in the sector, divided by the total number of companies in that sector:

$$Avg\ wait\ time = \frac{\sum wait\ time\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average production cost: this indicator is calculated by the sum of the total production cost of each company in the sector divided by the total number of companies in that sector:

$$Avg\ production\ cost = \frac{\sum total\ production\ cost\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average order delivery time: this indicator measures the average time it takes each company in the sector to deliver orders made by their customers and it is calculated by the ratio of the sum of the average order delivery time of each company in the sector with the total number of companies in that sector:

$$Avg\ order\ delivery\ time = \frac{\sum avg\ order\ delivery\ time\ per\ company\ in\ t}{N^{o}\ of\ companies\ in\ t}$$

- Site traffic variation: this indicator represents the variation in the total number of visits to the company's website in the sector per year. It is calculated by the difference of the sum of the total number of website visits per company in the sector this year with the sum of the total number of website visits per company in that sector in the previous year, devided by the sum of the total number of website visits per company in that sector in the previous year:

$$Site\ traffic\ variation = \frac{\sum total\ n^{o}\ of\ website\ visits\ in\ t - \sum total\ n^{o}\ of\ website\ visits\ in\ t-1}{\sum total\ n^{o}\ of\ website\ visits\ in\ t-1}$$

- Average number of new subscribers to newsletter: this indicator represents the average number per company in the sector each year of new subscribers to each company's newsletter and it is calculated through the sum of the total number of new subscribers of each company in the sector divided by the total nymber of companies in that sector:

$$Avg\ n^{o}\ of\ new\ newsletter's\ subscribers = \frac{\sum total\ number\ of\ new\ subscribers\ of\ newsletters\ per\ company}{N^{o}\ of\ companies}$$

4. Innovation

The Innovation dimension measures the sector ability of generating new knowledge, technology or intellectual assets through these 2 indicators:

- Average number of patentes per company: this indicator is calculated through the ratio of the total number of patents in the sector and the total number of companies:

$$Avg\ nº\ of\ patents = \frac{total\ number\ of\ patents\ in\ the\ sector\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average number of trade marks per company: this indicator is calculated through the ratio of the total number of trade marks in the sector and the total number of companies:

$$Avg\ nº\ of\ trade\ marks = \frac{total\ number\ of\ trade\ marks\ in\ the\ sector\ in\ t}{Nº\ of\ companies\ in\ t}$$

5. Efficiency and Productivity

The Efficiency and productivity dimension measures how well the sector can utilize its available resouces for service production and it is measured through these 7 indicators:

- Average transaction value: this indicator represents the value size of each transactions made per company in the sector and it is calculated through the ratio of the total sales value per in the sector by the total sales count per company in that sector:

$$Avg\ transaction\ value = \frac{\sum total\ sales\ value\ per\ company\ \ in\ t}{\sum total\ sales\ count\ per\ company\ in\ t}$$

- Average items per transaction: this indicator gives the information of the average size of the basket of a chosen sector and it is calculated by

doing a ratio between the total number of items purchased and the number of transactions for the sector:

$$Avg\ items\ count = \frac{\sum total\ number\ of\ items\ sold\ per\ company\ in\ t}{\sum total\ sales\ count\ per\ company\ in\ t}$$

- Average sales count: this indicator represents quantities of sales done by a company and it is calculated by the sum of the total sales count per company of the sector, divided by the total number of companies in that sector:

$$Avg\ sale\ count = \frac{\sum total\ sales\ count\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average sale worth per staff: this indicator represents the average value of sales for each staff member per company in the sector and it is calculated by the ratio of the sum of total sales value per company by the sum of total number of employees per company:

$$Avg\ sale\ worth\ per\ staff = \frac{\sum total\ sales\ value\ per\ company\ \ in\ t}{\sum total\ number\ of\ employees\ per\ company\ in\ t}$$

- Average sale count per staff: this indicator represents the average quantity of sales for each staff member per company in the sector and it is calculated by the ratio of the sum of total sales count per company by the sum of total number of employees per company:

$$Avg\ sale\ count\ per\ staff = \frac{\sum total\ sales\ count\ per\ company\ \ in\ t}{\sum total\ number\ of\ employees\ per\ company\ in\ t}$$

- Average number of clients per point of sale: this indicator is obtained through the ratio of average number of clientes per point of sale per company by the total number of companies:

$$Avg\ nº\ of\ clients\ per\ point\ of\ sale = \frac{\sum avg\ nº\ of\ clients\ per\ point\ of\ sale\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average sale value per point of sale per company: this indicator is obtained through the ratio of the average number of clientes per point of sale per company in the sector by the total number of companies in the sector:

$$Avg\ sale\ value\ per\ point\ of\ sale = \frac{\sum avg\ nº\ of\ clients\ per\ point\ of\ sale\ per\ company\ in\ t}{Nº\ of\ companies\ in\ t}$$

6. Sustainability

The Sustainability dimension measures the social cohesion and environment sustainability concerns within the sector through 4 indicators:

- Economic cohesion: this is a social cohesion indicator that represents the company effort in minimizing social disparities in a specific sector and it is calculated by doing the ratio between the sector average wage and the minimum wage:

$$Economic\ cohesion: \frac{sector\ average\ wage\ in\ t}{minimum\ wage\ in\ t}$$

- Average charity donation: this is a social cohesion indicator that represents the average amount of contributions the companies in the sector are giving to needy third parties and it is calculated by the ratio of, the total charity donations value of companies in the sector divided by the total net income value of companies in the sector, and the total number of companies:

$$Avg\ charity\ donation = \frac{\frac{\sum donation\ value\ per\ company\ in\ t}{\sum net\ income\ per\ company\ \ in\ t}}{Nº\ of\ companies\ in\ t}$$

- Average number of ISO 14001: this is an environmental indicator that represents the average number of certifications ISO 14001 each company in the sector holds. This certification sets the criteria,

mapping out a framework for setting up an effective environmental management system. It is calculated by dividing the total number of certifications in the sector by the total number of companies operating in the sector:

$$Avg\ nº\ of\ ISO\ 14001 = \frac{total\ number\ of\ ISO\ 14001\ in\ the\ sector\ in\ t}{Nº\ of\ companies\ in\ t}$$

- Average electrical energy consumption per m^2 : this is an environmental indicator that represents the expenditures of electrical energy of the companies per m^2 of physical point of sale and it is calculated by the ratio of total energy consumption in the point of sales and the total sale area for:

$$Avg\ electrical\ energy\ consumption = \frac{\sum total\ energy\ consuption\ \ in\ points\ of\ sale\ per\ company\ in\ t}{\sum total\ m^2\ per\ point\ of\ sale\ in\ t}$$

3.3 Context, Enablers and Results General Framework

For the porpose of this thesis we are considerating that the weight of each category as well of each dimension in equally distributed across them. As a result, the CER general framework presents the following structure:

CER Framework (62 indicators)

1. Context (8 indicators)
   1.1. Industry dimension (8 indicators)
      1.1.1. Number of Companies
      1.1.2. Entry of new Companies
      1.1.3. Exit of Companies
      1.1.4. Sector Weight[1]
      1.1.5. Regulation[2]
      1.1.6. Capital Intensity

[1] Adapted from the European Quality Scoreboard
[2] Adapted from the Global Innovation Index

1.1.7. Employment rate[1]

1.1.8. Dispersion of Earnings

2. Enablers (50%) (17 indicators)

2.1. Investment (25%) (2 indicators)

2.1.1. Average gross expenditure on R&D[3]

2.1.2. Degree of Investment

2.2. Infrastructure (25%) (7 indicators)

2.2.1. Average number of point of sales per company

2.2.2. Average number of new points of sales per company

2.2.3. Average number of closure of points of sale per company

2.2.4. Average size of physical points of sales per company

2.2.5. Average cost of m^2 per point of sales per company

2.2.6. Online presence

2.2.7. Average fleet size

2.3. Financing (25%) (3 indicators)

2.3.1. Weight of Debt Service

2.3.2. Leverage

2.3.3. Supplier Debt

2.4. Labour Force (25%) (5 indicators)

2.4.1. Sector average wage

2.4.2. Customer serving staff

2.4.3. Staff turnover

2.4.4. Workers qualification[4]

2.4.5. Average Staff training[5]

3. Results (50%) (37 indicators)

3.1. Quality (16,6%) (6 indicators)

[3] Adpted from the European Innovation Scoreboard
[4] Adapted from the Global Competitiveness Report
[5] Adapted from the Global Competitiveness Report

3.1.1. Satisfaction (50%) (3 indicators)

3.1.1.1. Customer satisfation[6]

3.1.1.2. Average number of complaints

3.1.1.3. Average rate of returns

3.1.2. Standars (50%) (3 indicators)

3.1.2.1. Average number of ISO 9001 Quality Certificates[6]

3.1.2.2. Average number of quality certified professionals[6]

3.1.2.3. Average number of other Quality Certificates[6]

3.2. Financial (16,7%) (11 indicators)

3.2.1. Return on assets

3.2.2. Return on equity

3.2.3. Return on sales

3.2.4. Current ratio

3.2.5. Solvency rate

3.2.6. Average EBITDA variation

3.2.7. Average EBIT variation

3.2.8. Average collection period

3.2.9. Average days payable outstanding

3.2.10. Average days sales of inventory

3.2.11. Sales Growths

3.3. Processes (16,7%) (7 indicators)

3.3.1. Average number of visitors

3.3.2. Average Service Time

3.3.3. Average wait time

3.3.4. Average production cost

3.3.5. Average order delivery time

3.3.6. Site traffic variation

[6] Adapted from European Quality Scoreboard

3.3.7. Average number of new subscribers to newsletter

3.4. Innovation (16,6%) (2 indicators)

3.4.1. Average number of patentes per company[7]

3.4.2. Average number of trade marks per company[8]

3.5. Productivity and Efficiency (16,7%) (7 indicators)

3.5.1. Average transaction value

3.5.2. Average items per transaction

3.5.3. Average sale count

3.5.4. Average sale worth per staff

3.5.5. Average sale count per staff

3.5.6. Average number of clients per point of sale

3.5.7. Average sale value per point of sale per company

3.6. Sustainability (16,7%) (4 indicators)

3.6.1. Economic cohesion

3.6.2. Average charity donation

3.6.3. Average number of ISO 14001[9]

3.6.4. Average electrical energy consumption per m^2[9]

3.4 Applying the CER Framework to a service sector

The CER framework can be applied to measure service sector performance at multiple levels. These levels can be defined through the use of the economic classifications system, NACE. This is relevant since "statistics produced on the basis of NACE are comparable at European and, in general, at world level" (European Commission, 2008, page 13).

[7] Adapted from the European Innovation Scorecard, the Global Competitiveness Report and the Global Innovation Index

[8] Adapted from the European Innovation Scorecard

[9] Adapted from the Global Innovation Index

As shown in Figure 13, the economic activities are also organized at a national level, which in the Portuguese case is de C.A.E. system. For the propose of this thesis, we will be using the Portuguese system C.A.E. to illustrate the application of the CER framework on the Portuguese retail setor.

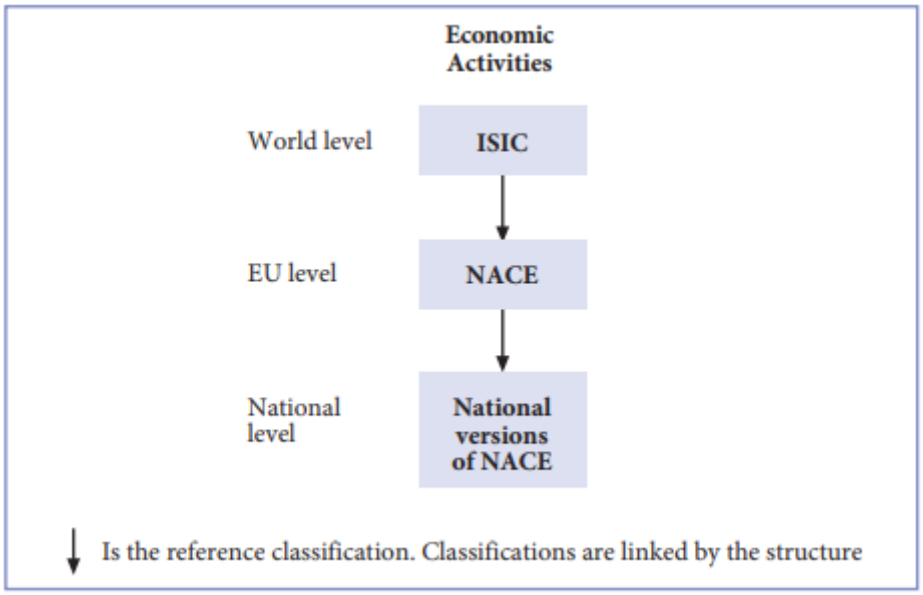


Figure 13: Economic activities hierarchy adapted from NACE Rev. 2, page 13

In the C.A.E system, section G, division 47 represents the retail trade, except of motor vehicles and motorcycles. This means the entire retail sector is inside this division. Each division can then be disaggregated into groups, each group into classes and each class into subclasses as shown in Table 9.

Table 8: Example of retail sector divisions, groups, classes and subclasses adpted from Classificação Portuguesa das Actividades Económicas Rev.3

471	Retail sale in non-specialized stores		
	4711	Retail sale in non-specialized stores where predominates food, beverages or tobacco items	
		47111	Retail sale in supermarkets and hypermarkets
		47112	Retail sale in other non-specialized stores where predominates food, beverages or tobacco items
	4719	Retail sale in non-specialized stores without predominating food, beverages or tobacco items	

472	Retail sale of food, beverages and tobacco in specialized stores
473	Retail sale of motor vehicle fuel in specialized stores
474	Retail sale of information technology equipment (ICT) in specialized stores
475	Retail sale of other household equipment in specialized stores
476	Retail sale of cultural and entertaining goods in specialized stores
477	Retail sale of nother goods in specialized stores
478	Retail sale via stalls, markets and on mobile units of sale
479	Retail sale not accomplished in stores, stalls, markets or mobile units of sale

To obtain the most accurate result, the CER framework should be applied to measure performance in classes or subclasses of the sectors. It is also possible to deviate from these and measure performance across divisions, but by doing so, the quality of the results will decay. As an example, when measuring the retail sector as a whole, represented in the C.A.E. system as division 47, we are measuring performance of different kind of retail companies, from supermarkets (C.A.E. 47111) to book stores (C.A.E. 47610). Since these provide two different kind of services, the results of the assessed dimensions might not have the same weight, resulting in misinterpreted information. For the purpose of this thesis, we will be applying the CER framework to the Portuguese retail sector of supermarkets and hypermarkets (C.A.E. 47111).

3.5 Methodology

The CER framework works as a composite indicator, formed by a range of compiled indicators across the framework dimensions and can be applied in two different ways to assess performance measurement.

The first application of the CER framework allows the measure of the overall sector performance across time. Through the assessment of the indicators across a designed time interval it allows to perceive the overall performance of the sector in that interval of time. This is done by calculating the Sector Value (Sv) for every indicator. After obtaining the Sector Value (Sv) for each indicator and

for each year of analysis, an analysis for the sector performance can then be performed.

The second application of the framework allows the measurement of performance of companies operating in the same sector in comparison to the sector overall performance.

The Sector Value (Sv) is first calculated for every indicator. The obtained value will represent the sector value, which will work as an anchor for the comparison between the companies operating in the same sector.

The indicator score (Is) can then be computed for each company, by the following formula:

$$\boldsymbol{Is} = \frac{company\ value - sector\ value}{|sector\ value|}$$

The value obtained will represent the difference of the company performance to the sector, for that indicator. This formula assumes that if data for specific companies are available it can be used to understand how the company performs in relation to the sector totals. By replacing the sector value with another companies' value, it also enables the comparison of performance between companies. The result will demonstrate the difference between performances of both companies.

After computing every indicator score for a dimension or subdimension we obtain the dimension score (Ds) through the sum of all the dimension indicators score divided by the number of indicators:

$$Ds = \frac{\sum Is}{n}$$

This will demonstrate, on average, how distant is the performance of the company to the sector, of that specific dimension.

Once every dimension score is computed, it is possible to calculate the category score (Cs). This is obtained by the weighted sum of the corresponding

dimensions scores (Ds). The CER score (CERs) is then calculated by the weighted sum of the categories score (Cs).

For evey score calculated, indicator score, dimension score, category score and CER score, the obtained values are a representation of the distance between sector performance and the companies' performance.

In order to classify organizations within the sector, a more realistic interval for the scores is needed. The companies with a CER score above 0 (CERs > 0) will be classified as Leeding companies, which mean their performance are above the average performance of the sector. Companies with a CER score near 0 (CERs~0), will be classified as On Point companies, which mean their performance is near the average performance of the sector. The companies with a CER score below 0 (CERs < 0) will be classified as Lagging companies, which mean their performance is lagging behind the average performance of the sector. This classification portraits the reality of the company performance of been ahead or behind the sector performance.

Chapter 4: Application of the CER framework to the Portuguese Retail Sector of Supermarkets and Hypermarkets

4.1 Data Source and Scope

For the analysis of the Portuguese retail sector of supermarkets and hypermarkets (C.A.E. 47111), the use of recognized sources of information is needed. These sources of information used are Banco de Portugal (BdP) database, PORDATA database, the Portuguese National Statistic Institute (Instituto Nacional de Estatistica – INE) database, the World Intellectual Property Organization (WIPO) database, the International Organization for Standardization (ISO) databe and the Portuguese competition authority (Autoridade da Concorrência).

Table 9 contains the detailed information regarding the source of data for each variable of the used indicators. Whenever data are not available we used the code: NDA (No Data Available).

Table 9: Indicators data sources

CER Framework – Variables data sources				
Dimension	Indicator	Numerator	Denominator	Year
Industry	1.1.1	Banco de Portugal	-	2010-2016
	1.1.2	Banco de Portugal	Banco de Portugal	2011-2016
	1.1.3	Banco de Portugal	Banco de Portugal	2011-2016
	1.1.4	Banco de Portugal	PORDATA	2010-2016
	1.1.5	Autoridade da Concorrência	-	2010-2016
	1.1.6	Banco de Portugal	Banco de Portugal	2010-2016
	1.1.7	Banco de Portugal	PORDATA	2010-2016
	1.1.8	NDA	-	2010-2016
	2.1.1	INE[10]	Banco de Portugal	2010-2015

[10] There is no data available relative to this variable for the C.A.E. 47111. The available information is regard entire division 47

Investment		2.1.2	Banco de Portugal	Banco de Portugal	2010-2016
Infrastructure		2.2.1	NDA	Banco de Portugal	2010-2016
		2.2.2	NDA	Banco de Portugal	2010-2016
		2.2.3	NDA	Banco de Portugal	2010-2016
		2.2.4	NDA	Banco de Portugal	2010-2016
		2.2.5	NDA	Banco de Portugal	2010-2016
		2.2.6	NDA	Banco de Portugal	2010-2016
		2.2.7	NDA	Banco de Portugal	2010-2016
Financing		2.3.1	Banco de Portugal	Banco de Portugal	2010-2016
		2.3.2	Banco de Portugal	Banco de Portugal	2010-2016
		2.3.3	Banco de Portugal	Banco de Portugal	2010-2016
Labour Force		2.4.1	Banco de Portugal	Banco de Portugal	2010-2016
		2.4.2	NDA	Banco de Portugal	2010-2016
		2.4.3	NDA	Banco de Portugal	2010-2016
		2.4.4	NDA	Banco de Portugal	2010-2016
		2.4.5	NDA	Banco de Portugal	2010-2016
Quality	Satisfaction	3.1.1.1	NDA	Banco de Portugal	2010-2016
		3.1.1.2	NDA	Banco de Portugal	2010-2016
		3.1.1.3	NDA	Banco de Portugal	2010-2016
	Standards	3.1.2.1	ISO[11]	Banco de Portugal	2010-2016
		3.1.2.2	NDA	Banco de Portugal	2010-2016
		3.1.2.3	NDA	Banco de Portugal	2010-2016
Financial		3.2.1	Banco de Portugal	Banco de Portugal	2010-2016
		3.2.2	Banco de Portugal	Banco de Portugal	2010-2016
		3.2.3	Banco de Portugal	Banco de Portugal	2010-2016
		3.2.4	Banco de Portugal	Banco de Portugal	2010-2016
		3.2.5	Banco de Portugal	Banco de Portugal	2010-2016
		3.2.6	Banco de Portugal	Banco de Portugal	2011-2016

[11] There is no data available relative to this variable for the C.A.E. 47111. The available information is relative to the total number of ISO 9001 certificates in Portugal

	3.2.7	Banco de Portugal	Banco de Portugal	2011-2016
	3.2.8	Banco de Portugal	Banco de Portugal	2010-2016
	3.2.9	Banco de Portugal	Banco de Portugal	2010-2016
	3.2.10	Banco de Portugal	Banco de Portugal	2010-2016
	3.2.11	Banco de Portugal	Banco de Portugal	2011-2016
Processes	3.2.2.1	NDA	Banco de Portugal	2010-2016
	3.2.2.2	NDA	Banco de Portugal	2010-2016
	3.2.2.3	NDA	Banco de Portugal	2010-2016
	3.2.2.4	NDA	Banco de Portugal	2010-2016
	3.2.2.5	NDA	Banco de Portugal	2010-2016
	3.2.2.6	NDA	Banco de Portugal	2010-2016
	3.2.2.7	NDA	Banco de Portugal	2010-2016
Innovation	3.3.1	WIPO[12]	Banco de Portugal	2010-2016
	3.3.2	WIPO[13]	Banco de Portugal	2010-2016
Productivity and Efficiency	3.4.1	Banco de Portugal	NDA	2010-2016
	3.4.2	NDA	NDA	2010-2016
	3.4.3	NDA	Banco de Portugal	2010-2016
	3.4.4	Banco de Portugal	Banco de Portugal	2010-2016
	3.4.5	NDA	Banco de Portugal	2010-2016
	3.4.6	NDA	Banco de Portugal	2010-2016
	3.4.7	NDA	Banco de Portugal	2010-2016
Sustainability	3.5.1	Banco de Portugal	PORDATA	2010-2016
	3.5.2	ISO[14]	Banco de Portugal	2010-2016
	3.5.3	NDA	NDA	2010-2016
	3.5.4	NDA	Banco de Portugal	2010-2016

[12] There is no data available relative to this variable for the C.A.E. 47111. The available information is relative to the total number of patents in Portugal

[13] There is no data available relative to this variable for the C.A.E. 47111. The available information is relative to the total number of trade marks in Portugal

[14] There is no data available relative to this variable for the C.A.E. 47111. The available information is relative to the total number of ISO 14001 certificates in Portugal

The framework will be applied to a 7-year time frame, from 2010 to 2016. This time frame was choosen due to data availability, as most data are not available before 2010 and after 2016.

4.2 Application of the CER framework

Our initial aim in this chapter was to apply the entirety of the CER framework to the Portuguese retail sector of supermarkets and hypermarkets (C.A.E. 47111). But when the data were collected, 3 problems arised as his shown in the previous section, Data Source and Scope.

The first issue is relative to data availability. Some of the indicators used in the CER framework rely on critical information of the company's management, data that is not to often publicly released. This means, from the 62 indicators proposed in the CER framework, 32 do not have available data leaving 30 indicators.

The second issue is related to data quality. From the 30 remaining indicators, 5 of them do not have specific data for the Portuguese retail sector of supermarkets and hypermarkets (C.A.E. 47111):

- there is no data available relative to average gross expenditure on R&D for the C.A.E. 47111, the available data is regard the entire division 47;
- there is no data available relative to the number of ISO 9001 Quality Certificates for the C.A.E. 47111, the available information is relative to the total number of certificates in Portugal;
- there is no data available relative to the number of patents per company for the C.A.E. 47111, the available information is relative to the total number of patents in Portugal;
- there is no data available relative to the number of trade marks per for the C.A.E. 47111, the available information is relative to the total number of trade marks in Portugal;

- there is no data available relative to the number of ISO 14001 for the C.A.E. 47111, the available information is relative to the total number of ISO 14001 certificates in Portugal.

This means, from the initial 62 indicators, there is only available data to execute 25 indicators of the framework.

Finally, all the information in the data bases is aggregated by the sector. This implies that the data allows to accomplish the sector analysis but doesn't allow to compute the companies' performance in the sector.

As a result, although our initial aim was to apply the entirety of the CER framework, we will only focus on a total of 21 indicators across 3 dimensions: the Industry dimension, which the data for the indicators are almost completed, the Financing dimension and the Financial dimension.

After the analysis of the sector is completed, we will compare the sector performance with a company performance of the same sector.

All the relevant data is presented in Annex V through VIII

4.2.1 Sector Performance

The Industry

The industry dimension is a representation of the internal context of the sector. As shown in Figure 14, the Portuguese retail sector of supermarkets and hypermarkets has been growing between the the years 2010 and 2016, going from a total number of 1.173 companies to 1.474, a respective overall increase of 26%.

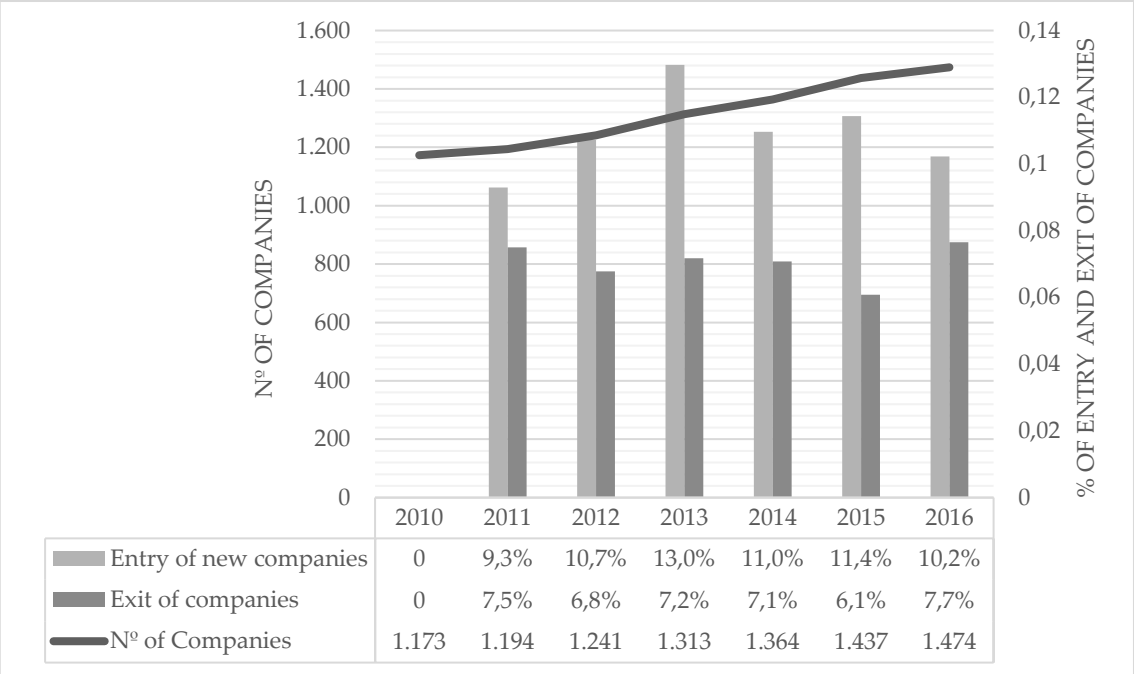


Figure 14: Evolution of the number of companies in the Portuguese retail sector of supermarkets and hypermarkets

This is a result of the difference in the number of new companies entering the sector, which has been increasing each year 10,9% in average, and companies leaving the sector, which has been stable around the 7% each year.

While not been under a specific regulation entity, the sector has a strong inpact in the country economy. As shown in Figure 15, from 2010 to 2016, the employment rate of the sector has been slowly increasing, representing 1,85% of the total economically active population in 2016. The weight of the sector in the country's economy has also been slowly increasing reaching a value of 1,12% in 2016.

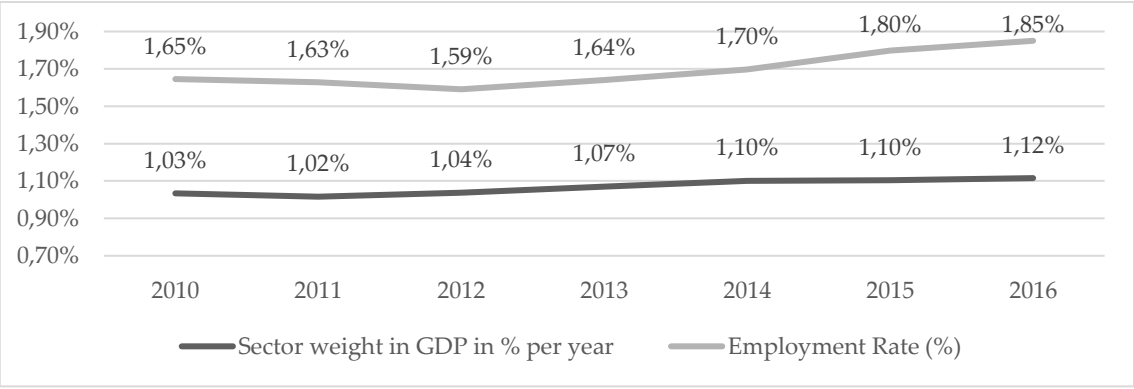


Figure 15: Evolution of sector weight and employment rate in the Portuguese retail sector of supermarkets and hypermarkets

Finally, the capital intensity of the sector has been decreasing over the years, as seen in Figure 16. This is due to a higher decline rate of the value of fixed assets in the sector than the decline rate of personal cost.

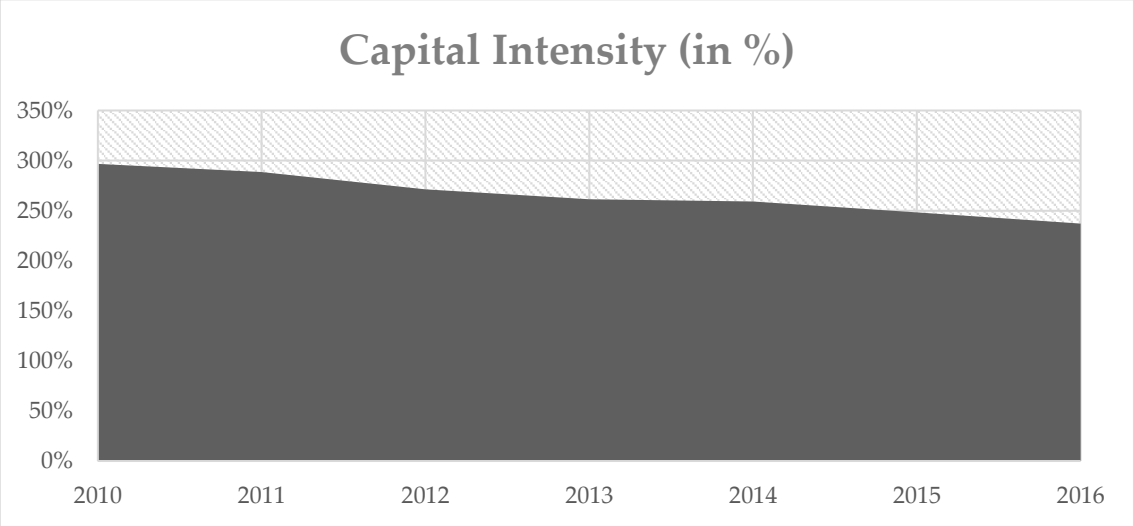


Figure 16: Evolution of sector capital intensity in the Portuguese retail sector of supermarkets and hypermarkets

We can conclude that the internal context of the Portuguese retail sector of supermarkets and hypermarkets shows that the sector is in expansion an it is an important sector in the Portuguese economy, having a significant part on its production and employment.

Financing

When analyzing the performance of the financing indicators of the Portuguese retail sector of supermarkets and hypermarkets, important information emerges from the data. As shown by the indicator weight of debt service, which represents the financial cost supported by interests in the sector, we find that the sector doesn't rely much on financial support. Figure 17 shows that, the weight of debt service of the sector has been decreasing over the years, reaching a value of 4,51% in 2016 and that the leverage, which represents weight of the debt of the sector, decreased to a value of 72,25%.

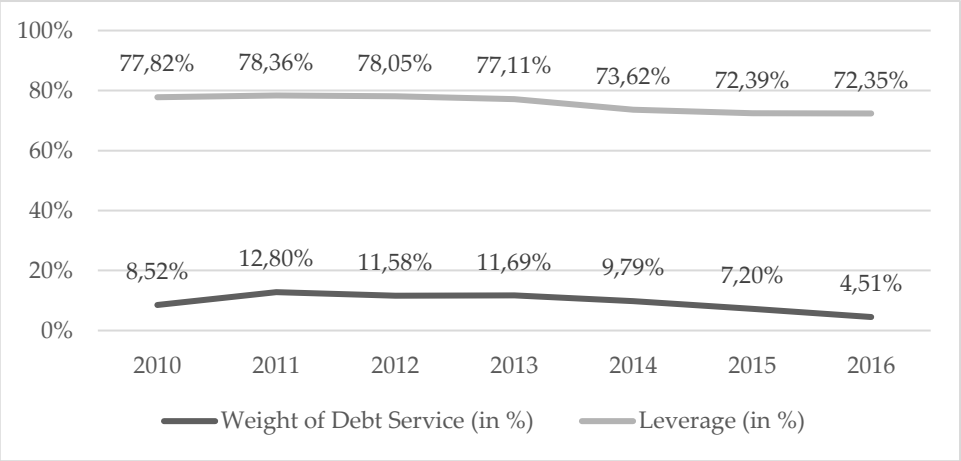


Figure 17: Evolution of sector weight of debt service and leverage in the Portuguese retail sector of supermarkets and hypermarkets

By analyzing the supplier debt indicator, presented in Figure 17 **Erro! A o rigem da referência não foi encontrada.**, we can also identify that the sector relies big part of its financing on the suppliers. Although it has been decreasing, in 2016, the sector owned to its supplier 8,8 times (as shown in Figure 18) their net income value, which means the sector would need almost 9 years to pay for the suppliers' debt.

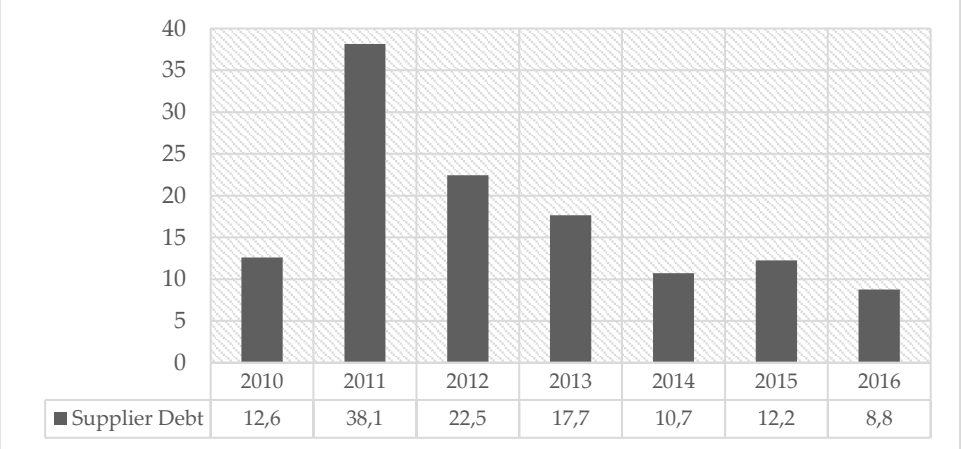


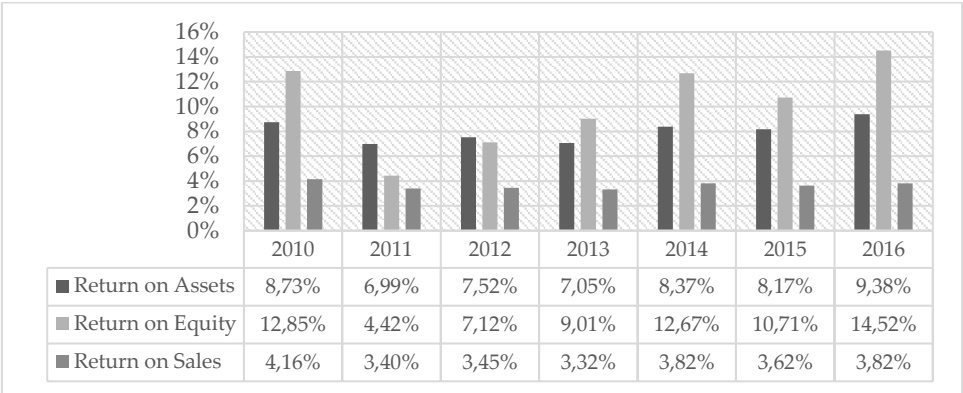
Figure 18: Evolution of sector supplier debt in the Portuguese retail sector of supermarkets and hypermarkets

Financial results

When analyzing the performance results of the financial indicators of the Portuguese retail sector of supermarkets and hypermarkets, we can identify that the sector has a high profitability. Although the values have been floating over the years, as shown in Figure 19, in 2016 for every euro invest in assets by the

companies in the sector, resulted in a production of 9,38 cents in value, while for every euro invested in equity in the companies of the sector, resulted a return of 14,52 cents. This represents roughly a return rate for the sector of almost 10% for assets and 14,5% for equity.

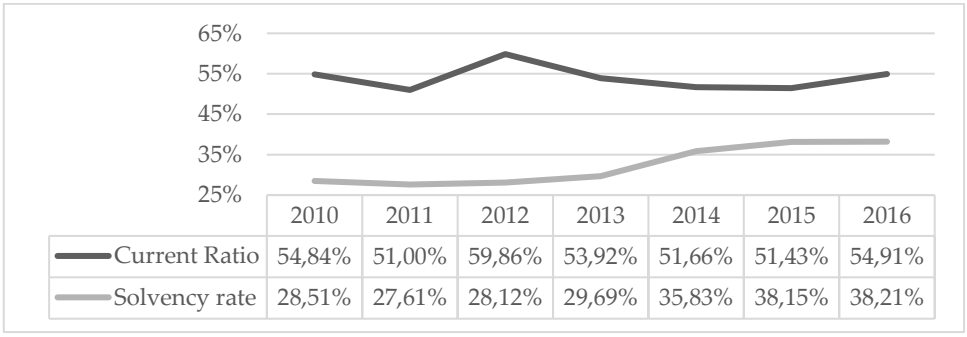
In contrast, the return on sales has declined from 2010 to 2016 8%, reducing from 4,16% to 3,82%. This might be an indicator of reduction in operation efficiency of the companies in the sector.



	2010	2011	2012	2013	2014	2015	2016
Return on Assets	8,73%	6,99%	7,52%	7,05%	8,37%	8,17%	9,38%
Return on Equity	12,85%	4,42%	7,12%	9,01%	12,67%	10,71%	14,52%
Return on Sales	4,16%	3,40%	3,45%	3,32%	3,82%	3,62%	3,82%

Figure 19: Evolution of the rentability ratios in the Portuguese retail sector of supermarkets and hypermarkets

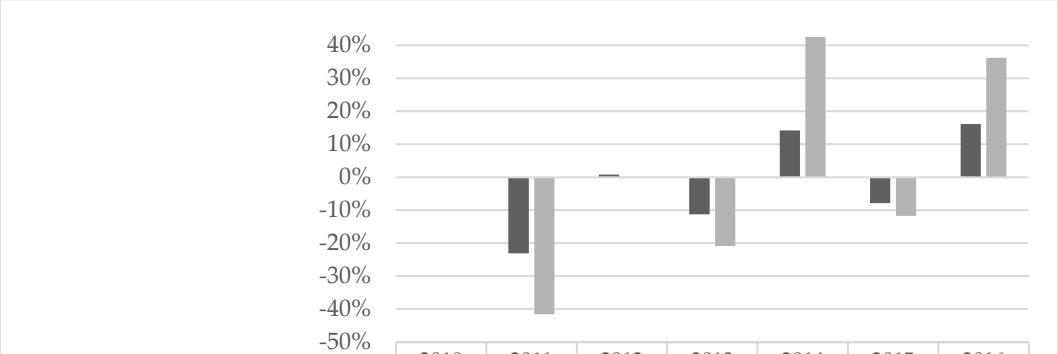
The capacity of the companies in the Portuguese retail sector of supermarkets and hypermarkets to pay short and long-term obligations from 2010 to 2016 has been stable around the value 54%. This is shown in Figure 20 by the sector current ratio, which means that the sector companies are capable of paying only 54% of those obligations. the amount of short and long-term liabilities that can be paid by the cash flow from the companies has been increasing, reaching a value of 38,21% in 2016.



	2010	2011	2012	2013	2014	2015	2016
Current Ratio	54,84%	51,00%	59,86%	53,92%	51,66%	51,43%	54,91%
Solvency rate	28,51%	27,61%	28,12%	29,69%	35,83%	38,15%	38,21%

Figure 20: Evolution of the current ratio and solvency rate in the Portuguese retail sector of supermarkets and hypermarkets

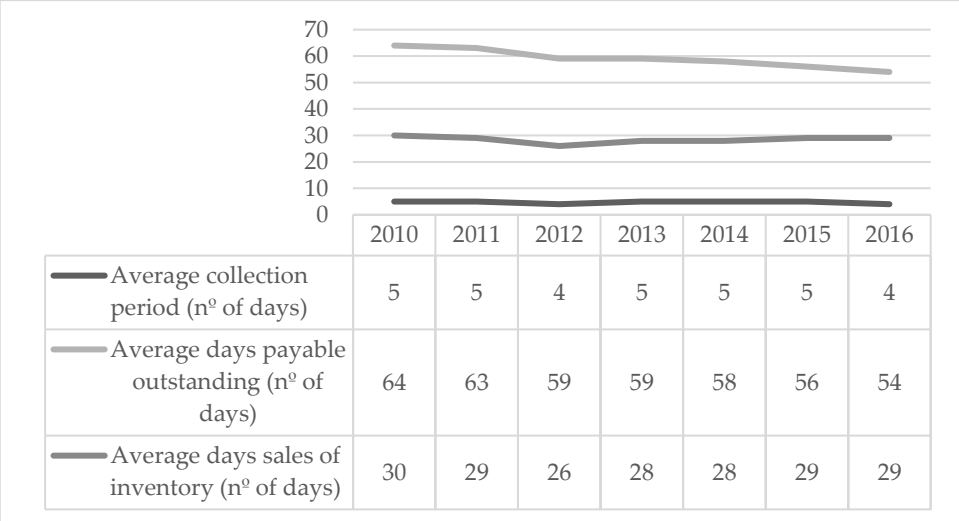
Figure 21 shows that the sector average EBITDA and EBIT, have been suffering different variations each year from 2010 to 2016. While it decreased in 2011, 2013 and in 2015, it increased in 2014 and 2016, staying almost stagnant in 2012.



	2010	2011	2012	2013	2014	2015	2016
Average EBITDA variation (in %)	0%	-23,10%	0,80%	-11,24%	14,25%	-7,79%	16,12%
Average EBIT variation (in %)	0%	-41,53%	-0,05%	-20,83%	42,58%	-11,71%	36,22%

Figure 21: Evolution of the sector EBITDA and EBIT in the Portuguese retail sector of supermarkets and hypermarkets

The literature supports that, the Enablers dimension directly potency the Results dimensions. When we analyzed supplier debt indicator, we identified that the companies operating in the sector rely big part of its financing on the suppliers. This can be identified through the indicators of collection period and days payable outstanding.



	2010	2011	2012	2013	2014	2015	2016
Average collection period (nº of days)	5	5	4	5	5	5	4
Average days payable outstanding (nº of days)	64	63	59	59	58	56	54
Average days sales of inventory (nº of days)	30	29	26	28	28	29	29

Figure 22: Evolution of the average collection period, average days payable outstanding and average days sales of inventory in the Portuguese retail sector of supermarkets and hypermarkets

Between 2010 and 2016, as seen in Figure 22, the companies of the sector took, in average, almost 5 days to receive payment owed, while it took the average

time of 59 days to pay to creditors. This is complemented by the data provided through the indicator average days of sales of inventory of the sector, since the companies in the sector manage to sell their inventory in an average time of 28 days. This represents an interval of time of a month for the companies to apply their cash flows into other projects, financing themselves through it.

Despite these, with the exception of the year 2016, the sector presents a continuous decrease on sales, as shown on Table 10, which could lead to negative impacts in profits if the tendency is not reverted.

Table 10: Sales variation in the Portuguese retail sector of supermarkets and hypermarkets from 2011 to 2016

	2010	2011	2012	2013	2014	2015	2016
Sales growth (in %)	NDA	-1,96%	-4,79%	-2,92%	-2,75%	-3,40%	1,40%

4.2.2 Application of the CER framework to a company: the Pingo Doce – Distribuição Alimentar, S.A. case

After the application of the CER framework to the Portuguese retail sector of supermarkets and hypermarkets we obtained the sector value for each indicator on the two assessed dimensions. It is now possible to compare the performance of companies operating in this sector through the Indicators Score:

$$Indicator\ score = \frac{company\ value - sector\ value}{|sector\ value|}$$

It was possible to get access to the SABI database and get the data, for the same indicators measured in the sector analysis, for the company Pingo Doce-Distribuição Alimentar, S.A. (see Appendix VIII). With that data, the indicator scores and dimensions score were calculated for the financing and financial dimension. Despite the effort, without the full data across all dimensions in every category no final conclusion is possible to be made.

The CER framework allows to assess the company performance with the average sector performance. Across Table 11 it is possible to perceive the distance

between company performance and the sector average performance, for each of the years, for the Financing dimension. Except for the year of 2013, Pingo Doce presented a performance above of the sector, on all the indicators as well as in the overall dimension. The negative score of 2013 is mainly due to the Supplier Debt indicator, which since it has such a large value, it affects the overall dimenson score.

Table 11: Variation between Pingo Doce- Distribuição Alimentar, S.A. and the sector value for each Financing Indicators and respective dimension Score value

	PINGO DOCE - DISTRIBUIÇÃO ALIMENTAR, S.A.								
	Indicator		2010	2011	2012	2013	2014	2015	2016
Financing	2.3.1	Weight of Debt Service	0,274	0,439	0,388	0,394	0,397	0,216	0,007
	2.3.2	Leverage	0,417	1,748	2,169	1,696	1,141	0,515	0,19
	2.3.3	Supplier Debt	0,104	1,063	2,286	-26,407	2,713	2,141	1,09
	-	Dimension Score	0,265	1,083	1,6143	-8,105	1,417	0,9573	0,429

In terms of financial indicators, Table 12 shows that, during the 7 years period of analysis, the company presented an overall performace above of the sector, in the Financial dimension, in the years 2011, 2014, 2015 and 2016, presenting values below the average sector performance on the remaining years.

It is also possible to assess, for every year, in which indicators the company performaned above the sector average performance or below it.

indicators below the sector average performance and 5 above, as seen in. This mean Pingo Doce performed below the average of the sector relatively to the return on assets, return on sales, current ratio, solvency rate and day sales of inventory indicators, while it performed above the sector average on the return on equity, EBITDA variation, EBIT variation, collection period and days payable outstanding indicators.

Through the dimension score we obtain the overall variation of the Financing indicators between the sector average and Pingo Doce performance.

Table 12: Variation between Pingo Doce- Distribuição Alimentar, S.A. and the sector value for each Financial Indicators and respective dimension Score value

	PINGO DOCE - DISTRIBUIÇÃO ALIMENTAR, S.A.							
	Indicator		2010	2011	2012	2013	2014	2015	2016
Financial	3.2.1	Return on Assets	-0,627	-0,843	-0,969	-1,047	-0,791	-0,727	-0,375
	3.2.2	Return on Equity	0,176	0,284	-0,821	-1,193	-0,349	-0,106	0,434
	3.2.3	Return on Sales	-0,672	-0,87	-0,974	-1,035	-0,847	-0,806	-0,528
	3.2.4	Current Ratio	-0,555	-0,479	-0,518	-0,498	-0,45	-0,364	-0,362
	3.2.5	Solvency rate	-0,244	-0,301	-0,34	-0,361	-0,409	-0,389	-0,263
	3.2.6	Average EBITDA variation	NDA	-0,068	-13,627	-0,102	1,191	1,327	1,739
	3.2.7	Average EBIT variation	NDA	-0,561	-1324,79	-4,256	91,505	2,225	3,372
	3.2.8	Collection period	0,84	0,944	2,163	0,902	0,633	0,69	0,94
	3.2.9	Days payable outstanding	0,044	0,024	-0,03	0,003	0,028	0,12	0,125
	3.2.10	Days sales of inventory	-0,216	-0,134	0,003	-0,105	-0,116	-0,215	-0,223
	3.2.11	Sales Growth	NDA	3,724	1,584	2,444	1,838	2,524	2,565
	-	Dimension Score	-0,1568	0,1563	-121,6654	-0,4771	8,3848	0,3890	0,6749

As a result of the application of the CER framework, new information is generated, information that may assist managers in decition making. By analyzing each indicator score across the designated dimensions, managers can identify disparity points with the sector value, and decide in which to act upon.

Chapter 5: Conclusions, Limitations and Future Work

5.1 Conclusions

The objective of this thesis was to propose the design of a new specific framework for performance measurement of service sectors, the Context, Enablers and Results (CER) Framework.

By analyzing the existing literature of performance measurement, two groups of frameworks were identified, (i) organization performance measurement frameworks, and (ii) country performance measurement frameworks, leaving a gap of sector performance measurement. It became evident the neglect of investigation on both the specificity of services as well as the performance measurement of sectors. An effort toward the identification of an eligible framework was made, and the common dimensions measured across both frameworks groups types were identified. From that analysis we proposed the new CER framework, a framework for the performance measurement of sectors as well as the performance measurement of the companies operating in that same sector, and some findings emerged. First, most of the organization performance measurement frameworks do not propose indicators to measure performance. The framework is presented accompanied only with the dimensions and their respective connections. Second, there doesn't seem to be a consensus in the reviewed literature regarding if there is a limit on which indicators are best to be used to ensure performance measurement. Third, the dimensions need to be flexible to be able to adapt to the reality. This means that dimensions that are used can lose importance, as seen with the accounting indicators, or new dimension appear to fill the gaps created with the evolution of society, like the appearance of the dimension sustainability.

Having the literature as foundation, we suggest that the dimensions used for sector performance measurement can be sorted into 3 major categories: Context,

Enablers and Results, and that 10 common dimensions can be measured across those categories through 62 indicators.

The developed CER Framework has two purposes of performance measurement. The first one is concerning sector performance measurement. The framework allows to measure the performance of a service sector across time and evaluate it. This results in the production of useful information regarding the sector performance evolution. It also allows, through the use of statistics produced on the basis of NACE, to compare sectors at an European level. This can produce important information regarding sectors disparities across the European Union.

The second purpose is, through the use of the sector values obtained by the framework, to benchmark the performance of the companies operating in the same specific service sector. This allows for the operating companies in the sector in question, to obtain information regarding how far their performance from the average sector performance is, allowing managers to obtain feedback across the common assessed dimensions for improvement. By replacing the sector value with other companies' value, it also allows the comparison between two companies operating in the same sector.

During the application of the framework we dissected each indicator and tried to identify relevant data sources and scope for each indicator. Despite our efforts, not all the needed data existed published in accessible databases and, as a consequence, we were able to identify which areas need more development in term of data availability. This issue was bound to happen due to the new nature of this performance measurement topic.

In the end, the CER framework was applied to the Portuguese Retail Sector of Supermarkets and Hypermarkets, and despite the restrictions in terms of data availability, 3 common dimensions were analyzed: Industry, Financing and Financial.

The results of the framework application showed that the internal context of the sector is in expansion, a result of the increase of number of new companies entering in the sector, and that the sector is an important sector in the Portuguese economy, having a significant part on its production and employment.

When analyzed the performance of the financing dimension, important information emerged from the data. We identified that the sector doesn't rely much on financial support which was later on verified by the financial dimension. When the indicators of collection period, days payable outstanding and average days of sale were analyzed, the fact that the sector unloads its financing needs on the suppliers became clearer, with companies having an average time of a month between the moment of selling the service and having to pay back to the suppliers.

The Sector values obtained on the Financing and Financial dimensions where then used to compare the performance of a company operating in the sector, the Pingo Doce- Distribuição Alimentar, S.A.. The analysis of the 14 assessed indicators through the 7 years interval of time, generates information about its performance benchmarked with the sector performance. As a result of the application of the CER framework, new information is generated, information that may assist managers in decition making. By analyzing each indicator score across the designated dimensions, managers can identify disparity points with the sector value, and decide in which to act upon.

5.2 Limitations and Future Work

During the realization of this thesis the fact that, there is no literature regarding the performance measurement of service sectors, had a direct impact in the construction of the framework and its application. We predict that this

topic would benefit from more investigation, preferably regarding two main domains: framework improvement and data availability improvement.

Regarding framework improvement, for the purpose of this thesis, we considerated that the overall weight of each dimension in the framework was equal. We suspect that, for each different service sector there will be a specific ponderation for each dimension. It is not realistic to say that the dimension innovation should have the same weight for, say, either the telecommunication sector or the restaurant industry sector. To bridge this gap, we propose for future investigation, in similarity to what was done with the performance measurement system for service industries (Fitzgerald et al., 1991), to perform a study for each service sector, where by gathering a representative sample of managers of the sector and collecting their evaluation of the ponderation and importance of each dimension, a new weighted distribution would be made specifically for each sector.

Not only that, but also, it was inicially identified that the computed values could presente values above, near or bellow 0, but no specific interval was presented. This was due to the lack of data available. By collecting the respective data for each indicator regarding each company in the sector, it will enable the identification and construction of the intervals and determination of the border values, allowing a better categorization of the companies in the sector.

Finally, the current CER framework resorts to the use of 62 indicators. Do to time and resources limitations, it was not possible to presente more indicators, but a continuous evaluation of them is encouraged. Each indicator represents an influx of information that can be used to improve management decisions. By surveying and collecting more specific indicators for each service sector, the CER framework can be further developed, creating "branches" for each service sector, resulting in the creation of barometer of indicators exclusive for the performance measurement of service sectors. By also collecting more indicators and increasing

the framework will assist in reducing the impact of outliers in the assessment of the dimension scores, since the fewer the number of indicators, the higher impacto n the overall score.

Regarding data availability improvement, during the data collection for the application of the CER framework, an issue aroused regarding the data needed for its implementation. The data needed for the computing of the indicators either did not existed compiled in data bases, or it existed but as an aggregated mean of the entire sector. Problems with data availability was to be expected since the topic of sector performance measurent is new and very few work as been made. Collaboration of official entities, like the Banco de Portugal or the National Statistic Institute, and investigation centers, like the Social Studies Center of University of Aveiro or the Institue of Sociology of the University of Oporto could potentiate, at national level, newer data bases more adapted toward sector performance measurement.

Finally, 2 types of data can be identified among the indicators: accounting data and operational data. The accounting data can be easily found since companies are obligated to deliver their balance sheet, income statement and cash flow statements. Yet, the operational data is information that the companies themselves collect for porpuse of performance measurement and since they see it as important information regarding the company performances, managers are reluctant to share this information. An effort must be done in order to close this gap. Colaboration between companies and investigation centers, through incentives like free access to the data bases and compiled performance measurement frameworks with the intent of helping them increase performance, and improving the way sector performance is made by increasing sector performance measurement literature will help in the development of this subject.

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Annex

Anexx I

The BSC model (Kaplan & Norton, 1992) presented us with 4 different perspectives: customer, financial, internal business and innovation and learning. While the customer and financial perspectives refers to the dimensions customer satisfaction and financial dimension, both the internal business perspective and innovation and learning perspective are more elaborated. The internal business perspective assesses "what the organization needs to excel at", not only processes, decisions and actions, but also core competencies, employee skills, and critical technologies, therefore, the internal business perspective can be divided into the dimensions processes and capabilities. The innovation and learning perspective assesses not only the organization ability to innovate, improve and learn, but also the capability to improve services, cycle time, defect rate and yields, which translates into the dimensions innovation, productivity and efficiency.

The Performance Prism (Neely, Adams, & Crowe, 2001) as a three-dimension model proposes 5 areas of analysis: stakeholder satisfaction, stakeholder contribution, strategies, processes and capabilities. These 5 areas can be grouped into 4 dimensions: stakeholders, strategies processes and capabilities.

The Performance Matrix (Keegan, Eiler, & Jones, 1989) identifies cost and non-cost perspectives in contrast with internal and external perspectives. Since the simplicity of the framework structure allows to accommodate any measure of performance no particular dimension can be identified in this model.

The Strategic Measurement Analysis and Report Technique (Lynch & Cross, 1991) identifies 10 dimensions distributed through 4 levels. We consider that these 10 dimensions can be regrouped in the following 9 dimensions: strategies, since corporate vision describes how it will achieve long-term success; market and financial into financial; customer satisfaction; productivity; quality; service,

since delivery is a service supplied by organizations; processes, since cycle time represents the time required to complete a cycle of an operation/process; and efficiency (decrease of waste can be a KPI to measure efficiency).

The OSLO Manual model (OECD/EUROSTAT, 2005) grasps 2 dimensions: the context, within which the organization operate and innovation through innovation factors identified.

The COTEC Innovation Scoring model (http://www.cotecportugal.pt) uses 5 dimensions and 14 subdimensions of analysis that can be re-organized in the following 8 dimensions:

- The dimension strategy and the sub-dimension strategic planning into strategy;
- The sub-dimensions context analysis, external relationships into context;
- The sub-dimension culture and leadership into leadership;
- The dimension organization and sub-dimension structure and governance into organizational structure;
- The sub-dimension human capital and organizational skills into capabilities;
- The dimension processes IDI and the sub-dimensions generation and assessment of ideas, project management, intellectual property protection and appreciation and knowledge management into innovation;
- Financing and market into financial;
- Sustainability;

The European Foundation for Quality Management model (http://www.efqm.org/the-efqm-excellence-model) proposes in its framework a set of 9 criteria: leadership, people, strategy, partnerships & resources, processes & products & services, people results, customer results, society results and business results. These can be sorted into the dimensions: leadership, strategy, capabilities (people and resources), stakeholders (partnerships, people results

and society results), processes and products and services (processes, products & services), innovation (processes, products & services), customer satisfaction (customer result) and financial (business results).

The Malcolm Baldrige framework (Baldrige National Quality Program – www.quality.nist.gov) presents 7 criteria: leadership, strategic planning, customer focus, measurement analysis and knowledge management, workforce focus, process management and results. Since the framework considers that the results dimension measures "how the organization performs in terms of customer satisfaction, finances, human resources, supplier and partner performance, operations, governance and social responsibility, and how the organization compares to its competitors", these can be translated into the dimensions customer satisfaction, financial, capabilities, stakeholders and social sustainability and market are measured. The framework also considers as an important part of its organization profile the environment in which its inserted, which can be considered as the dimension context. Along with leadership, strategy, and processes (operations focus), these 10 dimensions are measured through the 7 criteria applied in the framework.

The Performance Measurement System for Service Industries (Fitzgerald et al., 1991) presents 6 performance dimensions: competitiveness, financial performance, quality of service, flexibility, resource utilization and innovation. While the dimensions competitiveness and financial performance can be merged into a financial dimension, quality of service represents the common dimensions quality and costumer satisfaction. The dimension flexibility can be rearranged into the dimension processes and resource utilization can be split into two common dimensions, productivity and efficiency. Along with the dimension innovation, this framework results in 7 common dimensions.

The SERVQUAL model (1985, 1986, 1988, 1991, 1993, 1994) and Zeithaml et al., (1990) is a service quality framework, and as such, it only focus on the quality

dimension. To do so, it relies on the customer assessment of the service provided, and as such, we can considerate that it also asses the customer satisfaction dimension.

The Global Innovation Index (Johnson Cornell et al., 2016) assesses innovation through 7 variables to be measured by indicators: Institutions, Human Capital and Research, Infrastructures, Market Sophistication, Business Sophistication, Knowledge and Technology output and Creative output. These can be sorted into 9 more common dimensions: internal context (formed by the subdimensions political environment, regulatory environment and business environment), education (formed by the subdimensions education and tertiary education), financing (formed by the subdimensions credit), infrastructure (formed by the subdimensions information & communication technologies (ICTs) and general infrastructure), investment (formed by the subdimension investment), market (formed by the subdimension tade, competion & market scale), research (formed by the subdimension research & development (R&D)), innovation (formed by the subdimensions innovation linkages, knowledge absorption, knowledge creation, knowledge impact, knowledge diffusion, intangible assets, creative goods & services and online creativity) and sustainability (formed by the subdimension ecological sustainability).

The Global Competitiveness Report (Schwab et al., 2016) assess competitiveness across three sub-indices through 12 pillars. These can be arranged into 9 common dimensions: competitiveness, since the frameworks tries to measure it through the other dimensions, internal context (formed by the first pillar insitutions and the third pillar macroeconomic environment), education (formed by the subdimensions primary education and quantity of education), financing (formed by the 8th pillar financial market development), health (formed by the suddimension health), infrastructure (formed by the second pillar, infrastructure), labour market (formed by the subdimension on-

the-job training and the 7th pillar, labour market efficiency), market (formed by the 6th pillar, goods market efficiency, and 10th pillar, market size) and innovation (formed by the 9th pillar, technological readiness, by the 11th pillar, business sophistication, and 12th pillar, R&D innovation).

The European Quality Scoreboard (World State of Quality) aims to assess quality through the measurement of 10 quality related dimensions. From these dimensions, while some are already common dimensions with other frameworks as education, health, research, competitiveness, satisfaction and sustainability, the others need to be adapted, professionals into labour market, innovation and entrepreneurship into innovation, organanizations, professionals and satisfaction into quality and gross domestic product indicator into results, resulting in 10 common dimensions.

The European Innovation Scoreboard measures innovation through a framework composed by 4 groups and 10 innovation related dimensions. These can be rearranged into 6 common dimensions: infrastructure (by rearranging the dimension innovation-friendly environment), investment (by rearranging the dimensions finance and support and firm investments), labour market (by rearranging the dimension human resources and employment impacts), research (by rearranging the dimension attractive research systems), innovation (by rearranging the dimensions innovators, linkages and intellectual assets) and results (by rearranging the dimension sales effects).

Appendix

Appendix I. SERVQUAL Instrument

DIRECTIONS: This survey deals with your opinions of_____ services. Please show the extent to which you think firms offering ____ services should possess the features described by each statement. Do this by picking one of the seven numbers next to each statement. If you strongly agree that these firms should possess a feature, circle the number 7. If you strongly disagree that these firms should possess a feature, circle 1. If your feelings are not strong, circle one of the numbers in the middle. There are no right or wrong answers. All we are interested in is a number that best shows your expectations about firms offering _____services.

E1. They should have up-to-date equipment.

E2. Their physical facilities should be visually appealing.

E3. Their employees should be well dressed and appear neat.

E4. The appearance of the physical facilities of these firms should be in keeping with the type of services provided.

E5. When these firms promise to do something by a certain time, they should do so.

E6. When customers have problems, these firms should be sympathetic and reassuring.

E7. These firms should be dependable.

E8. They should provide their services at the time they promise to do so.

E9. They should keep their records accurately.

E10. They shouldn't be expected to tell customers exactly when services will be performed. (-)

E11. It is not realistic for customers to expect prompt service from employees of these firms. (-)

E12. Their employees don't always have to be willing to help customers. (-)

E13. It is okay if they are too busy to respond to customer requests promptly. (-)

E14. Customers should be able to trust employees of these firms.

E15. Customers should be able to feel safe in their transactions with these firms' employees.

E16. Their employees should be polite.

E17. Their employees should get adequate support from these firms to do their jobs well.

E18. These firms should not be expected to give customers individual attention. (-)

E19. Employees of these firms cannot be expected to give customers personal attention. (-)

E20. It is unrealistic to expect employees to know what the needs of their customers are. (-)

E21. It is unrealistic to expect these firms to have their customers' best interests at heart. (-)

E22. They shouldn't be expected to have operating hours convenient to all their customers. (-)

DIRECTIONS: The following set of statements relate to your feelings about XYZ. For each statement, please show the extent to which you believe XYZ has the feature described by the statement. Once again, circling a 7 means that you strongly agree that XYZ has that feature, and circling a 1 means that you strongly disagree. You may circle any of the numbers in the middle that show how strong your feelings are. There are no right or wrong answers. All we are interested in is a number that best shows your perceptions about XYZ. A. Shahin 10

P1. XYZ has up-to-date equipment.

P2. XYZ's physical facilities are visually appealing.

P3. XYZ's employees are well dressed and appear neat.

P4. The appearance of the physical facilities of XYZ is in keeping with the type of services provided.

P5. When XYZ promises to do something by a certain time, it does so.

P6. When you have problems, XYZ is sympathetic and reassuring.

P7. XYZ is dependable.

P8. XYZ provides its services at the time it promises to do so.

P9. XYZ keeps its records accurately.

P10. XYZ does not tell customers exactly when services will be performed. (-)

P11. You do not receive prompt service from XYZ's employees. (-)

P12. Employees of XYZ are not always willing to help customers. (-)

P13. Employees of XYZ are too busy to respond to customer requests promptly. (-)

P14. You can trust employees of XYZ.

P15. You feel safe in your transactions with XYZ's employees.

P16. Employees of XYZ arc polite.

P17. Employees get adequate support from XYZ to do their jobs well.

P18. XYZ does not give you individual attention. (-)

P19. Employees of XYZ do not give you personal attention. (-)

P20. Employees of XYZ do not know what your needs are. (-)

P21. XYZ does not have your best interests at heart. (-)

P22. XYZ does not have operating hours convenient to all their customers. (-)

Appendix II. Global Innovation Index

Global Innovation Index:
Innovation Input:

1. Institutions
   - 1.1 Political environment
     - 1.1.1 Political stability & safety
     - 1.1.2 Government effectiveness
   - 1.2 Regulatory environment
     - 1.2.1 Regulatory quality
     - 1.2.2 Rule of law
     - 1.2.3 Cost of redundancy dismissal, salary weeks
   - 1.3 Business environment
     - 1.3.1 Ease of starting a business
     - 1.3.2 Ease of resolving insolvency
     - 1.3.3 Ease of paying taxes
2. Human capital & research
   - 2.1 Education
     - 2.1.1 Expenditure on education, % GDP
     - 2.1.2 Gov't expenditure/pupil, secondary, % GDP/cap
     - 2.1.3 School life expectancy, years
     - 2.1.4 PISA scales in reading, maths, & science
     - 2.1.5 Pupil-teacher ratio, secondary
   - 2.2 Tertiary education
     - 2.2.1 Tertiary enrolment, % gross
     - 2.2.2 Graduates in science & engineering, %
     - 2.2.3 Tertiary inbound mobility, %
   - 2.3 Research & development (R&D)
     - 2.3.1 Researchers, FTE/mn pop
     - 2.3.2 Gross expenditure on R&D, % GDP
     - 2.3.3 Global R&D companies, avg. expend. top 3, mn $US
     - 2.3.4 QS university ranking, average score top 3
3. Infrastructure
   - 3.1 Information & communication technologies (ICTs)
     - 3.1.1 ICT access
     - 3.1.2 ICT use
     - 3.1.3 Government's online service
     - 3.1.4 E-participation
   - 3.2 General infrastructure

- 3.2.1 Electricity output, kWh/cap
- 3.2.2 Logistics performance
- 3.2.3 Gross capital formation, % GDP

3.3 Ecological sustainability

- 3.3.1 GDP/unit of energy use, 2005 PPP$/kg oil eq
- 3.3.2 Environmental performance
- 3.3.3 ISO 14001 environmental certificates/bn PPP$ GDP

4. Market sophistication

4.1 Credit

- 4.1.1 Ease of getting credit
- 4.1.2 Domestic credit to private sector, % GDP
- 4.1.3 Microfinance gross loans, % GDP

4.2 Investment

- 4.2.1 Ease of protecting minority investors
- 4.2.2 Market capitalization, % GDP
- 4.2.3 Total value of stocks traded, % GDP
- 4.2.4 Venture capital deals/bn PPP$ GDP

4.3 Trade, competition, & market scale

- 4.3.1 Applied tariff rate, weighted mean, %
- 4.3.2 Intensity of local competition
- 4.3.3 Domestic market scale, bn PPP$

5. Business sophistication

5.1 Knowledge workers

- 5.1.1 Knowledge-intensive employment, %
- 5.1.2 Firms offering formal training, % firms
- 5.1.3 GERD performed by business, % of GDP
- 5.1.4 GERD financed by business, %
- 5.1.5 Females employed w/advanced degrees, % total

5.2 Innovation linkages

- 5.2.1 University/industry research collaboration
- 5.2.2 State of cluster development
- 5.2.3 GERD financed by abroad, %
- 5.2.4 JV–strategic alliance deals/bn PPP$ GDP
- 5.2.5 Patent families 2+ offices/bn PPP$ GDP

5.3 Knowledge absorption

- 5.3.1 Intellectual property payments, % total trade
- 5.3.2 High-tech imports less re-imports, % total trade
- 5.3.3 ICT services imports, % total trade
- 5.3.4 FDI net inflows, % GDP
- 5.3.5 Research talent, % in business enterprise

Innovation Output:

6. Knowledge & technology outputs
   6.1 Knowledge creation
      6.1.1 Patents by origin/bn PPP$ GDP
      6.1.2 PCT patent applications/bn PPP$ GDP
      6.1.3 Utility models by origin/bn PPP$ GDP
      6.1.4 Scientific & technical articles/bn PPP$ GDP
      6.1.5 Citable documents H index
   6.2 Knowledge impact
      6.2.1 Growth rate of PPP$ GDP/worker, %
      6.2.2 New businesses/th pop. 15–64
      6.2.3 Computer software spending, % GDP
      6.2.4 ISO 9001 quality certificates/bn PPP$ GDP
      6.2.5 High- & medium-high-tech output manufactures, %
   6.3 Knowledge diffusion
      6.3.1 Intellectual property receipts, % total trade
      6.3.2 High-tech exports less re-exports, % total trade
      6.3.3 ICT services exports, % total trade
      6.3.4 FDI net outflows, % GDP
7. Creative outputs
   7.1 Intangible assets
      7.1.1 Trademarks by origin/bn PPP$ GDP
      7.1.2 Industrial designs by origin/bn PPP$ GDP
      7.1.3 ICTs & business model creation
      7.1.4 ICTs & organizational model creation
   7.2 Creative goods & services
      7.2.1 Cultural & creative services exports, % of total trade
      7.2.2 National feature films/mn pop. 15–69
      7.2.3 Global ent. & media market/th pop. 15–69
      7.2.4 Printing & publishing output manufactures, %
      7.2.5 Creative goods exports, % total trade
   7.3 Online creativity
      7.3.1 Generic top-level domains (TLDs)/th pop. 15–69
      7.3.2 Country-code TLDs/th pop. 15–69
      7.3.3 Wikipedia edits/mn pop. 15–69
      7.3.4 Video uploads on YouTube/pop. 15–69

Appendix III. Global Competitiveness Report framework

Basic Requirement Subindex (variable weight: 20 - 60%)

1st pillar: Institutions (25%)

A. Public institutions (75%)

1. Property rights (20%)

1.01 Property rights

1.02 Intellectual property protection

2. Ethics and corruption (20%)

1.03 Diversion of public funds

1.04 Public trust in politicians

1.05 Irregular payments and bribes

3. Undue influence (20%)

1.06 Judicial independence

1.07 Favoritism in decisions of government officials

4. Public-sector performance (20%)

1.08 Wastefulness of government spending

1.09 Burden of government regulation

1.10 Efficiency of legal framework in settling disputes

1.11 Efficiency of legal framework in challenging regulations

1.12 Transparency of government policymaking

5. Security (20%)

1.13 Business costs of terrorism

1.14 Business costs of crime and violence

1.15 Organized crime

1.16 Reliability of police services

B. Private institutions (25%)

1. Corporate ethics (50%)

1.17 Ethical behavior of firms

2. Accountability (50%)

1.18 Strength of auditing and reporting standards

1.19 Efficacy of corporate boards

1.20 Protection of minority shareholders' interests

1.21 Strength of investor protection*

2nd pillar: Infrastructure (25%)

A. Transport infrastructure (50%)

2.01 Quality of overall infrastructure

2.02 Quality of roads

2.03 Quality of railroad infrastructurei

2.04 Quality of port infrastructure

2.05 Quality of air transport infrastructure

2.06 Available airline seat kilometers

B. Electricity and telephony infrastructure (50%)

2.07 Quality of electricity supply

2.08 Mobile telephone subscriptions*

2.09 Fixed telephone lines

3rd pillar: Macroeconomic environment (25%)

3.01 Government budget balance

3.02 Gross national savings

3.03 Inflation

3.04 Government debt

3.05 Country credit rating

4th pillar: Health and primary education (25%)

A. Health (50%)

4.01 Business impact of malariak

4.02 Malaria incidence*

4.03 Business impact of tuberculosisk

4.04 Tuberculosis incidence

4.05 Business impact of HIV/AIDSk

4.06 HIV prevalence

4.07 Infant mortality

4.08 Life expectancy

B. Primary education (50%)

4.09 Quality of primary education

4.10 Primary education enrollment rate

Efficiency Enhancers subindex (variable weight: 35 - 50%)

5th pillar: Higher education and training (17%)

A. Quantity of education (33%)

5.01 Secondary education enrollment rate*

5.02 Tertiary education enrollment rate*

B. Quality of education (33%)

5.03 Quality of the educational system

5.04 Quality of math and science education

5.05 Quality of management schools

5.06 Internet access in schools

C. On-the-job training (33%)

5.07 Local availability of specialized research and training services

5.08 Extent of staff training

6th pillar: Goods market efficiency (17%)

A. Competition (67%)

1. Domestic competition variable %

6.01 Intensity of local competition

6.02 Extent of market dominance

6.03 Effectiveness of anti-monopoly policy

6.04 Effect of taxation on incentives to invest

6.05 Total tax rate*

6.06 Number of procedures required to start a business

6.07 Time required to start a business

6.08 Agricultural policy costs

2. Foreign competition variablel

6.09 Prevalence of trade barriers

6.10 Trade tariffs*

6.11 Prevalence of foreign ownership

6.12 Business impact of rules on FDI

6.13 Burden of customs procedures

6.14 Imports as a percentage of GDP* n

B. Quality of demand conditions (33%)

6.15 Degree of customer orientation

6.16 Buyer sophistication

7th pillar: Labor market efficiency (17%)

A. Flexibility (50%)

7.01 Cooperation in labor-employer relations

7.02 Flexibility of wage determination

7.03 Hiring and firing practices

7.04 Redundancy costs

7.05 Effect of taxation on incentives to work

B. Efficient use of talent (50%)

7.06 Pay and productivity

7.07 Reliance on professional management

7.08 Country capacity to retain talent

7.09 Country capacity to attract talent

7.10 Female participation in labor force

8th pillar: Financial market development (17%)

A. Efficiency (50%)

8.01 Financial services meeting business needs

8.02 Affordability of financial services

8.03 Financing through local equity market

8.04 Ease of access to loans

8.05 Venture capital availability

B. Trustworthiness and confidence (50%)

8.06 Soundness of banks

8.07 Regulation of securities exchanges

8.08 Legal rights index

9th pillar: Technological readiness (17%)

A. Technological adoption (50%)

9.01 Availability of latest technologies

9.02 Firm-level technology absorption

9.03 FDI and technology transfer

B. ICT use (50%)

9.04 Internet users

9.05 Broadband Internet subscriptions

9.06 Internet bandwidth

9.07 Mobile broadband subscriptions

9.08 Mobile telephone subscriptions

9.09 Fixed telephone lines

10th pillar: Market size (17%)

A. Domestic market size (75%)

10.01 Domestic market size index

B. Foreign market size (25%)

10.02 Foreign market size index

Innovation and Sophistication Factors subindex (variable weight: 5 - 30%)

11th pillar: Business sophistication (50%)

11.01 Local supplier quantity

11.02 Local supplier quality

11.03 State of cluster development

11.04 Nature of competitive advantage

11.05 Value chain breadth

11.06 Control of international distribution

11.07 Production process sophistication

11.08 Extent of marketing

11.09 Willingness to delegate authority

7.07 Reliance on professional management

12th pillar: R&D Innovation (50%)

12.01 Capacity for innovation

12.02 Quality of scientific research institutions

12.03 Company spending on R&D

12.04 University-industry collaboration in R&D

12.05 Government procurement of advanced technology products

12.06 Availability of scientists and engineers

12.07 PCT patent applications

1.02 Intellectual property protection

Appendix IV. European Innovation Scorecard Framework

1. Framework conditions capture the main drivers of innovation performance external to the firm and cover three innovation dimensions:
   1.1. Human resources:
      1.1.1. New doctorate graduates
      1.1.2. Population aged 25-34 with tertiary education
      1.1.3. Lifelong learning
   1.2. Attractive research systems:
      1.2.1. International scientific co-publications
      1.2.2. Top 10% most cited publications
      1.2.3. Foreign doctorate students
   1.3. Innovation-friendly environment:
      1.3.1. Broadband penetration
      1.3.2. Opportunity-driven entrepreneurship
2. Investments capture public and private investment in research and innovation and cover two dimensions:
   2.1. Finance and support:
      2.1.1. R&D expenditure in the business sector
      2.1.2. Venture capital expenditure
   2.2. Firm investments:
      2.2.1. R&D expenditure in the business sector
      2.2.2. Non-R&D innovation expenditure
      2.2.3. Enterprises providing training to develop or upgrade ICT skills of their personnel

3. Innovation activities capture the innovation efforts at the level of the firm, grouped in three innovation dimensions:

3.1. Innovators:

3.1.1. SMEs with product or process innovations

3.1.2. SMEs with marketing organization innovations

3.1.3. SMEs innovating in-house

3.2. Linkages:

3.2.1. Innovative SMEs collaborating with others

3.2.2. Public-private co-publications

3.2.3. Private co-funding of public R&D expenditures

3.3. Intellectual assets:

3.3.1. PCT patent applications

3.3.2. Trademark applications

3.3.3. Design applications

4. Impacts cover the effects of firms' innovation activities in two innovation dimensions:

4.1. Employment impacts:

4.1.1. Employment in knowledge-intensive activities

4.1.2. Employment fast-growing enterprises of innovative sectors

4.2. Sales effects:

4.2.1. Medium and high tech products exports

4.2.2. Knowledge-intensive services exports

4.2.3. Sales of new-to-market and new-to-firm product innovations

Appendix V – Portuguese Retail Sector of Supermarkets and Hypermarkets Context Category Data

Table 13: Portuguese Retail Sector of Supermarkets and Hypermarkets Industry Dimension Data

C.A.E. 47111 - Portuguese retail sector of supermarkets and hypermarkets									
Context	Indicator nº	Indicator	2010	2011	2012	2013	2014	2015	2016
Industry	1.1.1	Nº of Companies	1.173	1.194	1.241	1.313	1.364	1.437	1.474
	1.1.2	Entry of new companies per year (in %)	NDA	9,3%	10,7%	13,0%	11,0%	11,4%	10,2%
	1.1.3	Exit of companies per year (in %)	NDA	7,5%	6,8%	7,2%	7,1%	6,1%	7,7%
	1.1.4	Sector weight in gdp per year (in %)	1,034%	1,016%	1,038%	1,070%	1,101%	1,105%	1,116%
	1.1.5	Regulation	0	0	0	0	0	0	0
	1.1.6	Capital/Labour intensity (in %)	296,67%	288,62%	271,13%	261,47%	259,02%	248,11%	236,99%
	1.1.7	Employment rate (in %)	1,645%	1,628%	1,591%	1,640%	1,697%	1,798%	1,850%
	1.1.8	Dispersion of Earnings	NDA	NDA	NDA	NDA	NDA	NDA	NDA

Sources: Autoridade da Concorrência, PORDATA and Banco de Portugal databases

Appendix VI. Portuguese Retail Sector of Supermarkets and Hypermarkets Financing and Financial Dimensions Data

Table 14: Portuguese Retail Sector of Supermarkets and Hypermarkets Financing and Financial Dimensions Data

Enablers	Indicator nº	Indicator	2010	2011	2012	2013	2014	2015	2016
Financing	2.3.1	Weight of Debt Service (in %)	8,518%	12,802%	11,577%	11,686%	9,792%	7,204%	4,511%
	2.3.2	Leverage (in %)	77,8%	78,4%	78,1%	77,1%	73,6%	72,4%	72,4%
	2.3.3	Supplier Debt (number of times)	12,61	38,14	22,46	17,65	10,71	12,25	8,76
Results	Indicator nº	Indicator	2010	2011	2012	2013	2014	2015	2016
Financial	3.2.1	Return on Assets	8,73%	6,99%	7,52%	7,05%	8,37%	8,17%	9,38%
	3.2.2	Return on Equity	12,85%	4,42%	7,12%	9,01%	12,67%	10,71%	14,52%
	3.2.3	Return on Sales	4,16%	3,40%	3,45%	3,32%	3,82%	3,62%	3,82%
	3.2.3	Current Ratio	54,84%	51,00%	59,86%	53,92%	51,66%	51,43%	54,91%
	3.2.5	Solvency rate	0,2851	0,2761	0,2812	0,2969	0,3583	0,3815	0,3821
	3.2.6	Average EBITDA variation (in %)	NDA	-23,10%	0,80%	-11,24%	14,25%	-7,79%	16,12%
	3.2.7	Average EBIT variation (in %)	NDA	-41,53%	-0,05%	-20,83%	42,58%	-11,71%	36,22%
	3.2.8	Average collection period (nº of days)	5	5	4	5	5	5	4
	3.2.9	Average days payable outstanding (nº of days)	64	63	59	59	58	56	54
	3.2.10	Average days sales of inventory (nº of days)	30	29	26	28	28	29	29
	3.2.11	Sales growth (in %)	NDA	-1,96%	-4,79%	-2,92%	-2,75%	-3,40%	1,40%

Source: Banco de Portugal database

Appendix VII. Portuguese Retail Sector of Supermarkets and Hypermarkets Results Category, Quality and Financial Dimension Data

Table 15: Portuguese Retail Sector of Supermarkets and Hypermarkets Results Category, Quality and Financial Dimension Data

Results	Indicator nº	Indicator	2010	2011	2012	2013	2014	2015	2016
Financial	3.2.1	Return on Assets	8,73%	6,99%	7,52%	7,05%	8,37%	8,17%	9,38%
	3.2.2	Return on Equity	12,85%	4,42%	7,12%	9,01%	12,67%	10,71%	14,52%
	3.2.3	Return on Sales	4,16%	3,40%	3,45%	3,32%	3,82%	3,62%	3,82%
	3.2.3	Current Ratio	54,84%	51,00%	59,86%	53,92%	51,66%	51,43%	54,91%
	3.2.5	Solvency rate	0,2851	0,2761	0,2812	0,2969	0,3583	0,3815	0,3821
	3.2.6	Average EBITDA variation (in %)	NDA	-23,10%	0,80%	-11,24%	14,25%	-7,79%	16,12%
	3.2.7	Average EBIT variation (in %)	NDA	-41,53%	-0,05%	-20,83%	42,58%	-11,71%	36,22%
	3.2.8	Average collection period (nº of days)	5	5	4	5	5	5	4
	3.2.9	Average days payable outstanding (nº of days)	64	63	59	59	58	56	54
	3.2.10	Average days sales of inventory (nº of days)	30	29	26	28	28	29	29
	3.2.11	Sales growth (in %)	NDA	-1,96%	-4,79%	-2,92%	-2,75%	-3,40%	1,40%

Source: Banco de Portugal database

Apendix VIII. Pingo Doce – Distribuição Alimentar, S.A. Data

Table 16: Pingo Doce -Distribuição Alimentar, S.A. data

	PINGO DOCE - DISTRIBUIÇÃO ALIMENTAR, S.A.								
	Indicator		2010	2011	2012	2013	2014	2015	2016
Financing	2.3.1	Weight of Debt Service (in %)	10,851%	5,620%	4,496%	4,602%	3,890%	1,557%	0,030%
	2.3.2	Leverage (in %)	110,290%	136,957%	169,269%	130,813%	84,006%	37,274%	13,760%
	2.3.3	Supplier Debt	13,928	40,550	51,338	-466,092	29,069	26,221	9,553
Financial	3.2.1	Return on Assets	3,258%	1,095%	0,236%	-0,329%	1,748%	2,233%	5,867%
	3.2.2	Return on Equity	15,117%	5,674%	1,272%	-1,738%	8,252%	9,576%	20,823%
	3.2.3	Return on Sales	1,364%	0,442%	0,090%	-0,117%	0,585%	0,701%	1,802%
	3.2.4	Current Ratio	24,41%	26,56%	28,88%	27,08%	28,42%	32,72%	35,05%
	3.2.5	Solvency rate	21,556%	19,309%	18,558%	18,967%	21,188%	23,319%	28,176%
	3.2.6	Average EBITDA variation (in %)	NDA	-24,67%	-10,07%	-12,39%	31,21%	2,55%	44,16%
	3.2.7	Average EBIT variation (in %)	NDA	-64,82%	-64,75%	-109,48%	3939,19%	14,35%	158,33%
	3.2.8	Collection period (nº of days)	9,201	9,721	12,651	9,51	8,165	8,448	7,76
	3.2.9	Days payable outstanding (nº of days)	66,82	64,533	57,235	59,16	59,625	62,692	60,761
	3.2.10	Days sales of inventory (nº of days)	23,522	25,115	26,071	25,059	24,747	22,773	22,525
	3.2.11	Sales Growth	NDA	0,05338	0,02796	0,04219	0,02303	0,05177	0,04981

Source: SABI database