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ORGANISATIONAL EXCELLENCE BENCHMARKING STUDY

SWEDISH AND PORTUGUESE ORGANISATIONS OF THE AUTOMOTIVE INDUSTRY

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ABSTRACT

The conduction of benchmarking studies is a good strategy that all the organisations should follow to obtain better success in their activities. It allows the improvement of their practices. The goal of this master thesis project is to characterise the organisational excellence level of the Portuguese and Swedish automotive industry through a benchmarking study.

Firstly, it is reviewed the Benchmarking methodologies, the organisational excellence concept and then the SIQ Management Model and the EFQM Excellence Model that were the basis for building the used benchmarking model. It was possible to conclude that the SIQ Management Model is a simple and objective assessment model in comparison with the EFQM Excellence Model.

The benchmarking model was deeply based on the Sörqvist & Bergendahl Model developed by Sandholm Associates. This model is supported on Excellence Pillars: Strategy, Culture and Structure. This balance is a crucial factor for sustainable excellence. To identify the best practices, it was assessed the criteria: Quality Organisation, Certification and Awards, Leadership, Employee, Customer, Suppliers, Knowledge and Training, Processes, Continuous Improvement and Results these were assessed by a developed open answer survey.

The lack of knowledge in organisational excellence and the contact with the Portuguese organisations were an obstacle in this project. Due to the reduced number of the participant organisations, there is the necessity to do further validations of this benchmarking model.

The results of the benchmarking study showed that globally, the Swedish companies have a higher organisational excellence level than the Portuguese companies.

KEYWORDS

Benchmarking, Organizational Excellence, Quality, EFQM Excellence Model, SIQ Management Model, Automotive Industry, Portugal, Sweden

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CHAPTER 1
INTRODUCTION

1.1. BACKGROUND AND OBJECTIVES OF THE STUDY

This master thesis consists in a benchmarking study of the organisational excellence of Swedish and Portuguese enterprises of the automotive industry, and it has the objective of characterise the maturity of organisational excellence among companies of these two nationalities.

The sketch for this study started in May of 2018 with a contact made with Professor Lars Sörqvist after a conference of RIQUA[1] organised by APQ[2].

This work was done at Sandholm Associates, a Swedish Quality Management consulting and training company, and it had the support from KTH – Royal Institute of Technology from Sweden. For having the necessary academic recognition, it was carried out under the university students' mobility program from the European Union Programme Erasmus+ Placements.

There are several excellence and management models or awards that could be used for conducting this study, such as the EFQM[3] Excellence Model, the SIQ[4] Management Model, Deming Prize, MBNQA[5] award and others. As the study was conducted in Portugal and Sweden, the models that were pre-selected to be used were the EFQM Excellence Model, that is used in Portugal and the SIQ Management Model that is the national model in Sweden.

Due to the lack of experience and training in the EFQM Excellence Model and the SIQ Management Model and due to the extensiveness of these models, it was agreed to build a tailored benchmarking model. Then, to make possible a coherent analysis of several companies was necessary to create an inquiry with a set of parameters, based on the benchmarking model, to assess the company's practices, that could be compared and scored. The final score translates the organisational excellence maturity of the company and the areas of focus for the improvement of organisational excellence.

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[1] RIQUA - ***R**ede dos **I**nvestigadores da **Q**ualidade* (Quality Researchers Network)
[2] APQ – ***A**ssociação **P**ortuguesa para a **Q**ualidade* (Portuguese Association for Quality)
[3] EFQM – **E**uropean **F**oundation for **Q**uality **M**anagement
[4] SIQ – **S**wedish **I**nstitute for **Q**uality
[5] MBNQA - **M**alcolm **B**aldrige **N**ational **Q**uality **A**ward

1.2. MASTER THESIS STRUCTURE

This Master Thesis is organised in chapters and sections.

Chapter 2 - Literature Review, addresses "Benchmarking", its benefits and limitations, and the most used methodologies for conducting a benchmarking study. The case of success from Xerox is also presented. In the section "Models to Assess Excellence" is defined the Organisational Excellence concept and then are reviewed the EFQM Excellence Model and SIQ Management Model these were the chosen models to be the basis of the benchmarking model.

Chapter 3 - Methodology, addresses the build of the “Benchmarking Model” for the conduction of the study, based on the literature review. In the section “Survey” is described the survey that was used to assess the organisations. In the section “Selection of the companies” is described the process of selection and contact of the companies for participation in the study. The “Conductions of the visits” section describes the method used to deploy the survey. In the “Results Analysis” section is presented the methodology for the analysis of the results.

Chapter 4 - Results Analysis, presents the results from the analysis of the survey. It shows the score and the best practices for each criterion of the benchmarking model from the analysis of all the companies.

Chapter 5 - Conclusions, is the last chapter and presents the main conclusions of this study, a personal reflexion about this work, and some considerations for the future work that might be done.

CHAPTER 2
LITERATURE REVISION

2.1. BENCHMARKING

Benchmarking is a systematic process of comparing the structure, practices and processes of a given group of organisations. This comparison aims to identify best practices of organisations and subsequent implementation in other organisations to achieve performance improvement or excellence [1-5]. According to the American Productivity & Quality Center [4, 6], “Benchmarking is the practice of being humble enough to admit that someone else is better at something and wise enough to learn how to match and even surpass them at it.”.

The great focus of benchmarking is the improvement of any process or practice of an organisation through the exploitation of "best practices" rather than merely identifying the best performance. Best practices are the causes of the best performances. Thus, organisations that undergo benchmarking studies have a great opportunity to develop advances in strategic, operational and financial terms.

The conduction of benchmarking studies is a good strategy that all the organisations should follow to obtain better success in their activities. It allows the improvement of their practices.

The systematic process of benchmarking consists in identify, study, analyse and adjust the best practices and then implementing them within the organisation. The commitment of top management is essential to the success of the benchmarking process. The process can lead to radical changes in the organisation culture, but which will later have high returns and strategic advances in comparison with its competitors [3, 4, 7].

The benchmarking process, desired by a given organisation, involves the comparison of measurable indicators and of high strategic importance with other organisations that have better performance compared to the indicators. As it is expected, this process is only possible by sharing information between organisations through a previously agreed methodology.

Benchmarking should be an improvement tool for customer focus, which is one of the critical parameters for achieving organisational excellence. Benchmarking can be an initiative of the organisation's top management, or it may be a customer requirement [3, 4, 7, 8].

Benchmarking implies gathering information from an organisation and apply it to another organisation to improve processes through the application of more efficient and

innovative work processes. It also allows the development of the Organization's thinking and culture for continuous improvement and innovation [3-5, 7].

It is a form of comparative analysis; therefore, it is necessary to have a basis for the comparison. Typically, one or more areas of the organisations are identified for analysis, and one or more indicators are selected as a quantitative basis for comparison. These are then compared with recognised organisations as having best practices [4, 5].

In the final analysis, these questions should be answered:

- What are the alternatives to our current process/methodology?
- What are the benefits, costs, and risks of alternatives?

Benchmarking is possible and desirable if the indicators to be compared are present in both organisations.

2.1.1. BENEFITS OF BENCHMARKING

Benchmarking offers the following benefits for companies and organisations [4, 5]:

- Highlights the areas of activity and performance that require attention and improvement;
- Identifies strengths and weaknesses of the organisation;
- Allows to classify the organisation in relation to its competitors, facilitating the implementation of plans/actions of improvement;
- Helps measure the organisation's current performance;
- Avoids the application of resources for the development of something that has already been developed by others;
- Accelerates change and restructuring through:
  - ✓ The use of tested and proven practices;
  - ✓ It is convincing for the most sceptical because good practice already works in other organisations;
  - ✓ Creates motion and urgency when gaps are revealed.
- It leads to thoughts/ideas "outside the box"-different and innovative, looking for ways to improve outside the organisation;
- Obliges organisations to examine current processes, which often leads to improvement;
- Makes the implementation more likely due to the involvement of the entire leadership;
- Enables the identification of other organisations with processes that result in superior performance, with a view to their adoption.

Also, these benefits described above may lead to appreciation by stakeholders, such as leading to better financial results [4, 5].

2.1.2. BENCHMARKING LIMITATIONS

Dervitsiotis [5] presents several limitations in conducting benchmarking studies: the first has to do with the size and level of performance of the organization, that is extremely important; the second discusses the need to explain the interactions between the various processes that can lead to misleading conclusions; the third refers to the appropriate stage for the development of the organisation, that is, the choice of the right time for benchmarking applications.

Type of organisations involved:

The type of organisations involved suggests that conducting benchmarking studies is easier for large organisations because they have more resources to use more sophisticated techniques, which is more restrictive for medium and small organisations. The second factor is the level of performance already achieved typically large organisations with high performance are those that have higher productivity, quality and profit levels. As these have achieved a high level of performance, the improvement becomes more complicated so they will have to resort to more exhaustive processes.

Process interactions and organisation context

Conducting a benchmarking study will identify, for each process/indicator, what failures, and what improvements should be implemented. In turn, are trigger projects, investments and actions necessary to improve the desirable performance. A grave mistake that the team that conducts the benchmarking study can easily commit is the omission of the context in which best practices are implemented in each organisation.

Benchmarking will only have its maximum value if it leads to obtain reliable and useful information insofar as performance data for different parts of the system cannot be seen alone, but always in the context of essential business processes.

Improvement in the current context versus innovation

As described by several authors, benchmarking has better results when it is carried out considering the context of the organisation and nowadays. One of the significant pieces of evidence is in large successful companies where top management has made a substantial long-term investment in conducting benchmarking studies and implementing the best practices that have better results. Subsequently, this investment was recognised for the results obtained, and the level of organisational excellence attained [3, 5].

In this time of rapid change, benchmarking is suitable for incremental improvements in organisations with some size and market and who want to see the performance developed and stand out from their competitors, as happened to Xerox, which innovated by developing Benchmarking as a systematic tool. For the development of new products, new markets and paradigm shifts, even internally, organisations should not resort to

benchmarking studies, but rather to entrepreneurship methodologies such as "Lean Startup" defended by Eric Ries [3-5, 7, 9, 10].

2.1.3. BENCHMARKING METHODOLOGIES

Benchmarking studies are usually carried out at the initiative of a given organisation. However, independent entities such as institutes or universities have promoted benchmarking as a vital tool for improving performance [3, 8].

Benchmarking processes may diverge, either in terms of the design of the evaluation model (benchmarking model) or in terms of the implementation mechanism used. This is due to the tendency to design the evaluation model according to each case. However, regarding implementation, generally, the methodologies adopted present a set of common steps, reasonably well modelled by the cycle of continuous improvement P-D-C-A of Deming: Planning (Plan), Execute (Do), Analyse (Check) and Correct (Act) [3, 8, 11, 12].

Some authors propose variants of the P-D-C-A cycle, as shown in **FIG. 1**. Spendolini [11] distinguishes three main planning activities: "Identification of areas – the target of study", "Team formation" and "Identification of partners". In turn, Andersen and Jordan [13] highlight the "Search for partners" of the other planning activities of the benchmarking study. The Xerox methodology highlights the adapt activity [3, 8, 11-15].

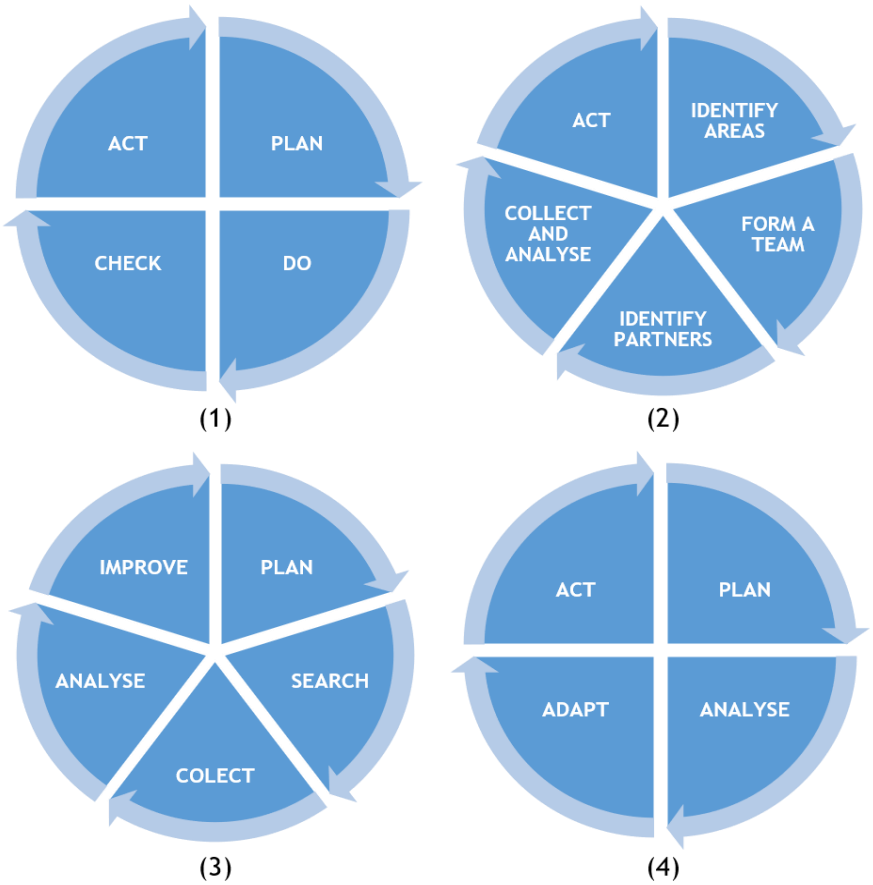


FIG. 1 Benchmarking cycles: (1) Deming; (2) Spendolini; (3) Andersen; (4) Xerox [3, 8, 11-14, 16-18]

2.1.4. BENCHMARKING SUCCESS – XEROX CASE

Xerox was the pioneer company in the development of the benchmarking process and the implementation of the best practices that result. Thus, this company and its benchmarking methodology are taken as a universal reference [17].

There are numerous successes achieved by different organisations through benchmarking. One of the oldest and most well-known cases of success is Xerox, in 1993, and had the following improvements [16]:

- Stock reduction in 67%;
- Duplication of the number of engineering projects that each designer has in charge;
- 33% increase in marketing department productivity;
- 30% reduction of service charges;
- Increase of 8 to 10% of productivity in the distribution of products.

Other companies such as AT & T, DuPont, Ford, IBM, Eastman Kodak, Milliken and Motorola were pioneers in using benchmarking as a standard tool for identifying best practices. A report from MIT (Massachusetts Institute of Technology) [19], on the state of the American industry, concluded that the best successful companies had implemented the competitive benchmarking in their culture.

2.2. MODELS TO ASSESS EXCELLENCE

2.2.1. ORGANISATIONAL EXCELLENCE

One of the meanings of "Excellence" is the quality of being excellent, a state of superiority due to a high degree of perfection. For modern organisations, the focus on organisational excellence should be a daily activity to succeed in the increasingly competitive markets of today. Moreover, organisational excellence is beneficial to the organisation itself, to its customers and other stakeholders because it allows them to stand out against their competitors [20, 21].

The term "organisational excellence" refers to a level of superiority obtained in all functions of an organisation. This level of superiority is achieved through the quality deployment of management values and practices. These values are a complex approach to the economic, technical and social parameters of the organisation [22, 23].

The approach of quality deployment corresponds to a depth level of development and understanding of the TQM (Total Quality Management) philosophy [24, 25].

The concept of TQM philosophy and its principles is quite old and was introduced into the USA during the ‘80s. This concept was primarily in response to the severe competitive challenge from Japanese companies. Initially, the attention was towards manufacturing

industries, setting aside the service industries. It was only at the end of the '90s that the TQM philosophy in service industries has been applied.

When the TQM principles emerge, in the '80s, several companies attempted to implement them, but most of these implementations failed. As being an entirely new way of thinking, imported from the oriental culture, the executives and managers didn't know how to interpret and adapt the TQM philosophies and principles to the reality of the occidental manufacturing industries. These obstacles that organisations faced led to the non-implementation in all its depth. The failure rates of the TQM programs were high as 75% [21, 25, 26].

Some of the critical factors of TQM identified in the literature are: a flexible organisational culture oriented to innovation and continuous improvement; a determined commitment and leadership by the management; strategic planning; continuous improvement; a client and other stakeholder focused approach; management based on data and information analysis, as well as the management of personnel, processes and suppliers or other partners [27-29]. According to Rahman and Bullock [30], all these critical factors could be classified into three groups:

- Strategic aspects, i.e. the need to integrate the quality objectives, plans and policies into the general strategic process of the organisation. In this sense, effective TQM ensures that management adopts a strategic overview of quality and focuses on the prevention of problems;
- Hard aspects, associated with the technical factors of the design, implementation and improvement of the quality management systems, such as the control and management processes, the use of analysis, measurement and problem-solving tools, the management of different resources and supplier management;
- Soft aspects, corresponding to social and behavioural factors, such as an open and flexible culture, the management's commitment and leadership, the human resources management and the focus on stakeholders.

In general, the excellence models don't make an explicit distinction between social (soft), technical (hard) and strategic factors [31]. According to Brown [32], Bou-Llusar *et al*. [33] and Calvo-Mora *et al*. [34] it is easy to distinguish the soft and hard aspects, but they depend one from the other, and they should be developed and deployed simultaneously. For Castresana and Fernández-Ortiz [35], strategy criteria reflect the business strategy as a tool or instrument of integration and coordination of other business resources and capabilities.

Excellence (whether called organisational, operational or business excellence) is generally associated with the EFQM Model, but there is a vast diversity of excellence quality models that could also be called "Quality Models". The most referenced excellence models are the EFQM model (Europe), the MBNQA (USA), the Deming Prize (Japan), the SIQ Management Model (Sweden), the IQA (Central and South America and Iberian Peninsula), the EQA (European Quality Award and the ABEF (Australian Business Excellence Framework). At its origin, the EFQM Model was based on TQM principles. In the past, the

TQM became unpopular due to the failure. The TQM principles aren't easily understood by everyone within the organisation; so the use of the excellence models became much more popular [36-38].

The excellence models provide enough guidelines to develop and deploy the organisational excellence concept with a margin to be easily adaptable. This makes it easier for an organisation to train its staff on the model and apply it in-house. The presentation of the excellence models also makes it easier to sell across the organisation.

Another key benefit of the use of excellence models is the opportunity for self-assessment and benchmarking. The opportunity to carry out assessments against the model also means that progress towards excellence can be measured and promotes continuous improvement.

But the excellence models don't cover all the necessary tools to achieve the desired excellence maturity. Such tools should be chosen according to the activity of the organisation, but two of the most currently popular and powerful tools are the Lean Thinking and Lean Practices and the Six Sigma methodology.

Any organisation that deploys an excellence model will almost certainly be faced with poor results in the initial assessments because most of the organisations focus on "management of quality" and other initiatives. Many authors believe that excellence models incorporate the "quality of management" principles; this is the most challenging change because it involves the changing of the managers' behaviour [26].

In summary, the TQM principles complement the excellence performance. The focus on quality at every level and by everyone inside an organisation is a need to accomplish excellence.

2.2.1.1. World-Class Organisations

As said before, the focus on Quality at every level and by everyone inside an organisation is a need to accomplish excellence. For achieving the desired level of excellence is very important to benchmark with the world-class organisations to learn the best practices.

There is agreement on the correlation between quality and business performance as organisations mature in their quality and continuous improvement efforts; they are using quality more and more to drive profitability. With that, most organisations are increasing their investment in quality, and it is expected to see greater visibility and a positive financial impact. As showed in **FIG. 2**, world-class organisations are active in this area; many organisations still lack clarity into the benefits from their spending. Having sophisticated systems in place to effectively measure and then report the financial and other business impacts of quality can help justify the need for increased investment. That may be why, in 2016, 100% of world-class organisations reported increased investment in quality in the last three years [39].

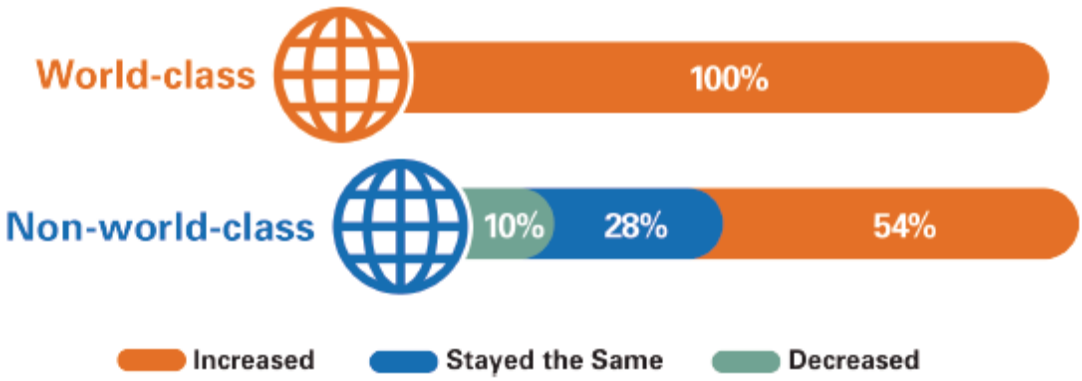


FIG. 2 Investment in Quality in the previous three years [39]

With this growth in the Quality focus is expected an evolution in the development of the knowledge and culture to deploy Quality in the organisations. It is consensual there has been an increased focus on training around improvement disciplines instead of just focusing on Quality Assurance. There was a decrease in ISO certification, quality management and audit and an increase in Lean and Six Sigma training, as it is shown in the **FIG. 3**.

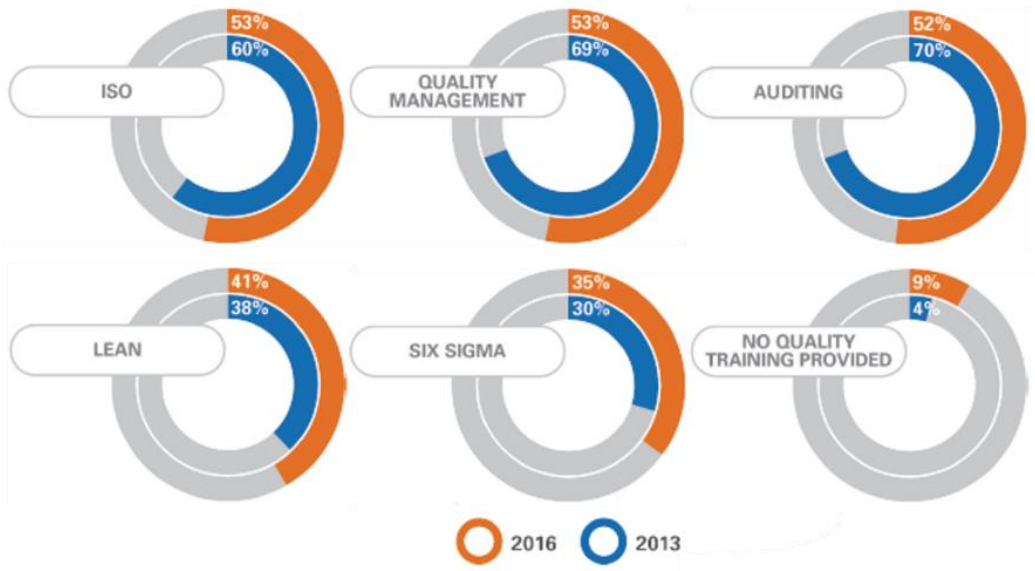


FIG. 3 Focus on the various Quality training tools [39]

In 2016, the ASQ collected a list of the best practices of the world-class organisations from 1665 organisations from all the continents. The list of these practices is available in **TABLE 1**, as well as the level of focus in comparison with the non-world-class organisations [39].

TABLE 1 Best practices from the world-class organisations and the focus level compared with the non-world-class organisations [39]

FOCUS LEVEL	BEST PRACTICE
	Business Focus
↑ 3x	Quality is a strategic asset and competitive differentiator
↑ 2x	Promote challenging quality goals to drive high performance
↑ 2x	Use quality to drive profitability
↑ 4x	Have greater savings than $1 million
↑ 2x	Have increased investment in quality
↑ 2x	Use quality to spur innovation
↑ 2x	Have quality governed by senior leadership (C-suite)
↑ 2,5x	Use each incentive type to reward meeting quality targets
↑ 2x	Involve customers in quality discussions
↑ 2x	Share customer feedback and intelligence across the organisation
	Measures
↑ 0,5x	Use quality measures as part of variable compensation
↑ 2x	Use measures for trend and/or predictive analysis
↑ 2x	Measure the quality of their business processes
↑ 3x	Have most visible metrics on performance against customer needs
	Training
↑ 2x	Train suppliers (tier 1, tier 2, and tier 3)
↑ 2x	Train all employees
↑ 2x	Offer training on regulations
↑ 3x	Offer training on customer experience
↑ 2x	Apply knowledge transfer techniques from retiring employees
	Standards
↑ 4x	Be challenged by international quality standards being less than their standards
↓ 2x	Likely to have quality-related setbacks
↑ 2,5x	Likely to have standardised reporting across the organisation

	Technology
↑ 2x	Likely to leverage technology across the board to increase the quality
↑ 0,5x	Use technology to improve quality awareness and results
↑ 2x	Use social media to gauge customer sentiment
↑ 2x	Use big data to improve understanding of customers' needs

2.2.2. ASSESSMENT MODELS

As it happens with the Quality frameworks, there are several frameworks of organisational excellence, with different structures, focus and characteristics. Some of the factors to be considered in the selection of the model to be adopted in a given organisation are the size of the organisation, the culture and the level of organisational excellence. There may also be a preference for the selection of excellence models designed by reference organisations in the geographic area concerned, for example, the EFQM Excellence Model is mainly selected by European organisations or whose Europe is the leading market and the SIQ Management Model is mostly used by Swedish organisations [33, 40, 41].

According to Dommartin [42]: "... A model of organisational excellence should frame the changes of the business model, new management ideas, as well as meet the requirements of large, small and medium-sized enterprises in the public and private sectors. The model should be based on the philosophy of business excellence in the TQM principles and should be applied in all organisations independently of the country, size, sector or level of excellence".

Despite the many existing models, if they are not sufficiently appropriate for implementation in a given organisation to meet the strategic objectives of the same, it is common to develop a more specific model, based on models that already exist. The disadvantage of using this type of model is the difficulty of its application in benchmarking studies [41]. According to Porte and Tanner [43]: "There is no model better than the other, just the most appropriate".

2.2.2.1. THE EFQM EXCELLENCE MODEL

The European Foundation for Quality Management disseminates the EFQM Excellence Model. This model is used as an assessment model of the management practices and sustainability of an organisation. This model is based on eight "Fundamental Concepts of Excellence" which support the nine criteria of evaluation. Despite the specificity of each organisation, this model allows a generic assessment [1, 22, 44, 45]. This evaluation leads to a final score of the organisation's excellence performance. If the organisation has a very high level of excellence and is a World-Class Organisation, it receives the "EFQM Excellence Award".

To provide the needed guidance for the deployment in the organisations, the EFQM integrates three components: the Fundamental Concepts of Excellence, EFQM Model Criteria, and the RADAR logic.

The Fundamental Concepts of Excellence are the base for the development of the model, and they must be present in the organisations. They are eight and are showed and described below **FIG. 4**.

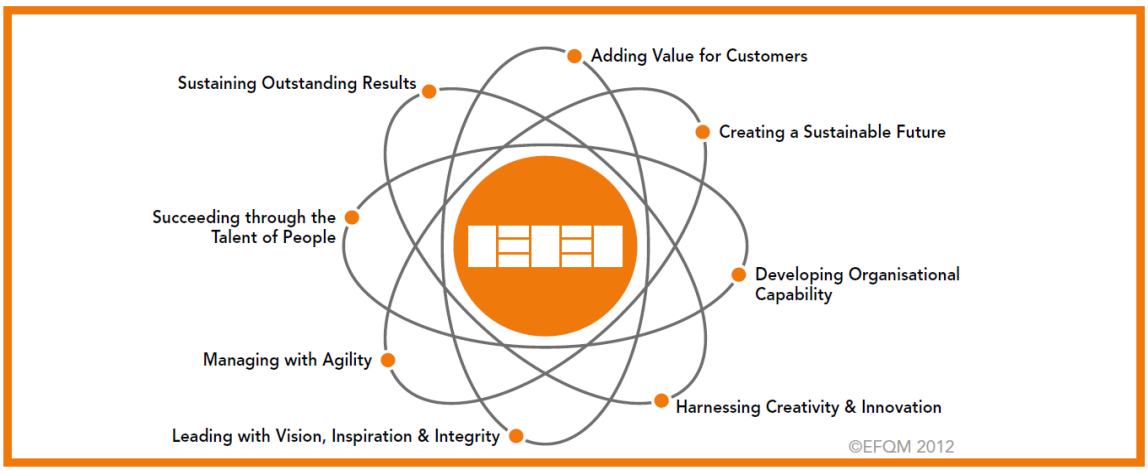


FIG. 4 Fundamental Concepts of Excellence by the EFQM Model [1, 20, 31, 32]

Adding Value for Customers:

Excellent organisations consistently add value for customers by understanding, anticipating and fulfilling needs, expectations and opportunities.

Creating a Sustainable Future:

Excellent organisations have a positive impact on the world around them by enhancing their performance while simultaneously advancing the economic, environmental and social conditions within the communities they touch.

Developing Organisational Capability:

Excellent organisations enhance their capabilities by effectively managing change within and beyond the organisational boundaries

Harnessing Creativity & Innovation

Excellent organisations generate increased value and levels of performance through continual improvement and systematic innovation by harnessing the creativity of their stakeholders.

Leading with Vision, Inspiration & Integrity

Excellent organisations have leaders who shape the future and make it happen, acting as role models for their values and ethics.

Managing with Agility

Excellent organisations are widely recognised for their ability to identify and respond effectively and efficiently to opportunities and threats.

Succeeding through the Talent of People

Excellent organisations value their people and create a culture of empowerment for the achievement of both organisational and personal goals.

Sustaining Outstanding Results

Excellent organisations achieve sustained outstanding results that meet both the short- and long-term needs of all their stakeholders, within the context of their operating environment.

EFQM Excellence Model Criteria

The nine criteria of the EFQM model, as specified in **FIG. 5**, are divided between "means" and "results". The five "Enablers" criteria assess what an organisation does and how it does it. The four criteria "Results" cover what the organisation achieves in the face of enablers, that is, the "results" are caused by the "means". The arrows evidence this dynamic and show that "learning, creativity and innovation" support the improvement of "means" based on feedback from "results". This dynamic aims a continuous improvement [22, 23, 45, 46].

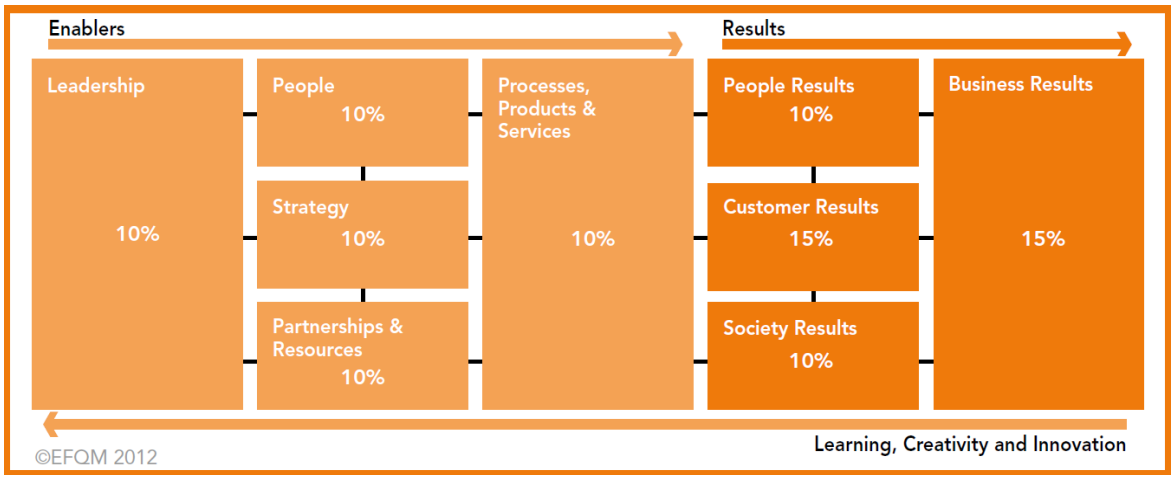


FIG. 5 The Criteria of the EFQM Model [45]

Analysing each of the nine criteria of the EFQM Model is possible to distinguish that each criterion of "Enablers" is divided into several key points and the criteria of the "Results" consider the perceptions, results and performance indicators [1, 2, 44, 45, 47]:

1. Leadership:

The "leadership" criteria assess the performance of the leaders in the organisation and are divided into five key points. Ideally, leaders must: define the objectives of the organisation and promote their achievement; be an example of the values and ethical

principles of the organisation; and encourage the anticipation of events to enable timely intervention and thus ensure the success of the organisation.

2. People:

The criteria "People" assess the way organisations value their people and foster a culture, which is a mutually beneficial way, enables the achievement of organisational and personal objectives, and encouraging the development of their people's capacities and promoting justice and equality. Organisations should ensure proper communication and good recognition to motivate people and build engagement to benefit from their knowledge and capabilities.

3. Strategy:

The "Strategy" criteria assess the implementation of the organisation's mission and vision. This implementation should be developed with a focus on the various stakeholders originating the organisation's policies, plans, objectives and processes.

4. Partnerships and Resources:

The criteria "Partnerships and Resources" assess that organisations should plan and manage external partnerships, suppliers and internal resources to support their strategy, policy and effective process operationalisation. Thus, organisations will be able to ensure the effective management of their environmental and social impact.

5. Processes, Products and Services:

The criteria "Processes, Products and Services" assess that organisations of excellence should develop, manage and improve their processes, products and services to generate value for their customers and other stakeholders.

6. People Results:

In the criterion "People Results" the organisations of excellence must achieve remarkable and sustained results that meet, or exceed, the needs and expectations of their people.

The development and involvement of people are fundamental concepts of excellence. In organisations of excellence, the results of focusing on people should go against the good practices implemented. People should feel motivated and satisfied through the existence of training, career progressions and rewarding wages. Management should also ensure excellent and fluid communication, good professional relations and a pleasant and healthy workplace and environment.

7. Customer Results:

In the criteria "Customers Results", organisations of excellence must achieve remarkable and sustained results that meet, or exceed, the needs and expectations of its customers.

This criterion is the one that has a higher weighted. In the fundamental concepts of excellence, this criterion states that "the client is the final arbitrator that determines the

quality of the product, the service and the loyalty"; The market share should be optimised through the clear focus on the needs of current customers and potential customers.

Other of the fundamental concepts of excellence are process management and the fact-based decision, and this includes perceptions as reliable information of stakeholders, such as customers.

8. Society Results:

In the criterion "Society Results" the organisations of excellence must achieve remarkable and sustained results that meet, or exceed, the needs and expectations of the various stakeholders of society.

One of the fundamental concepts of excellence is public responsibility: "The long-term interest of the organisation and its employees must be the best and should be ensured by adopting an ethical approach and according to the highest and most restrictive legislation and regulations.

9. Business Results:

In the criterion "Business Results" the organisations of excellence must achieve remarkable and sustained results that meet, or exceed, the needs and expectations of the business stakeholders.

By analysing **FIG. 5** it is noticeable that for calculating the final score, the EFQM Model assigns different weights relative to each criterion. It gives more importance to the criteria "Processes, Products and Services" and "Customer Results"; this is due to the interference that these criteria have or should have in the overall management of the organisation.

2.2.2.2. SIQ Management Model

The SIQ Management Model was developed in 1991 to provide support to Swedish organisations and companies in their development [48]. The development of the SIQ Management Model is based on values and cornerstones of Total Quality Management. The idea was the creation of an extensive model with significant adaptability for all types of private and public organisations [49, 50].

The model provides a holistic approach. It focuses on the crucial role of management and the importance of all co-worker's participation. The SIQ Management Model has been developed from research and practical application. It is built on three cornerstones – Culture, Structure and Systematics as seen in **FIG. 6**.



FIG. 6 The SIQ Management Model cornerstones [51]

CULTURE

Culture consists of five success factors that are characteristic of leading organisations:

- Create value with customers and stakeholders;
- Lead for sustainability;
- Involve motivated employees;
- Develop value-creating processes;
- Improve the organisation and create innovations.

These factors have been defined based on research and practical applications and are described in **FIG. 7**.



SIQ Management Model is based on success factors that characterise leading organisations. The success factors are defined based on research and practical application.

Success factors

CREATE VALUE WITH CUSTOMERS AND STAKEHOLDERS
An organisation's long-term success depends on its ability to create value together with those it has been created for. The explicit and implicit needs, requirements, desires and expectations of its customers and stakeholders guide the organisation's decisions and actions.

LEAD FOR SUSTAINABILITY
Committed leaders who base their actions on customer and stakeholder needs reinforce a culture that creates the conditions for sustainable development. Leaders see the organisation, its products, services and processes as parts of a larger whole and work actively to improve society, the environment and the economy. Leaders utilise and develop the collective competence and diversity of the organisation and its coworkers.

INVOLVE MOTIVATED COWORKERS
A precondition of a successful organisation is motivated coworkers who feel appreciated and respected. Leaders and coworkers are committed to developing a good working environment. Everyone sees their role in the whole and has a clear mandate to contribute to the organisation's development.

DEVELOP VALUE-CREATING PROCESSES
The operations of the organisation are seen as processes that create value with customers and stakeholders. Process orientation stimulates preventive work. The basic causes of problems are identified and fact-based decisions are taken. The processes are designed to create predictable results, while there is the capacity to rapidly adjust to the changed needs of customers and stakeholders.

IMPROVE OPERATIONS AND INNOVATE
Successful sustainable operations over time require both continuous improvement and innovation of products, services and processes. The prerequisite for this is a culture that stimulates continuous learning, creativity and new ideas. By comparing with leading organisations, leaders and coworkers gain knowledge about what can be achieved and how to get there. Systematic and sustainable improvement work leads to satisfied customers, more satisfied coworkers, a better society and environment as well as greater efficiency.

SIQ – Swedish Institute for Quality is there for those who wish to be better. Our mission is to create, gather and disseminate knowledge about quality development.

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FIG. 7 Culture in the SIQ Management Model [51]

A constant feature of the SIQ Management Model is the focus on the working methods that an organisation chose. The reason for this is that the capacity to be successful is linked to the selected working methods. If we work in the same way, we will also obtain the same results. If we wish to improve our results, we also must change the way we work, and it is therefore essential that we can describe how we work [51, 52].

STRUCTURE

The SIQ Management Model consists of the areas that have the most significant impact on an organisation's results. The areas focus on customers and stakeholders, management, employees and processes. By developing its working methods in these areas, an organisation strengthens its culture and its results. The working methods from the areas that have a high impact on the organisation and then lead to the Results are shown in **FIG. 8**. [51, 52]

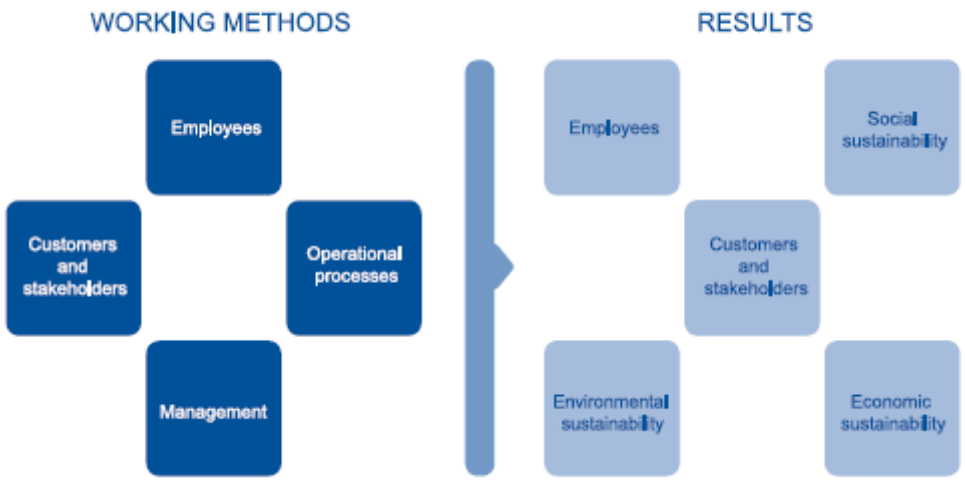


FIG. 8 Structure in the SIQ Management Model [51]

SYSTEMATICS

Systematics is a way of asking questions that provide insight into how each organisation works. It is only when we become aware of how we do something that we can improve what we do. This systematic way is illustrated in **FIG. 9**, and it is based on the well-known improvement wheel or Deming's PDSA-wheel (Plan, Do, Study, Act). Continuous improvement can be achieved if we keep asking ourselves these questions regularly [51-53].

What do we do to..?

Do we have a consciously chosen, well-considered, systematic and organised working method to implement our working tasks? Is this also permeated by the success factors? Does the chosen working method support the organisation's plans? Does it interact positively with other chosen working methods? Does the working method prevent errors, problems and risks through foresight and planning?

To what extent are the chosen working methods applied?

When we develop systematic and integrated working methods, they shall also be applied in relevant contexts, in the entire organisation, in all processes, for all products, goods and services on essential occasions.

What results does it lead to?

Results are the ultimate proof that the chosen and applied working methods lead to the intended outcome. To be able to monitor the organisation and its development, the results must be compared with the organisation's target values and with the corresponding values of leading organisations and competitors.

How do we monitor, learn from and improve what we do?

One of the model's successes factors is the improvement of the organisation and creative innovations. How do we evaluate the chosen working methods and their application? Are we systematically implementing improvements based on performed evaluations and lessons learned?

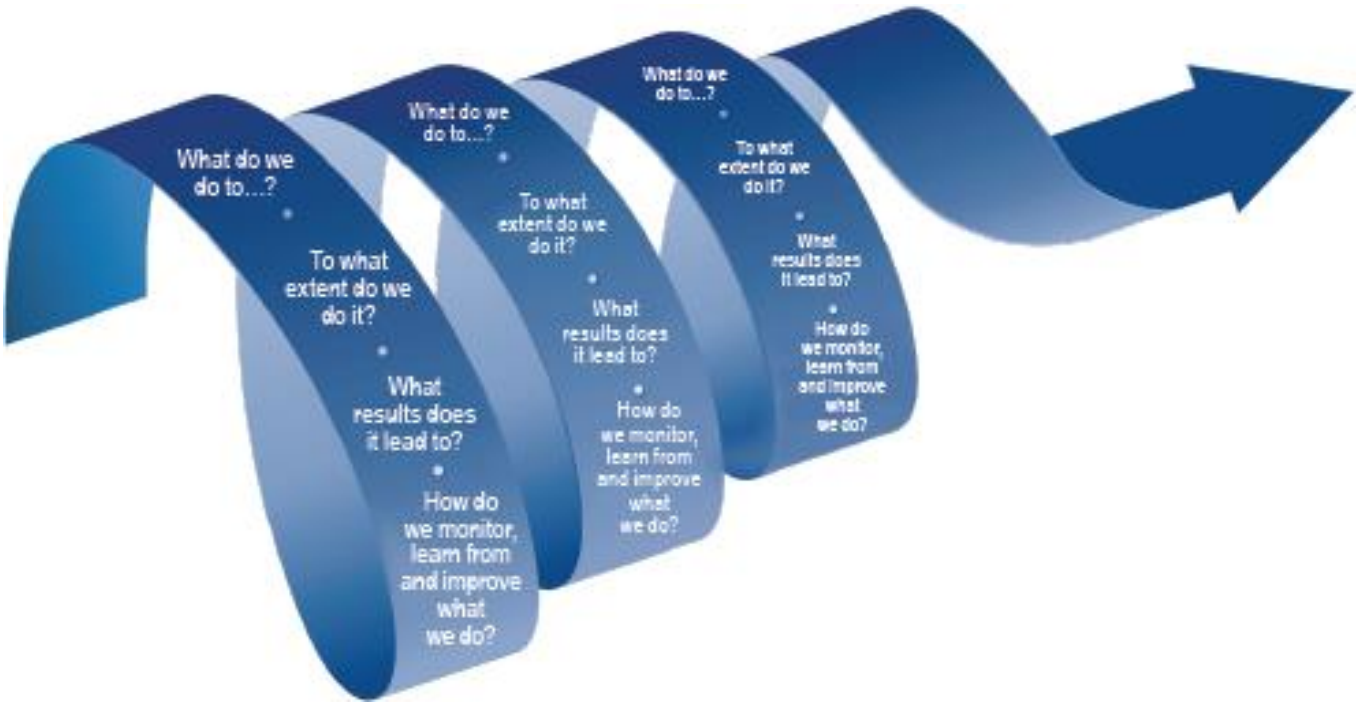


FIG. 9 Deming's PDSA-wheel [51, 53]

THE CRITERIA

For the assessment of the SIQ Management Model, there are a group of five criteria that cover all the fundamental principles of the Organisational Excellence. The evaluation of each criterion and sub-criterion are scored with points that are summed and then translated in an excellence level from 1 to 7, being 7 a holistic approach that represents the total of 1000 scored points. In **FIG. 10** is shown the SIQ Management Model structure with the criteria, the sub-criteria and the corresponding points [51, 52].

1	**CUSTOMERS AND STAKEHOLDERS**	**150**
1.1.	Understand the needs and expectations of customers and stakeholders	50
1.2	Create value with customers and stakeholders	50
1.3.	Create promises to customers and stakeholders	20
1.4.	Follow up the level of satisfaction among customers and stakeholders	30
2	**MANAGEMENT**	**125**
2.1	Plan for a sustainable organisation	30
2.2	Lead the organisation for sustainability	40
2.3	Lead coworkers	30
2.4	Lead processes	25
3	**COWORKERS**	**125**
3.1	Develop coworker skills	40
3.2	Promote creativity and participation	45
3.3	Follow up coworker satisfaction and develop a good work environment	40
4	**OPERATIONAL PROCESSES**	**100**
4.1	Establish processes	30
4.2	Improve processes	70
5	**RESULTS**	**500**
5.1	Results - Customers and stakeholders	100
5.2	Results - Coworkers	100
5.3	Results - Social sustainability	100
5.4	Results - Environmental sustainability	100
5.5	Results - Financial sustainability	100
TOTAL POINTS		**1000**

FIG. 10 The SIQ Management Model Criteria [51, 52]

1. Customer and Stakeholder

This main criterion focuses on how the organisation understands the needs and expectations of its customers and stakeholders, how value is created and how the organisation creates trust among its customers and stakeholders through its pledges to them. It also asks for information about working methods used to measure customer and stakeholder satisfaction.

2. Management

The main criterion deals with working methods used to plan and lead the organisation based on the needs, requirements, wishes and expectations of customers and stakeholders. The criterion also deals with how the organisation uses the information to plan its activities. Information that may be needed can include facts about customers and stakeholders, employees, research and development, finances, leading organisations and competitors, etc.

3. Employees

The main criterion deals with working methods for drafting development plans for each employee and how skills development is carried out based on strategies, objectives and action plans for the organisation's overall competence.

The area of creativity and innovation, both incremental (continuous improvement) and radical changes, demonstrates the engagement that is created among the employees. It is also essential for the promotion of a pleasant work environment and excellent employee satisfaction.

4. Operational Processes

The main criterion Operational Processes asks for information about the working methods applied by the organisation to develop stable processes that also can adapt to new conditions and how the organisation and its processes are improved. The criterion refers to the day-to-day management of the operations.

5. Results

The main criterion Results asks what the most crucial result indicators and goals are and in what way these are relevant to the organisation. The main criterion Results describes how the results can be linked to the working methods and their application, levels and trends.

2.2.2.3. Sörqvist & Bergendahl

The Sörqvist & Bergendahl Model describes organisational excellence as a balance between three pillars: the Excellence Pillars are the support of the excellence in the organisations, they represent the approach for the excellence deployment and define the values that are behind excellence and should be part of the organisation values too.

The Excellence Pillars follow the distinction of the TQM principles made previously in section 2.2.1, being them: the Strategy, the Structure corresponding to the hard/technical aspects, and the Culture corresponding to the soft/social behaviour aspects.

For consistent and sustainable deployment of organisational excellence, there is a need for a Strategy, Structure, and a Culture. These three pillars should be having the same focus for obtaining a three-point balance, as it showed in the diagram of **FIG. 11**. Most organisational excellence models do not consider this essential balance.



FIG. 11 Triangular Balance Diagram of the Excellence Pillars [54]

The **"Strategy"** is an overarching plan that describes the way with which an organisation intends to realise its business idea and visions. This plan is converted into adapted strategic goals and aims that reflect what the organisation must do.

Kim *et al.* [55] and Dahlgaard-Park *et al.* [56] point out that there is a severe lack of attention to the strategy. Strategic planning constitutes a key piece in all quality systems since it is a fundamental factor in the initiation and development of change in the organisation, which requires the whole TQM initiative.

It's common for organisations the development of a strategic plan, by the executive for guiding the organisation. Following the excellence fundaments, this plan should be developed following long-term thinking. But for achieving the strategical goals and aims, it is mandatory the existence of medium- and short-term strategic plans [27, 34].

According to Oakland [29], the board of executive management must all demonstrate that they are serious about quality and organisational excellence and understand quality well beyond as the assurance of specifications. The middle managers have a particularly vital role to play since they must not only grasp the principles of quality and organisational excellence but also go on to explain to the people for whom they are responsible and ensure that their commitment is communicated.

Following Sörqvist & Bergendahl [54], Oakland [29] and Suarez *et al.* [6] it is possible to build a flow of the strategic plan development. As it is explained in **FIG. 12**, the strategy is the job of the executive management team, that defines the strategy of the whole organisation; every middle manager and team, that defines the strategy of each department and team; and each employee until the operator in the shop-floor. Everyone should have a strategic plan with group and individual goals and aims and the proper tasks to reach them that will contribute to the strategy defined by the executive leadership.

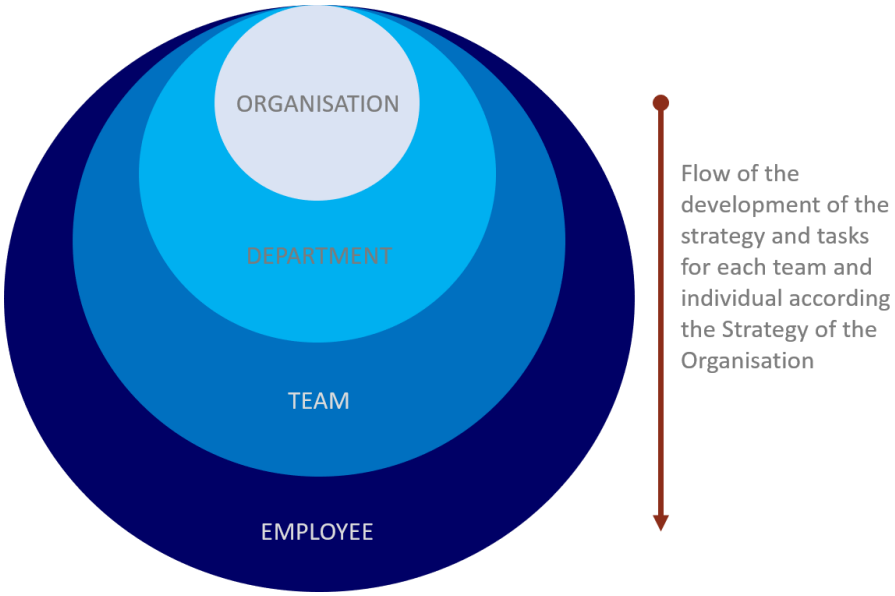


FIG. 12 The flow of the deployment of the strategy in an organisation [54]

The development of the strategy should also include a controlling system, such as key process indicators monitoring, to continuously assess the deployment of the strategy to drive the organisation to the defined goals and aims [29].

The **"Structure"** pillar focuses on the working methods, models, processes, procedures and work instructions that the organisation utilises for the deployment of excellence. The organisations should have well-defined and straightforward management and production or manufacturing system that regulates the working methodology [45, 51, 52, 57].

According to Sommerhoff [58], to achieve sustainable excellence, an organisation must have designed its structure around quality management to obtain on a right level of maturity of organisational excellence [31].

"Culture" one of the definitions of this word is "the set of shared values, attitudes, behaviours and goals that characterises (and unite a group of people) an organisation". According to Keim [59], this pillar is the most difficult to develop in the organisations, that requires a significant change in management thinking. Sörqvist and Bergendahl [54] point out that this difficulty is due to the presence of social and behavioural factors such as people relations and personal feelings and opinions. For Bolboli and Reiche [31] "changing organisational culture is a difficult, tedious, and time-consuming process, which takes several years, and it can often be realised by the change of generation or ownership structure".

The culture for excellence is the set of values, attitudes and behaviours that support the organisation vision. The following benefits are based on the SIQ Management Model and on some authors that will be referred:

Value for the customers and stakeholders

An organisation's long-term success depends on its ability to create value together with its customers and stakeholders. The value created jointly by customers and organisations is a basis for future competitiveness because customer engagement enables sales promotion, product quality improvement, increase in customer satisfaction, decrease in costs and risk, and rise of competitive advantage [60-63].

Employeeship

Employeeship is the English translation of the Swedish word "*medarbetarskap*". The concept of employeeship is the responsibility and commitment among employees, in co-operation with other employees, to strive to do what is of importance to the organisation and its customer and to develop and improve this ability continuously.

Employeeship is a crucial success factor for an organisation and creates a link between proper leadership/management and good business results for development cooperation among people and a mutual endeavour to deliver results. Good employeeship is needed as a necessary complement to good leadership to create a culture based on responsibility, commitment, loyalty, cooperation and development in an organisation.

To better understand the concept of employeeship, FIG. 13 it is described the critical dimensions of the Employeeship Model. The grey part in the model represents a daily commitment from both the employee and the leader, where the leader must work on both the "culture side" with leadership and the "structural side" with management [64].

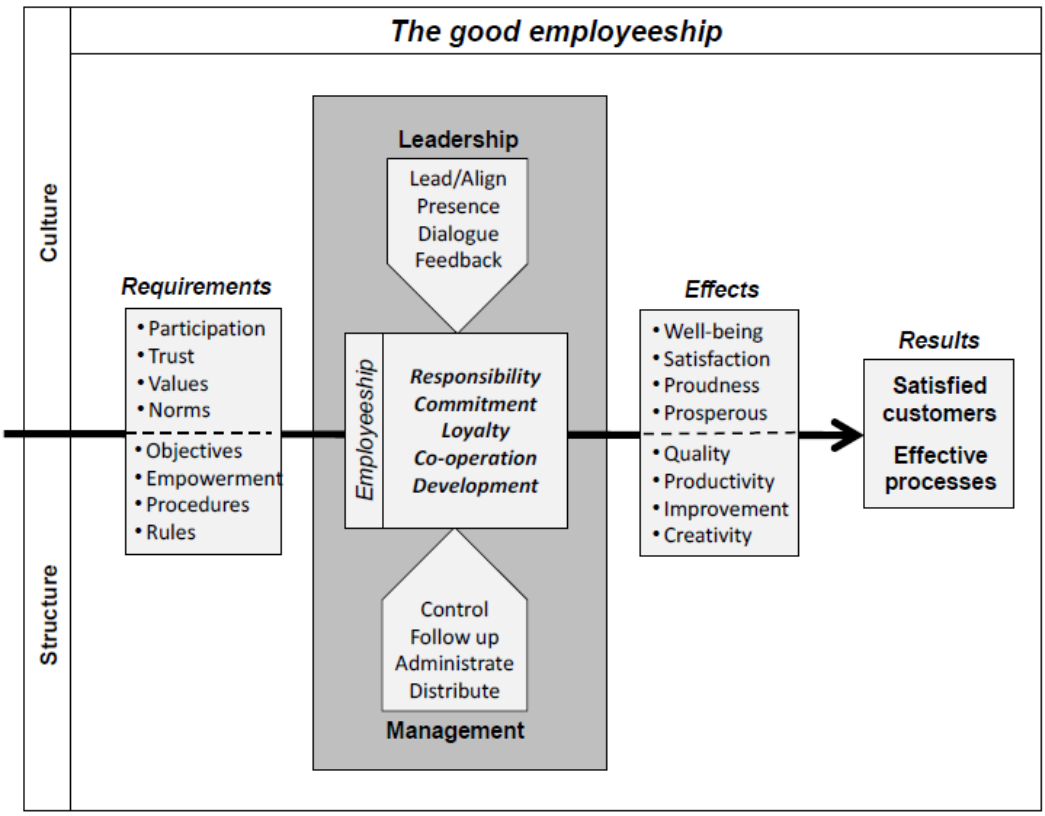


FIG. 13 The Employeeship Model [24]

Leadership for Sustainability

It is essential to have long-term base thinking for the sustainability of an organisation. This base thinking carries out to the commitment of the leaders for developing a culture oriented for meeting the customer and stakeholder needs but seeing it with a wide lens where are the need to work actively to improve society, the environment and the economy [51, 52].

Adding value processes

The operations of the organisation are processes that create value for customers and stakeholders. So there must be a capacity to adjust to the needs of customers and stakeholders that change continuously. All types of wastes are undesirable, and the motivation to cost decreasing is demanding by the increase of productivity, improvements and higher efficiency [51, 52, 65, 66].

Continuous Improvement and Innovation

Successful sustainable operations over time require both continuous improvement and innovation of products, services and processes. For the deployment of this factor, the culture of the organisation must stimulate continuous learning, creativity and new ideas providing the necessary tools and opportunities for their employees. The organisation must be continuously benchmarking with best practices organisations and benchmark internally. This should be systematic and sustainable practices [51, 52].

CHAPTER 3
METHODOLOGY

3.1. THE BENCHMARKING MODEL

The conception of this benchmarking model was deeply based on the Sörqvist & Bergendahl Model [54] developed by Sandholm Associates (not yet published), on the SIQ Management Model and the EFQM Model.

Both SIQ Management Model and EFQM Excellence Model have three different sections: the first where the fundaments concepts that are the base of the model are defined; the second one where the criteria are described and the third one that represents the methodology for assessment and scoring. The proposed benchmarking model follows the same construction, having the "Excellence Pillars" from the Sörqvist & Bergendahl Model, the "Criteria" and "Assessment Methodology".

The activities and business areas of the organisations that the study covered are all related to the automotive industry. So, it is essential to highlight that the framework criteria is oriented to assess the best practices of this industry.

3.1.1. CRITERIA

As shown in **TABLE 2**, the benchmarking model has ten criteria that are grouped into three different importance levels. These criteria were selected based on the EFQM Model and the SIQ Management Model. The ten criteria are the main areas that an organisation should focus, with the consideration of the importance levels, in the deployment of the organisational excellence. The importance levels are also taken into account for the calculation of the final score of the benchmarking assessment.

TABLE 2 The Benchmarking Model criteria

Importance Level	Criteria
3x	Quality Organisation
	Leadership
	Employee
	Customer
	Continuous Improvement
	Results
2x	Knowledge and Training
	Processes
1x	Certifications and Awards
	Suppliers

The three importance levels are justified by the influence that each criterion has for the deployment and achievement of the organisational excellence and are based on the different score weights that EFQM Model and SIQ Management Model attributed to their criteria. As it is shown in section 2.2.1., there is a differentiation on the weight that each criterion has in the calculation of the organisational excellence score.

1. Quality Organisation

The Quality Organisation criterion has the objective of assessing the importance and commitment of the organisation in the Excellence deployment. The sub-criteria should address the structure, hierarchy, extensiveness of the quality management system, the proximity with the executive management, and the policies and the training. This assessment shows how quality is spread in the organisation.

2. Leadership

The Leadership criterion has the objective of assessing how the leaders are focused and committed to obtain Excellence, and if they include the deployment of Excellence in their agendas and the organisation strategy.

The full commitment of the leadership with Quality and Excellence and with long term perspective is mandatory for the correct deployment.

3. Employee

The Employee criterion has the objective of assessing the awareness and knowledge in quality and continuous improvement; who in the organisation deploys the quality culture; whose managers provide the needed tools, promote the creativity, critical thinking and involvement for continuous improvement; and how employee satisfaction is assessed and taken in consideration in up-manager decisions.

4. Customer

The Customer criterion has the objective of assessing if the organisation has a customer focus policy; the way this policy is developed and implemented, and how the organisation involves the customer in the creation of value. It's also imperative to assess the way the organisation deals with customer needs and long-term satisfaction and loyalty.

5. Continuous Improvement

The Continuous Improvement criterion has the objective to assess how the organisations structure the work for continuous improvement. Some tools and methodologies could be used to deploy the continuous improvement; in this deployment, it is also crucial to assess who are involved in this process, which training these people have and what are their responsibilities.

To succeed, it's crucial to have the engagement of the leadership in this process to create a continuous improvement culture. The innovation also has a significant role in the continuous improvement process. So, it must also be taken into consideration by the organisation.

6. Results

The Results criterion has the objective to assess how the organisation measure and explore the data for the analysis of the results. The analysis of the results should be made for all functions in the organisation and all the stakeholders. The results from the improvement activities, the deployment of quality and excellence should also be considered. This should translate the effectiveness and efficiency of the activities of the organisation.

7. Knowledge and Training

The Knowledge and Training criterion has the objective of assessing the training in quality that the organisation provide to all the employees and how this training is developed. It is also vital, for continuous improvement and innovation, to establish partnerships with institutions of R&D[6].

8. Processes

The Processes criterion has the objective of assessing if the organisation has a process-oriented approach, and how does its deployment. There are several tools and methodologies to deploy this approach that could be used. It's very important to have a

[6] R&D – **R**esearch and **D**evelopment

consistent and robust process monitoring methodology. The principles of Lean should also be present in the development and the continuous improvement of the processes.

In every organisation exists the need for the development of products or processes. For this reason, during the product development, Quality must be present too.

9. Certifications and Awards

The criterion Certification and Awards have the objective of assessing the certifications in standards related to Quality Management that are currently updated, and awards/assessment results of Quality and Excellence Models developed by recognised institutions.

10. Suppliers

The Suppliers criterion has the objective of assessing which are the supplier's quality policies; the way has the organisation develop an excellent supplier satisfaction and long-term relationship with them. It's also essential to build a good partnership with the suppliers for meeting the customer needs and for reaching a high excellence level for both organisations.

3.1.2. ASSESSMENT METHODOLOGY

The assessment of the organisation covered all the ten criteria referred to the previous section. This assessment was made by surveying all the organisations. After leading the survey, the answers were compared and scored. For each of the ten criteria, it was scored the three Excellence Pillars: Strategy, Structure and Culture in an integer scale from 1 to 5 as shown in **FIG. 14**. This scoring is a subjective assessment that deeply depends on the experience of the person that is doing the study. After this scoring, is calculated the Criterion Excellence Maturity ($EM_{Criteria}$) that is the average of the score of the Excellence Pillars, obtained from Equation 1.



FIG. 14 Integer scale for scoring the Excellence Pillars.

$$EM_{Criteria} = \frac{S_{Strategy} + S_{Structure} + S_{Culture}}{3} \quad (1)$$

As described before, the organisational excellence must be sustained by the development of the three Excellence Pillars: Strategy, Structure and Culture. These three pillars must be deployed with the same focus to have a sustainable balance. For each of the

ten criteria, is calculated the relevance of each Excellence Pillar ($B_{Strategy}$, $B_{Structure}$, $B_{Culture}$), that is the relative weight of each Excellence Pillar score, as is showed in Equations 2, 3 and 4.

$$B_{Strategy} = \frac{S_{Strategy}}{S_{Strategy} + S_{Structure} + S_{Culture}} \quad (2)$$

$$B_{Structure} = \frac{S_{Structure}}{S_{Strategy} + S_{Structure} + S_{Culture}} \quad (3)$$

$$B_{Culture} = \frac{S_{Culture}}{S_{Strategy} + S_{Structure} + S_{Culture}} \quad (4)$$

With the relevance of each Excellence Pillar, a ternary diagram is built, as shown in **FIG. 15**, to visualise the focus of each pillar. The optimum situation is to have a perfect focus balance, with 33.33% of focus in each pillar.

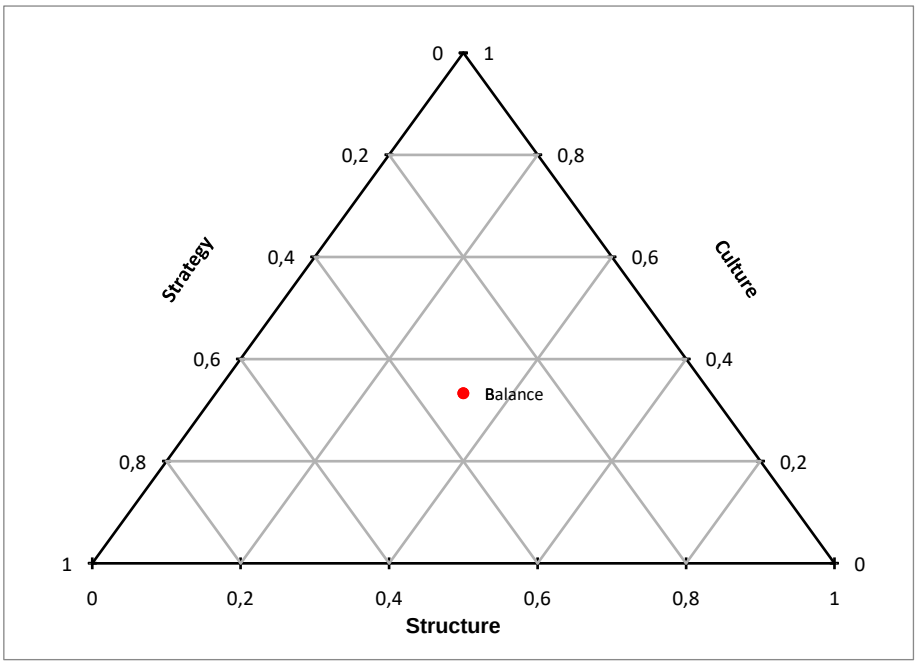


FIG. 15 Balanced focus of Excellence Pillars

For a better understanding of the assessment methodology, it is presented the **TABLE 3** that is an example of the calculations of the score of a determined criterion.

TABLE 3 Example of the calculations

	Strategy	Structure	Culture
Excellence Pillar Score	3	4	3
$EM_{Criteria}$ (Equation 1)	$EM_{Criteria} = 3.33$		
$B_{Excellence\ Pillar}$ (Equation 1, 2 and 3)	$B_{Strategy} = 0.30$	$B_{Structure} = 0.40$	$B_{Culture} = 0.30$

After the calculation of every $EM_{Criteria}$ of the company, is calculated the final score of the company based on the weighted average of all the ten criteria according to **TABLE 2**.

3.2. THE SURVEY

For the benchmarking study, it was elaborated a survey with the following structure:

IDENTIFICATION OF THE ORGANISATION

Identification of the organisation, characterisation of the activities, type of customers, business model and the dimension. For the benchmarking study, it is essential to contextualise the organisations to support the best practices that might result from the study.

a. Name
b. Products
c. Supply Chain level: OEM, Tier 1, 2 or 3
d. Quantity/weight of products per year
e. Percentage of production/revenue for the automotive sector
f. Number of employees
g. Extra information

ORGANISATIONAL EXCELLENCE SURVEY:

The survey is divided into ten criteria. For each criterion are various open-answer questions that should be answered. In some of these questions, there are topics to define better what is pretended. When conducting and answering the survey it is essential to have in mind the three Excellence Pillars that later will be scored.

1. **Quality Organisation**
   a. How is organised the structure of the Quality Management System of the company?
   b. How is the focus for Quality on the executive level?
   c. Which training/knowledge have the employees in the quality departments?

d. Which are the company policies?

2. **Certifications and Awards**
   a. Which certifications of standards related to Quality System the company has?
   b. Which awards related to Quality had the company received?

3. **Leadership**
   a. How is the leadership committed with quality, continuous improvements and excellence?
      i. Following up the quality and continuous improvement of managers on all levels
      ii. Training in quality and continuous improvements on management level
   b. How is quality/continuous improvement present in the strategies/goals defined by the leadership?
   c. How the company project its future?
      i. Long/short time perspective

4. **Employee**
   a. How do you make sure of the awareness of quality, continuous improvements and the Quality Management System of each employee?
      i. Training of employees in quality and continuous improvements
      ii. Quality culture
   b. How the company involve all the employees in the Quality Culture and Continuous Improvement?
      i. Employee satisfaction
      ii. Participation and involvement
      iii. Recognition and compensation
      iv. Ideas, creativity and suggestions

5. **Customer**
   a. Does the company have a policy in customer focus?
   b. How the company develop this policy?
      i. Treatment of information about the customer's needs
      ii. Customer satisfaction and loyalty
   c. How the company involve the customers in the development of the products/needs?

6. **Suppliers**
   a. Which are the Suppliers Quality policies?
      i. Finding good suppliers
      ii. Assessing and auditing the suppliers
   b. How do you develop a long-term relationship with the suppliers?
      i. Following up suppliers

   ii. Partnership and improvement work
   iii. Suppliers satisfaction

7. **Knowledge and Training**
   a. Which are the standards for universal competence in quality and continuous improvements?
   b. How do you develop the training and knowledge of quality?
      i. Internal or external training
   c. How is the company involved in partnerships with universities and researchers?

8. **Processes**
   a. Does the company have a process-oriented policy?
   b. Which methods are used to define the processes?
      i. Process definition
      ii. Process maps
      iii. Value Stream Maps
      iv. Risk Management
   c. Which methods are used to control the processes?
      i. Measurements/KPI's[7] and analysis of processes
      ii. Control of variations and SPC[8]
   d. How does the company include the Lean flow and Lean thinking in the process?
   e. How is Quality present in the development of new products? Which methods are used to the development?
   f. How is Quality present in the other structures of all organisation?
      i. Market and selling
      ii. Manufacturing
      iii. Purchasing
      iv. Administration

9. **Continuous Improvement**
   a. How is the organisation of continuous improvement work (teams, cross-functional projects, etc.)?
   b. How do these teams/projects work? Which methodologies and tools they use and have available?
      i. Employee participation
      ii. Roles and responsibilities
      iii. Coaches/facilitators (like Black Belts)
      iv. Improvement partnership with suppliers
      v. Use of Six Sigma
   c. What is the view of the leadership for continuous improvements?
      i. Improvement and quality culture

[7] KPI's – **K**ey **P**rocess **I**ndicators
[8] SPC – **S**tatistical **P**rocess **C**ontrol

d. How does the company deal with innovation?

10. **Results**
    a. How the company measure the results (financial, customer, processes, employee, suppliers, etc.)?
    b. How are the Improvement results?
    c. How the company measure the Quality results and the maturity of the Quality?
    d. How are the changes in effectiveness and efficiency?
    e. How the company analyse the results?

3.3. SELECTION OF THE PARTICIPATING ORGANISATIONS

The selection of the organisations addressed for this study followed the conditions agreed with Sandholm Associates.

All the organisations operate for the automotive market and could be in a different level of the supply chain, being a Tier 1, 2, 3 or could be an OEM[9].

3.3.1. SWEDISH ORGANISATIONS

Sandholm Associates made the selection of the Swedish organisations.

From the various contacts stablished by Sandholm Associates AB, only four companies were available for taking part in the study during the available time in Sweden. These companies were:

- Volvo Cars
- Scania
- Sandvik Machining Solutions
- ABB Robotics

The identification of the companies is presented in **APPENDIX B**.

3.3.2. PORTUGUESE ORGANISATIONS

For selecting the Portuguese organisations, it was agreed that the organisations must be exporters for the Swedish market. This condition has been placed as a way of ensuring a relation between the two markets and the quality standards that are required by customers and suppliers. To fulfil this condition, it was asked to INE[10] the list of organisations that exported to Sweden, with the following CAE[11]:

- CAE 2211 - Manufacture of tires and inner tubes;

[9] OEM - **O**riginal **E**quipment **M**anufacturer
[10] INE - ***I**nstituto **N**acional de **E**statística* (Portuguese Statistics Institute)
[11] CAE- ***C**ódigo de **A**tividade **E**conómica* (Code of Economic Activity)

- CAE 29 - Manufacture of motor vehicles, trailers, semi-trailers and components for motor vehicles.

The list that was provided from INE was combined with the list of organisations that are exporters for the Swedish market that is available at the AFIA[12] website for public consulting.

The final list of the 49 companies is in **APPENDIX A**. From this list 13 companies with relationships with FEUP were selected to establish a more accessible contact. From the 13 companies that were contacted only four, that are listed below, agreed to be part of the study:

- Caetano BUS
- DF - Elastomer Solutions
- INAPAL Plásticos
- Sakthi Portugal

The identification of the companies is presented in **APPENDIX B**.

3.4. CONDUCTION OF THE FACE-TO-FACE VISITS

For the development of the benchmarking study, a presential visit was made in each company. This visit involved a considerable amount of travels between the different cities in Sweden and Portugal for visiting the company's facilities.

The visits to the companies usually started with a short introduction about the benchmarking study and the company and then a tour of the operational facilities. During these tours, there was a big focus to get the host to explain and divulge the presence of quality and excellence in the shop floor, working methods, best practices, etc.

After the tour, it was carried a meeting with the people that answered the survey: quality head manager, executive manager or equivalent functions inside the company.

As the survey was sent to the host and meeting attendees before, some of the companies have already answered the questions to facilitate the task. All the questions are opened answer questions, which made possible to conduct the survey as a conversation between the various attendees. In other cases, after the meeting for answering the survey, the company sent the survey approved by the corporative office.

After the recordings of the meetings were transcribed, and the information about the practices of each company was linked with all the questions and criteria. This method seemed to be the most appropriate.

[12] AFIA - ***A**ssociação de **F**abricantes para a **I**ndústria **A**utomóvel* (Association of the Producers for the Automotive Industry)

3.5. RESULTS ANALYSIS

After the collection of all the answers with the practices in every company, the data were analysed. Due to confidentiality issues, during the analysis and discussion of the results, the names of the companies were codified, maintaining the nationality to allowing possible country correlations. The code with "S" stands for the Swedish companies as S1, S2, S3, S4 and the code "P" stands for the Portuguese companies as P1, P2, P3, P4.

The analysis of the results was done according to the "Assessment Methodology" described earlier. The scoring was made by comparing the answers with each other and then scoring according to the 1 to 5 scale.

For each one of the criteria, a chart is presented, as showed in **FIG. 16** with the score of the Excellence Maturity of all the companies; a ternary diagram with the Balance of the Focus of the Excellence Pillars, as shown in **FIG. 17**; and the best practice of the criterion in question. In the end, it will be made a broader analysis of all the criteria.

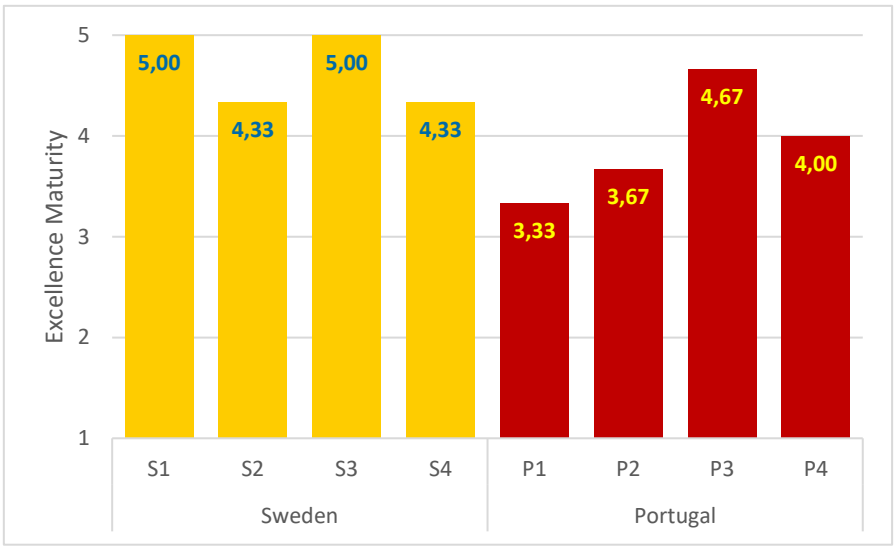


FIG. 16 Example of the chart with the Excellence Maturity

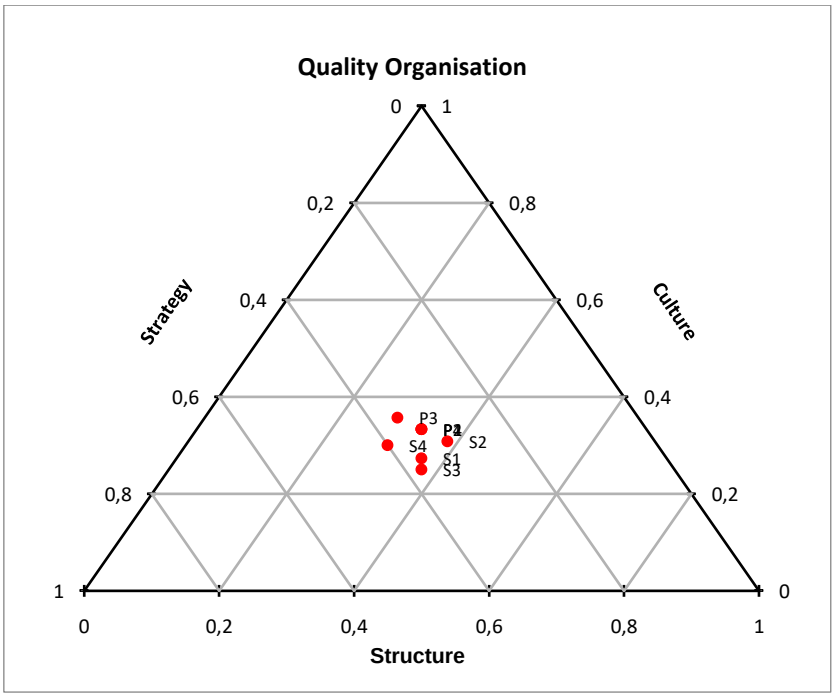


FIG. 17 Example of the ternary chart

3.5.1. PRESENTATION OF THE RESULTS TO THE COMPANIES

The conduction of a benchmarking study should lead to the implementation of the best practices that might result from that. For make it possible, this Master Thesis will be entirely available for the companies that make part of it.

Before the assessment, it was agreed with all the companies that, after the publication of this Master Thesis it will be sent a shorter report with the analysis of the results and with the best practices identified. The report that will be sent to the companies is presented in **APPENDIX C**. Along with this report, it should also go the reference for decode the name of the company in question. With this information, the company could compare its position and practices with the others and with the best practices without compromising the confidentiality and identity of all the companies. The Master Thesis will also be available for the companies for a deeper understanding.

CHAPTER 4
RESULTS ANALYSIS

4.1. CRITERIA DISCUSSION

4.1.1. QUALITY ORGANISATION

As showed in **FIG. 18**, five of the organisations have a final score higher than 4, which means that they have a well build Quality Organisation. Through the ternary diagram analysis, in **FIG. 19**, it is possible to conclude that it exists variation in focus on the deployment of the Excellence Pillars. The values are between 0,25 and 0,40. The Structure pillar was the one with a lower focus.

It is notable that the level obtained by the P1 and P2 organisations that is more than 1 point below the other companies.

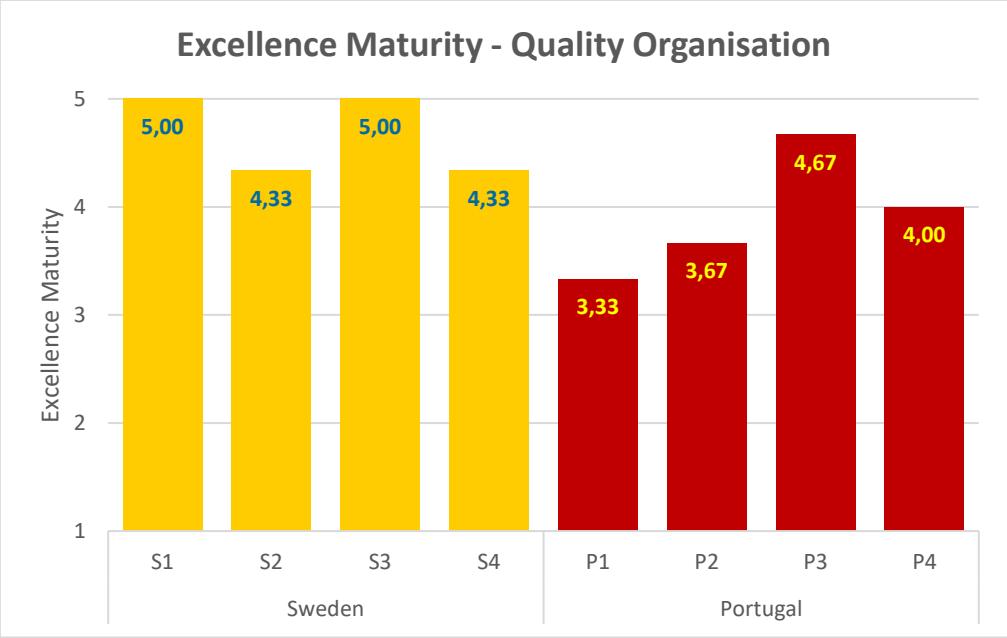


FIG. 18 Excellence Maturity - Quality Organisation



FIG. 19 Excellence Pillars Balance - Quality Organisation

BEST PRACTICES

- The executive managers drive the Quality focus at the governance level, the chief director of Quality Management reports directly to the COO or even to the CEO of the company, and they have the full support from the executive leadership;
- The CEO is the main booster of Quality and Excellence, having it deployed in every activity of the company. The tactics for quality deployment are concrete and applicable throughout the company structure. The final objective is to have Quality present in the entire organisation and every action of the employees, suppliers, customers, etc.;
- The quality organisation isn't confined to the members of the "Quality Team/Department" but spread in the entire company. All the employees have the responsibility for taking care of quality in their tasks. In each team (from shift team to executive management) there is a qualified person in the field of the quality policies of the company, regarding the working issue of the group, this person could be an operator with and better quality training or awareness.

4.1.2. CERTIFICATION AND AWARDS

As showed in **FIG. 20**, excepting the company P1, all the companies have a good final score, that is higher than 4, and the balance between the focus in the Excellence Pillars showed in **FIG. 21**, is very well distributed, being between 0,28 and 0,39.

The company P1 has a lower criterion score of 3,67 that is almost 1,5 points below the best in class company. The Structure pillar was the one with a smaller focus.

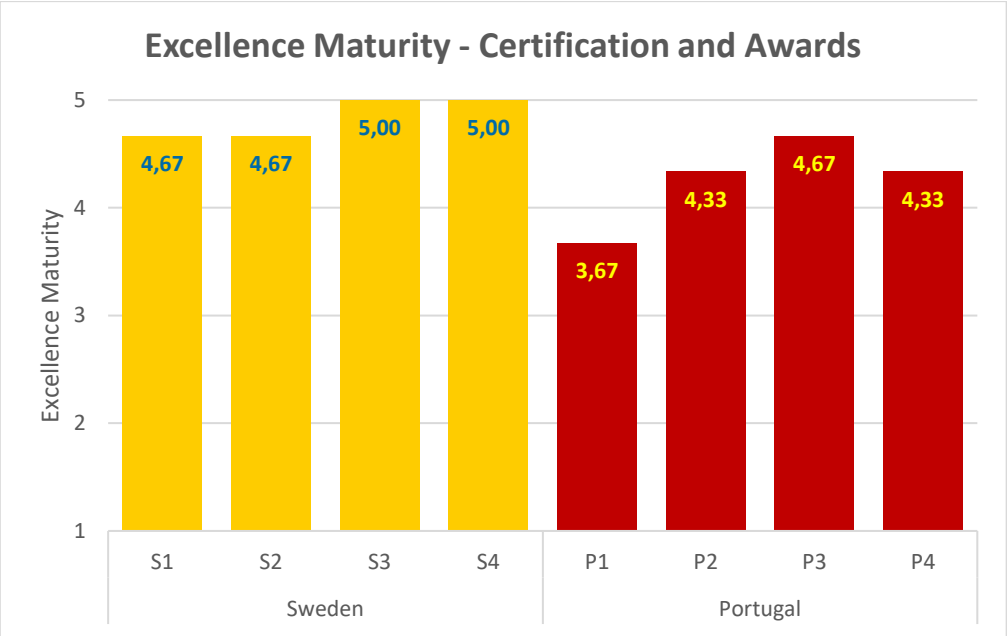


FIG. 20 Excellence Maturity - Certification and Awards

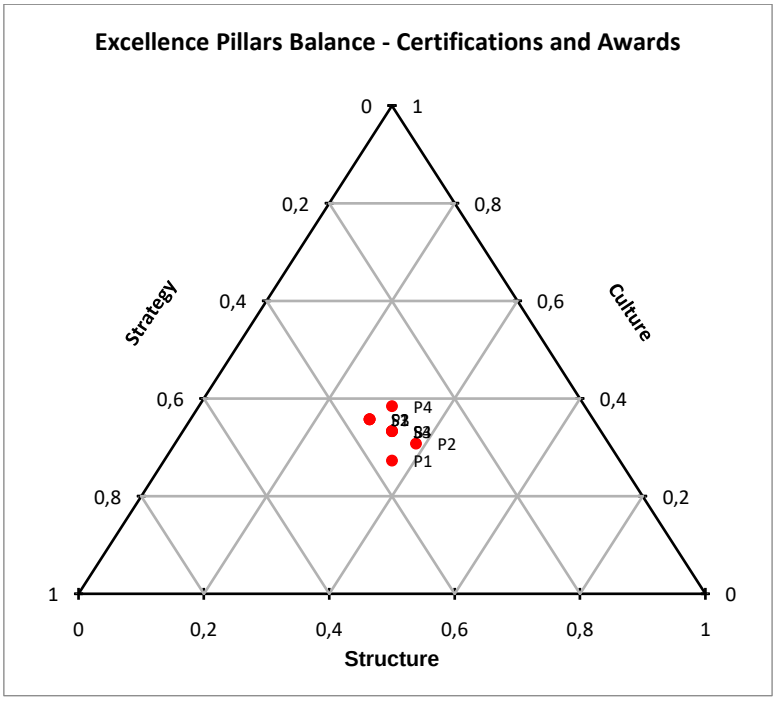


FIG. 21 Excellence Pillars Balance - Certifications and Awards

BEST PRACTICES

- It is mandatory to have the standards ISO 9001 or IATF 16949, ISO 14001, certification EMAS and OSHAS 18001;
- There is a company that has been distinguished with Excellence Awards.

4.1.3. LEADERSHIP

The Swedish companies have a similar score, higher than 4,6, compared with the Portuguese companies score, as shown in **FIG. 22**.

The companies P1 and P2 have a shallow score being 2,00 and 2,33, respectively. With the analysis of the ternary chart, in **FIG. 23**, it is possible to conclude that the company P1 has a lack of focus in the development of the Culture and a substantial focus on the development of the Structure. For the company P2 is visible a stronger focus on the Strategy. Both companies should balance the focus on the Excellence Pillars for having sustainable leadership.

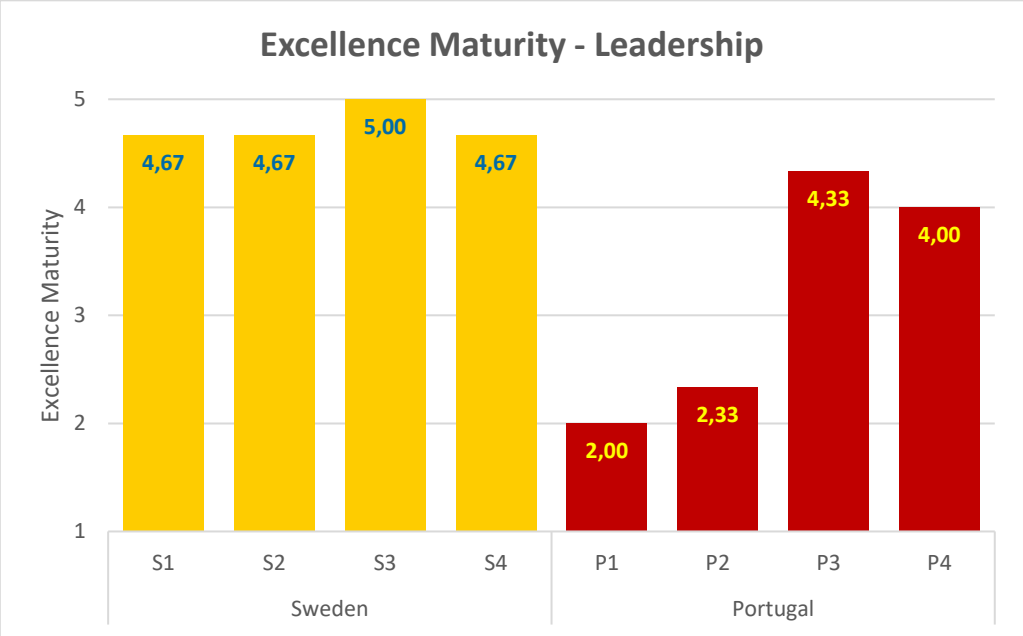


FIG. 22 Excellence Maturity - Leadership

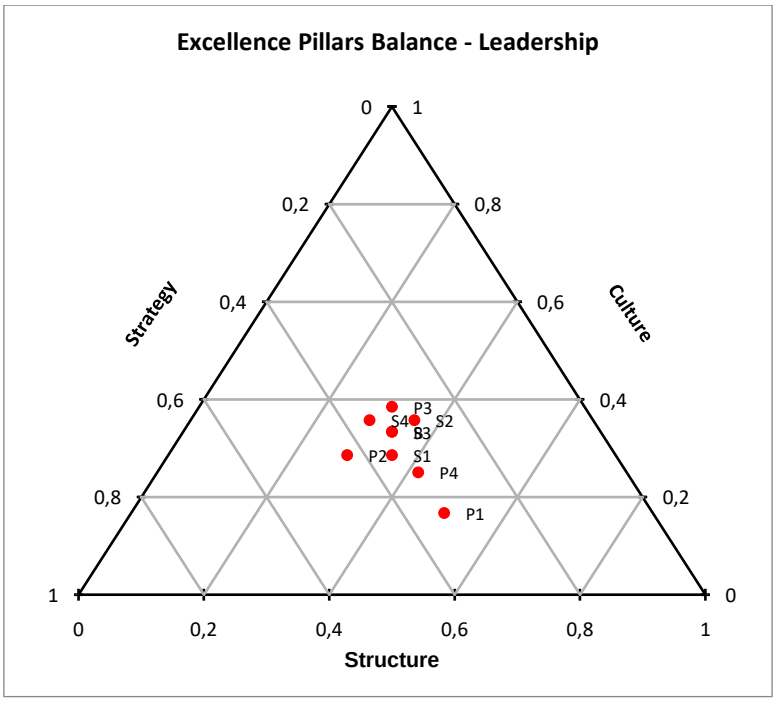


FIG. 23 Excellence Pillars Balance - Leadership

BEST PRACTICES

- The executive management is wholly committed with quality, continuous improvements and excellence for the entire organisation. For this, it is developed a strong Quality Culture that is present in all the management activities and levels, and it is also instilled by the middle managers in every employee. The necessity of this culture is to guarantee the presence of the Quality in each task that is made by the operators and each decision that is taken by the top managers. So, they ensure continuous improvement and excellence;
- The custom build structure also supports the Quality Culture;
- The leadership is also compromised in thinking with a long-term perspective and define strategies and goals for the future. For that, the leadership needs to drive the provision of an excellent product and service to the customers and establish useful and mutually beneficial partnerships with the employees, suppliers and society.

4.1.4. EMPLOYEE

As showed in **FIG. 24**, the Swedish companies have a similar score, higher than 4,6. The companies P1 and P2 have a low score between 2,67 and 3,33.

The balance between Excellence Pillars, **FIG. 25**, is quite good, being between 0,29 and 0,40.

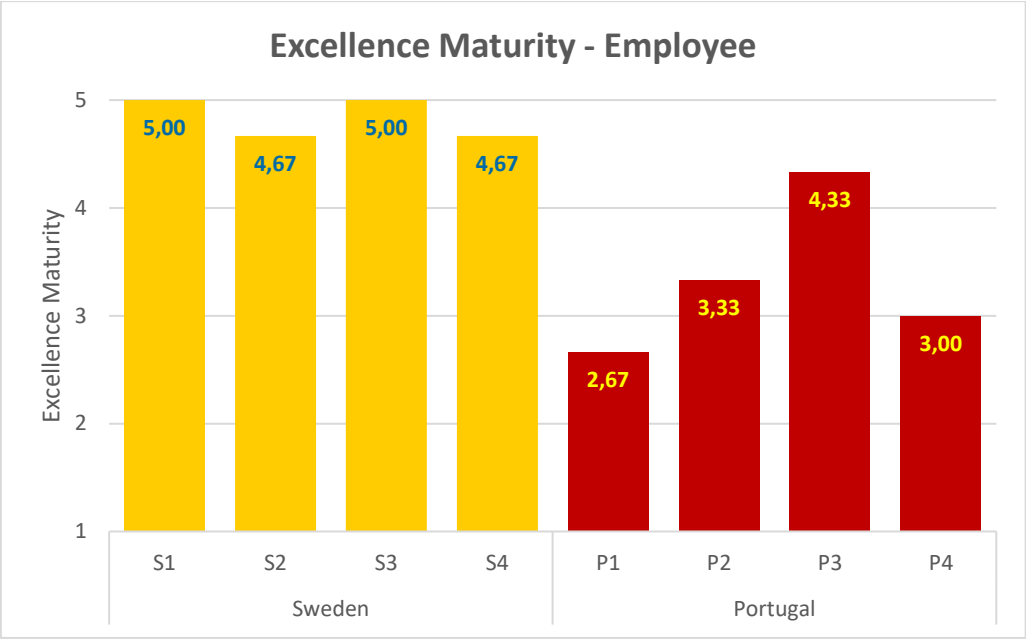


FIG. 24 Excellence Maturity - Employee

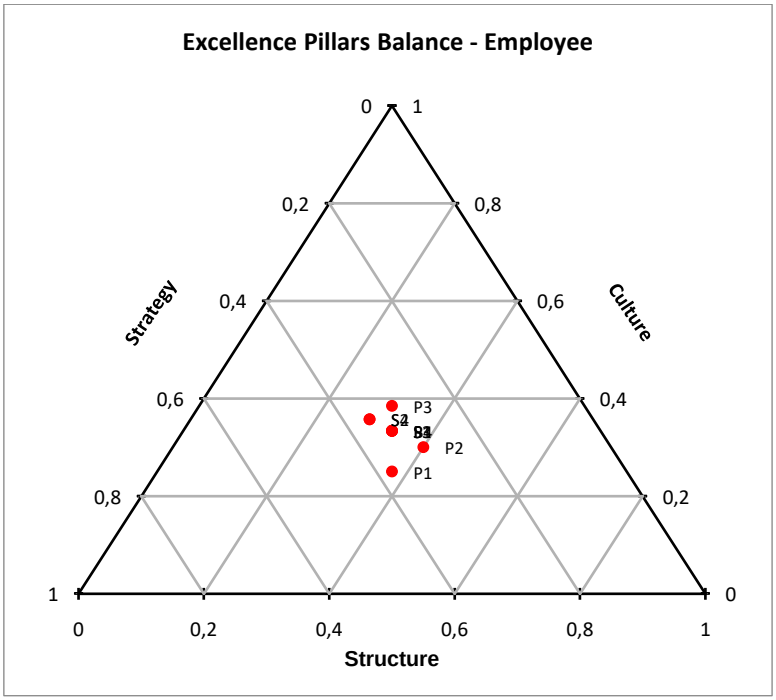


FIG. 25 Excellence Pillars Balance - Employee

BEST PRACTICES

- All the employees are very capable of the task they are doing, and the processes are very well known. For this, the employees need to have the training and precise instructions for how to make the task. Also, the procedures must be simple and error-proof. The employees are aware of the Quality Culture and think in continuously improve the tasks;

- Workers must have the needed and best technical skills. For the Quality Culture that the leadership pursue, all the employees are involved and make part of it, so beyond the technical skills, it is essential to have managerial skills too. All the managers, even the small team managers, receive training for managing and dealing with the team and in quality and continuous improvement. With this training, provided by higher managers or specialists, employees become aware of quality policies, driven from the leadership. So, they can manage the teams in the best way considering the principles: take care of the employee satisfaction (besides the regular surveys that are made); never blame an operator for a problem or mistake that might happen; all the employees and teams are involved, and all the actions are transparent;
- The employees are aware of the continuous improvement and give the right feedback about the mistakes and problems, suggestions for improvements in their tasks. The operators solve the issues and offer ideas that might come up in the production's lines. Only if the problem persists, a specialist from the Manufacturing Engineering division, is requested to help.

4.1.5. CUSTOMER

All the companies had a good score, being higher than 4,50 and the Swedish companies have a 5,00 score, the maximum, as shown in **FIG. 26**. The ternary chart, in **FIG. 27**, shows a very balanced focus on the Excellence Pillars. It is possible to conclude that the development of this criterion is conducted in a very sustainable way.

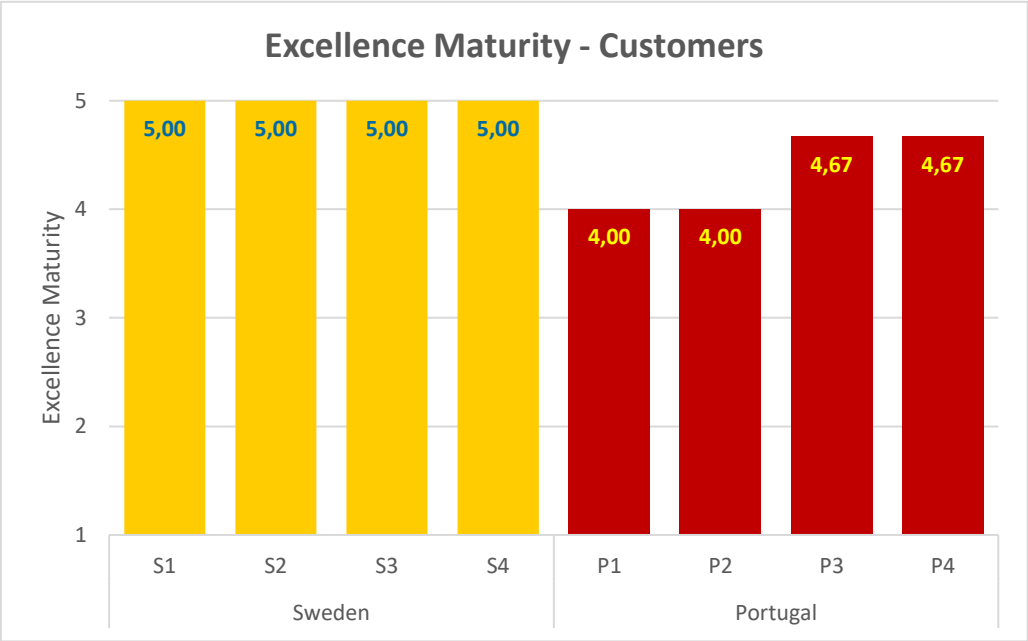


FIG. 26 Excellence Maturity - Customers

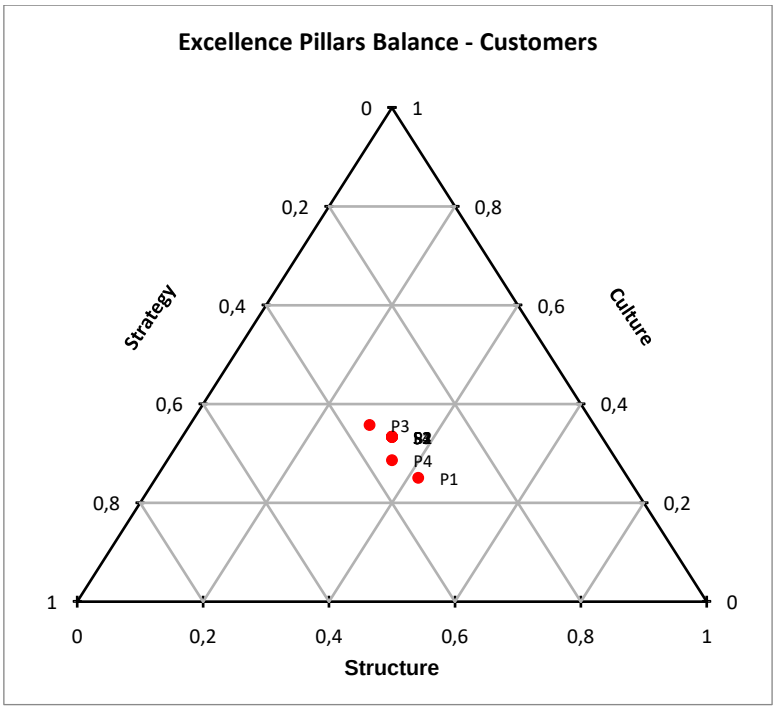


FIG. 27 Excellence Pillars Balance - Customers

BEST PRACTICES

- The leadership define strategies to make sure that each employee is aware that the final products are for customers/people, and their wants must be fulfilled;
- Collect essential data from each customer. Audit every customer satisfaction, and it's continuously asking for feedback and product performance and relate this with customer loyalty;
- All the information is treated and provided to the team that has an interest in it, from the product design and development to the shop floor operators. The team could use to evaluate if the job they make contribute to customer satisfaction and is used to improve the products or processes;
- The collected information is used by the development teams to improve the products. It is also essential to introduce and develop new/disruptive changes and technologies in the final products. It is common to have some selected customers to analyse the ideas of the developers and to evaluate the products before going to market.

4.1.6. SUPPLIERS

The S2, P1 and P2 have a low score, as shown in **FIG. 28**. With the analysis of the ternary diagram, in **FIG. 29**, it is possible to conclude that the S2 company need to focus more on the development of the culture with the suppliers.

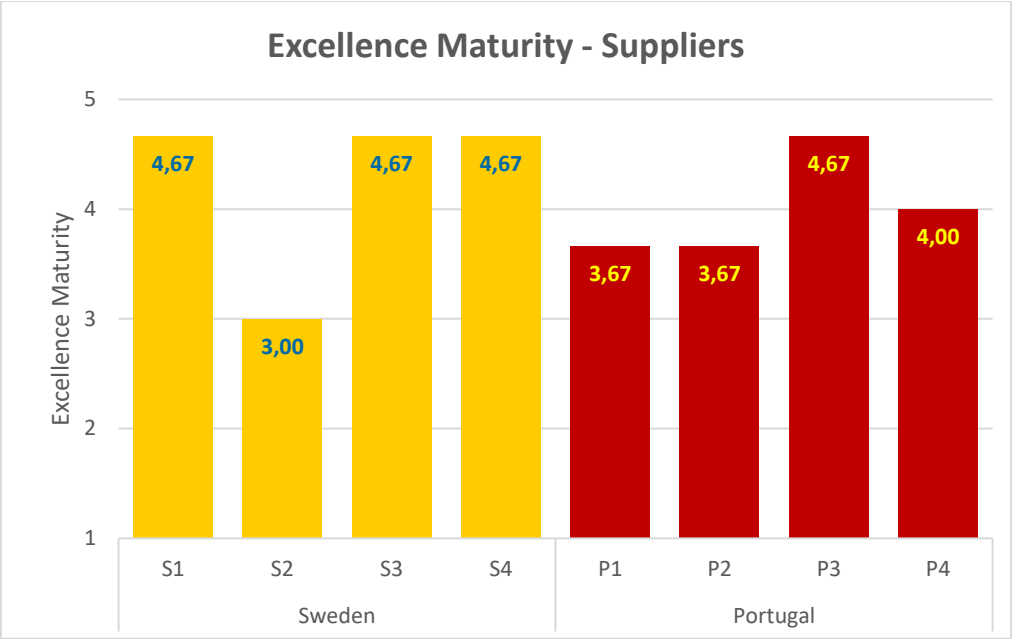


FIG. 28 Excellence Maturity - Suppliers

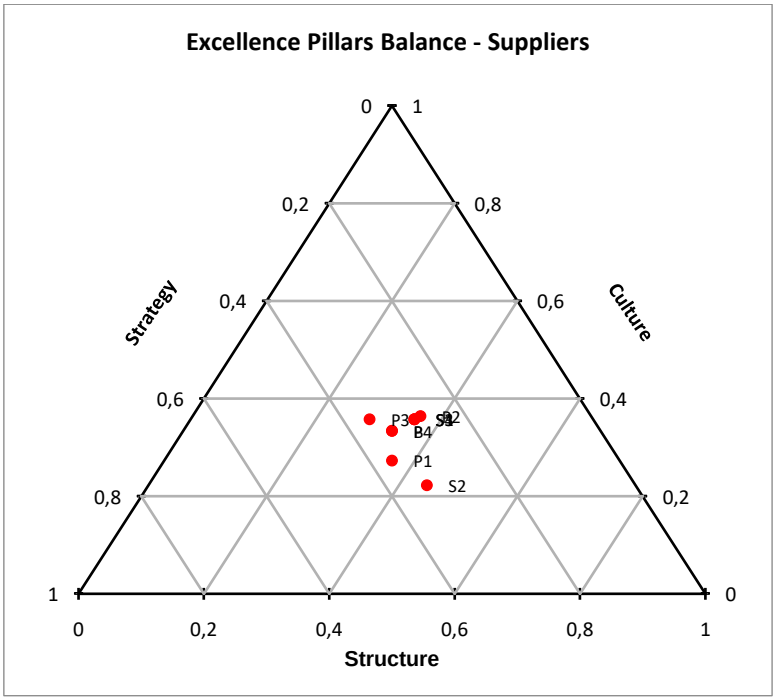


FIG. 29 Excellence Pillars Balance - Suppliers

BEST PRACTICES

- The suppliers are certified according to ISO 9001 and ISO 14001. For the suppliers that aren't certified, the company helps them in this process;
- The company has a well-defined and public suppliers' policy, a selection methodology and an audit methodology;
- Regular visits are scheduled to maintain a close relationship with the suppliers;

- The company invites the suppliers when they have training sessions or seminars for the employees about quality, quality management and excellence;
- For maintaining a mutually beneficial relationship, the company deploys a Supplier Development Plan.

4.1.7. KNOWLEDGE AND TRAINING

As showed in **FIG. 30**, the companies have a high score, above 4, except P1 company that has a score of 3,33. With the analysis of the ternary diagram, in **FIG. 31**, it is concluded that exists the right balance between the Excellence Pillars; the balance is between 0,27 and 0,36.

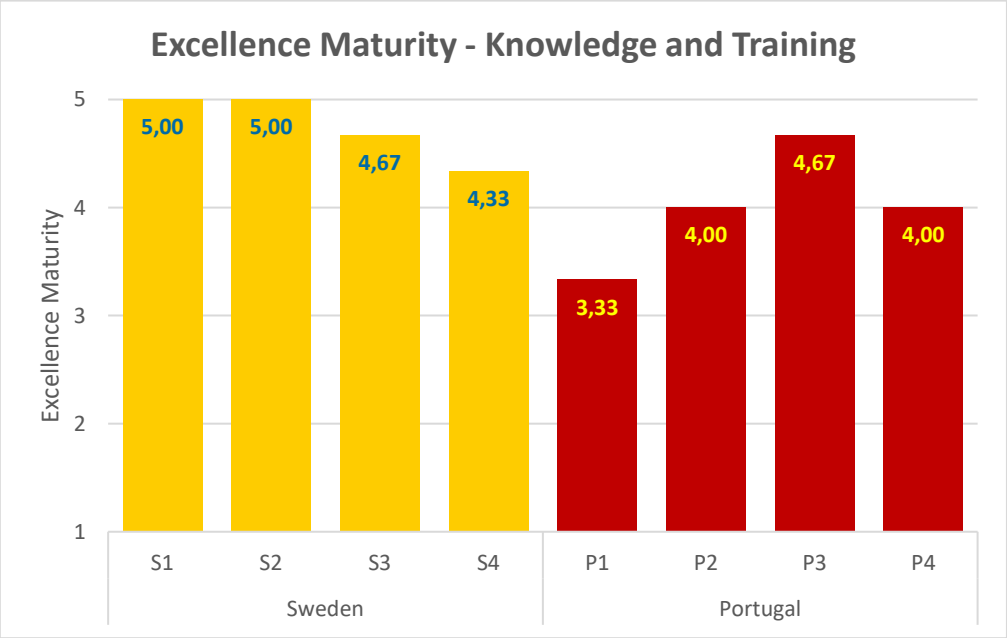


FIG. 30 Excellence Maturity - Knowledge and Training



FIG. 31 Excellence Pillars Balance - Knowledge and Training

BEST PRACTICES

- Beyond the necessary training, the employees are a Lean Six Sigma White Belt and have regular Quality Management training;
- Every employee and operator must up three levels of autonomy for the process that they are doing. For upgrading the level, they fulfil a practical and theoretical exam;
- From the team and shift managers to the executive managers, all have regular management, soft skills and quality training and are examined according to these skills;
- The company establish partnerships with institutes, universities for developing research programs to import innovation.

4.1.8. PROCESSES

As showed in **FIG. 32**, all the Swedish companies have the maximum score on this criterion, and the P3 company also has an excellent score of 4,67. By analysing the ternary diagram, in **FIG. 33**, it is possible to conclude that it exists a right balance between the Excellence Pillars being between 0,29 and 0,40.

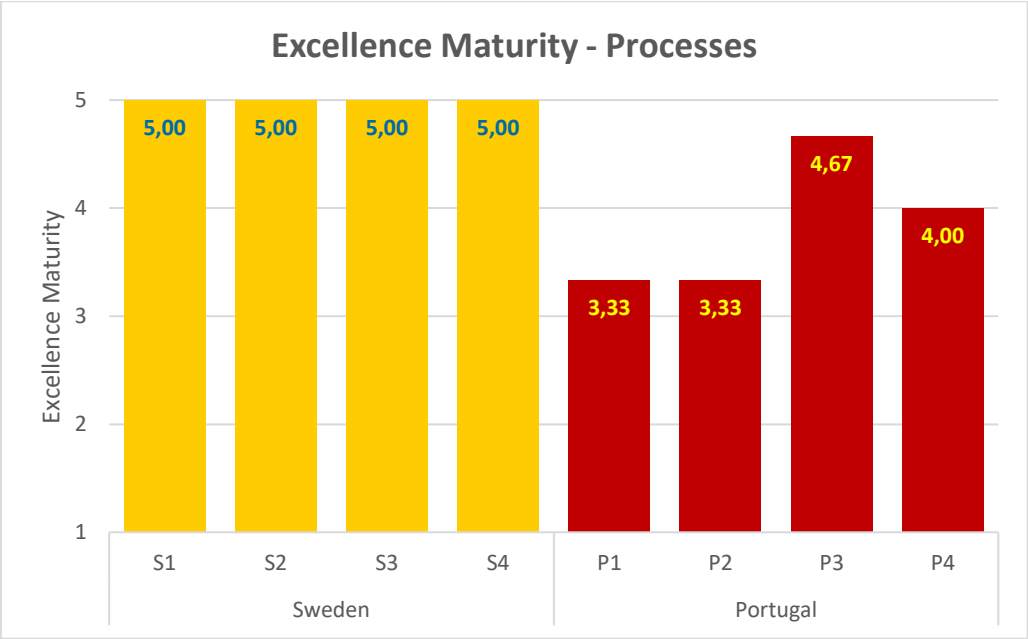


FIG. 32 Excellence Maturity - Processes

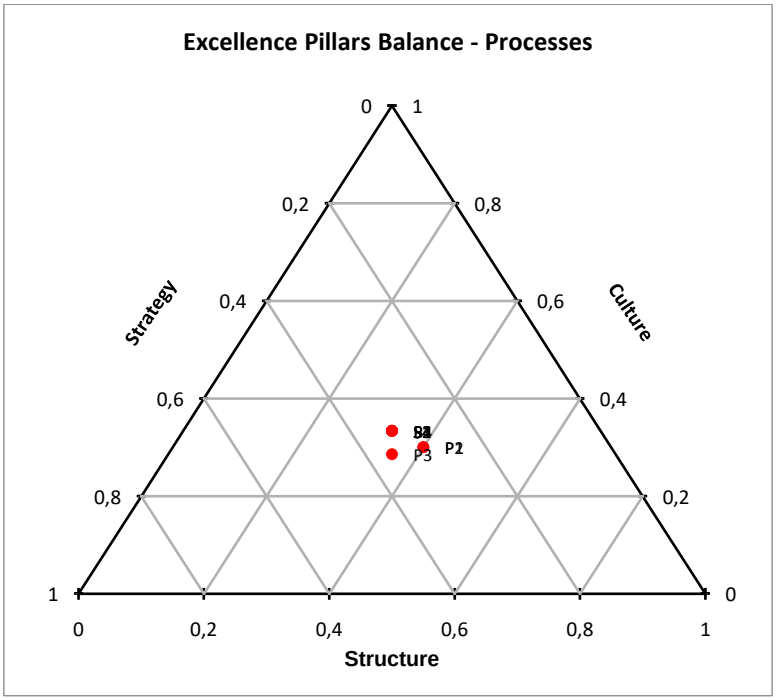


FIG. 33 Excellence Pillars Balance - Processes

BEST PRACTICES

- The Management System is based on a process approach. Not only the production processes but also all the methods from product development, financial management, to marketing, etc. have a well-defined way of doing every task. This management system also focusses on the deployment of the quality policies in the different functions of the company;

- The lean thinking, lean methodologies and tools are present in every task that the employees do, in every product and process development to minimise the waste. The most used tools are the Process Maps and Value Stream Maps;
- The company designs the processes with a lean flow and continuous flow thinking;
- The processes are controlled by the analysis of the KPI's. This analysis is automatic and in real-time. The KPI's are compared with the expected values. The processes are controlled under SPC methods;
- There are several following up meetings with the factory managers throughout the day for analyse the KPI's, plan and deploy the necessary actions. The executive managers are present in some of these meetings, at least once a week, or have an appropriated way of continuously check the KPI's of the production;
- Each process manager has a following up meeting with the operators every hour, and the company has the objective to stop with the following up meetings and allowing the process manager to make constant following up with the operators;
- The information is available for all the employees, a performance KPI analyses of each operator is done, and personalised corrective actions are implemented in case of bad results.

4.1.9. CONTINUOUS IMPROVEMENT

In this criterion, the Swedish companies and the P3 company have a very good score, as shown in **FIG. 34**. The balance of the Excellence Pillars illustrated in **FIG. 35**, is good being between 0,29 and 0,42.

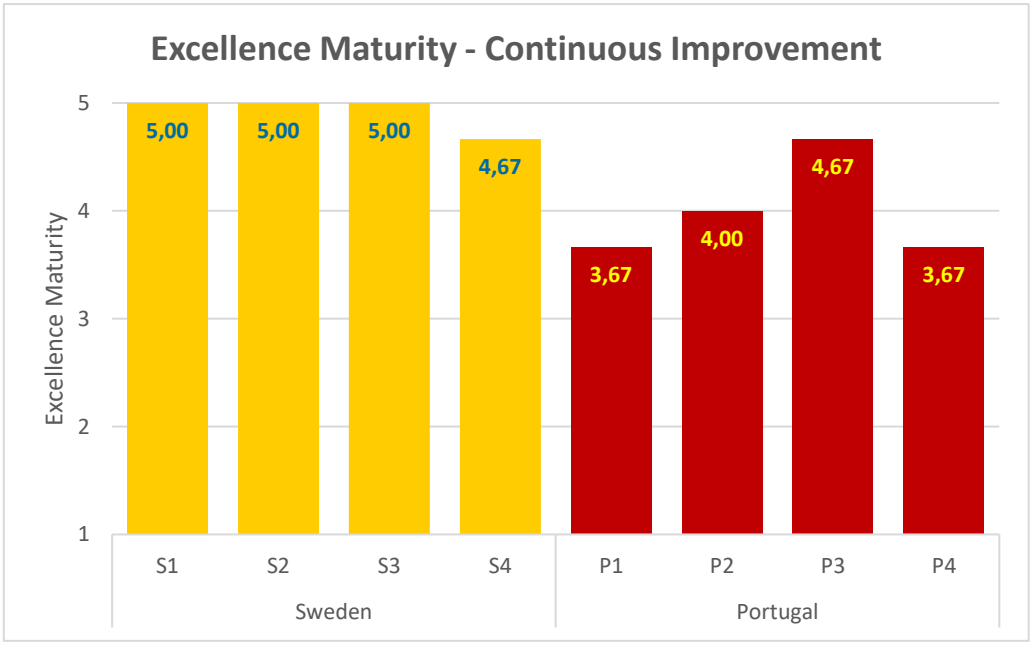


FIG. 34 Excellence Maturity - Continuous Improvement

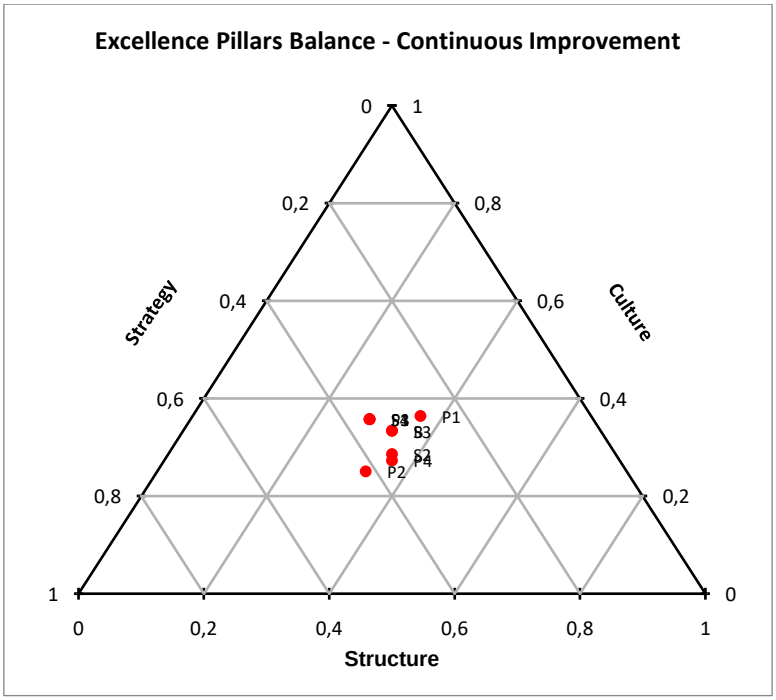


FIG. 35 Excellence Pillars Balance - Continuous Improvement

BEST PRACTICES

- It exists an internal procedure for the development of Continuous Improvement Projects, and this procedure could be triggered by an employee, KPI's and customer suggestions;
- Exists a writing official channel where every employee could suggest improvement actions and it should have an answer in 48h;
- In every following up meeting in the shop floor, the suggestions from the operators are registered to be analysed;
- The company has a particular organisation of the meeting schedules. If a problem or report from an operator doesn't get resolved by the engineering teams or all the management hierarchy, it is reported to the global executive management team in one week through noun urgent communication channels. There is a fast and agile reaction for solving the problem;
- The company involves the operators in the development of the continuous improvement projects and encourage the employees through compensations to suggest and enrol in continuous improvement actions;
- There are several coaches, with Lean Six Sigma training, that are included in the continuous improvement teams;
- All the continuous improvement projects and fast problem-solving situation are registered in the company informatic system and are followed by all the managers in the various factories around the globe and are discussed in the weekly quality

managers global meetings. When an improvement is made, and the project ends, the other factories are obliged to implement the same improvement.

4.1.10. RESULTS

As showed in **FIG. 36**, the companies have a good score except for the P1 and P2. By the ternary diagram, in **FIG. 37**, we can conclude that the Excellence Pillars are balanced, having a balance between 0,27 and 0,40.

No company had a score of 5, which means there is room for improvement in the quality results and the influence of the quality.

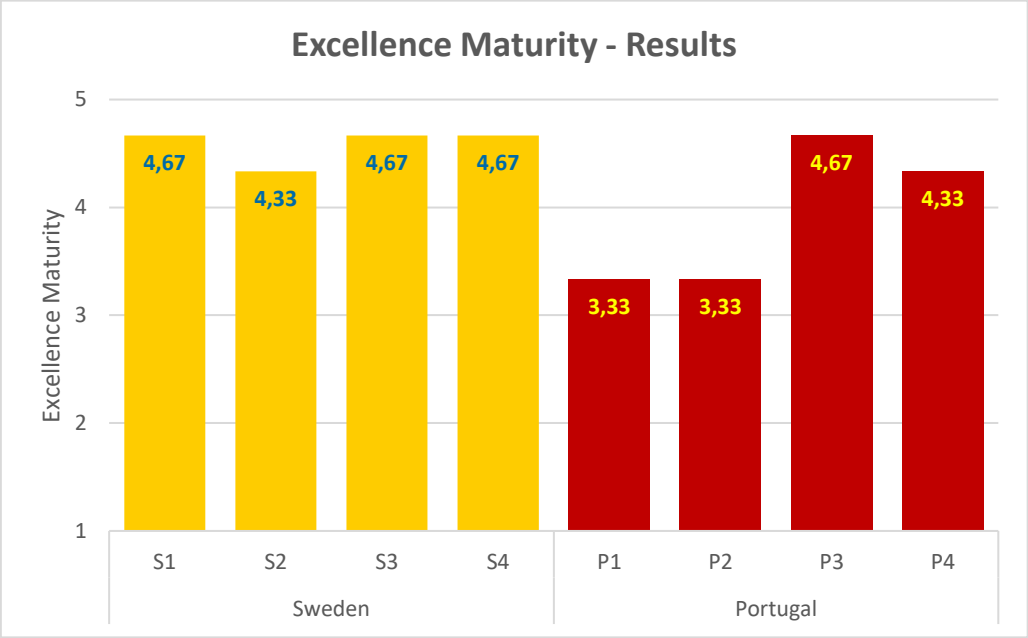


FIG. 36 Excellence Maturity - Results



FIG. 37 Excellence Pillars Balance - Results

BEST PRACTICES

- The results are measured according to the goals defined in the strategic plans, the main measures are available for the employees and are registered in various types of wallboards;
- The company measures:
  - Financial results
  - Customer satisfaction and claims
  - Employees satisfaction and happiness
  - Supplier satisfaction
  - OEE[13]
  - Processes efficiencies
- The company makes internal audits and assessments according to excellence and management models.

4.2. EXCELLENCE MATURITY LEVEL DISCUSSION

According to the chart on **FIG. 38**, the Swedish companies have a higher organisational excellence level. For enhancing their level, the companies must work in developing the Suppliers and Results criteria where they have lower scores. Generally speaking, the Portuguese companies have a lower organisational excellence score. Except for the P3,

[13] OEE - **O**verall **E**quipment **E**fectiveness

the Portuguese companies need to focus on the improvement of the Quality Organisation, Leadership, Employee and Results criteria.

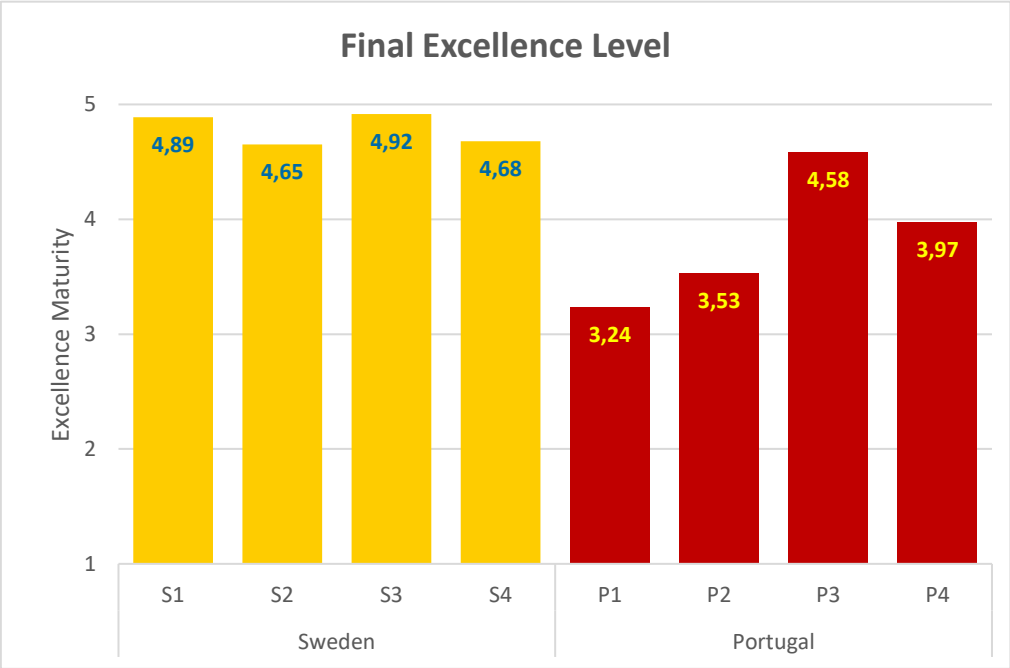


FIG. 38 Final Excellence Level

CHAPTER 5
CONCLUSIONS

In this master thesis project, instead of using one of the several organisational excellence models available it was used a tailored benchmarking model (Sörqvist & Bergendahl model) based on the TQM principles, the new SIQ Management Model and the EFQM Excellence Model. The information about the SIQ Management Model was quite poor, probably due to this model has been recently published, only in February of 2019. This model also revealed to be more straightforward and more objective in comparison with the EFQM Excellence Model.

The proposed model allowed to address the organisational excellence by base it on the balance of the three Excellence Pillars: Strategy, Culture and Structure. The balance of the Excellence Pillars revealed to be a powerful concept, but the methodology for assessing and scoring should be simpler and should be much more objective.

The open answer survey applied during the visits to the companies, allowed to assess the practices related to each of the ten criteria. The practices with a higher score were selected as “best practices” for being shared within the companies.

By comparing the results of the Swedish and Portuguese companies is concluded that the first ones have a higher organisational excellence maturity and a better-balanced Excellence Pillars. Globally, the Portuguese companies have a lower organisational excellence maturity, and the excellence pillars are unbalanced, with a more significant focus on Structure one. The Portuguese companies should focus, with priority, on the improvement of the Quality Organisation, Leadership, Employee and Results criteria.

The main obstacle of this project was my lack of knowledge and practice in organisational excellence and management field, and this difficulty was overtaken with a literature review and with personalised training in Sandholm Associates.

In Portugal, there were some difficulties with the contact of the companies, that was overtaken. Anyhow the benchmarking model should be validated with more organisations.

For future studies, it would be appealing make the same study a few years from now to see the tendency of the organisational excellence level and which practices have changed.

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APPENDIX

APPENDIX A LIST OF THE PORTUGUESE AUTOMOTIVE MANUFACTURERS THAT EXPORTED TO SWEDEN IN 2017

NAME	ACTIVITY
AFN, LDA	----
ALVA CONFECÇÕES, SA	Airbags, seatbelts
ANTÓNIO FERREIRA RITO & FILHOS, LDA	----
APTIVPORT SERVICES, S.A.	Software and computing platforms for automotive
ASPOCK PORTUGAL, SA	Lighting systems for cars and trucks
B&T ARVORENSE, LDA	Bodies and Tippers for Trucks
BASCONTRIZ-ACESSÓRIOS E COMPONENTES PARA CARROÇARIAS, LDA	----
BORGWARNER EMISSIONS SYSTEMS PORTUGAL, UNIPESSOAL LDA	Production Plant: Emissions & Thermal Systems
CAETANO COATINGS	Automotive components coating
CAETANOBUS - FABRICAÇÃO DE CARROÇARIAS, SA	Body and Bus assembly
COINDU, COMPONENTES PARA A INDÚSTRIA AUTOMÓVEL, SA	Leather Car Interiors
CONTINENTAL MABOR	Tiers
COPEFI	Injected Plastic components
COPO TEXTIL	Leather Car Interiors
COURO AZUL	Leather Car Interiors
CRUZ MARTINS & WAHL	Casting
DALPHI METAL ESPAÑA, S.A.	From ZF Group - Passive Safety Systems
DELPHI POWERTRAIN SYSTEMS PORTUGAL, S.A.	Injection, starters, etc
DF - ELASTOMER SOLUTIONS LDA	Rubber and elastomers
DURA AUTOMOTIVE PORTUGUESA - INDUSTRIA DE COMPONENTES PARA AUTOMÓVEIS LDA	Production of Car Components and Systems in lightweight materials/metals
DURIT CAST	Casting
FAB	Aluminium Casting

FABOR	Rubber components
FABRISCAPE-FABRICA DE ESCAPES PARA AUTO-MOVEIS LDA	----
FEHST - COMPONENTES LDA	Interior plastic components
FICO CABLES - FÁBRICA DE ACESSÓRIOS E EQUI-PAMENTOS INDUSTRIAIS, LDA	Electric/information cables/wires for automotive
FUNDÍNIO, S.A.	Aluminium high pressure die casting
GESTAMP VENDAS NOVAS, UNIPESSOAL LDA	Presses sheet metal components
GRUPO PR	Various
HHO PLUS, LDA	----
HUF PORTUGUESA-FABRICA DE COMPONENTES PARA O AUTOMOVEL, UNIPESSOAL LDA	Locks and door handles, locks for steering wheel column
HUTCHINSON (PORTO) - TUBOS FLEXÍVEIS, SOCI-EDADE UNIPESSOAL LDA	Fluid, sealing systems
I.M., INAPAL METAL, SA	Sheet metal components
INAPAL PLASTICOS SA	Plastic and composite car components
INDÚSTRIAS METÁLICAS VENEPORTE, SA	Exhaust system
IRMÃOS MOTA - CONSTRUÇÃO DE CARROÇARIAS, S.A.	Body and Bus assembly
J. ANTONIO DA SILVA LDA	Shafts, rods for motorcycles
JETESETECAR-EQUIPAMENTOS AUTO LDA	----
KATHREIN AUTOMOTIVE GMBH & CO.KG	Car Antenna Systems
KIRCHHOFF	Forming and joining metal components
LEONISCHE PORTUGAL - INDUSTRIA DE CABELA-GENS LDA	Electric/information cables/wires for automotive
PREH PORTUGAL, LDA	Electronic systems for car controlling and connec-tion
ROFEL - INDÚSTRIA METALÚRGICA DE ÁGUEDA LDA	----
SAKTHI PORTUGAL, SA	Foundry Car components - Cast Iron
SIMSEG-COMPONENTES PARA MOTORES LDA	Castings
SOCIEDADE IRMÃOS MIRANDA, SA	Lighting systems for cars and trucks
TECNOCABEL - COMPONENTES ELÉCTRICOS LDA	----
VOLKSWAGEN AUTOEUROPA, LDA	Automobile Assembly
YAZAKY SALTANO	Electric components

APPENDIX B IDENTIFICATION OF THE COMPANIES

Volvo Cars

a. **Name:**

Volvo Cars Group

b. **Products:**

Passenger Cars

c. **Supply Chain level (Original Equipment Manufacturer, Tier 1, 2 or 3):**

Original Equipment Manufacturer

d. **Quantity of products/revenue per year:**

642 253 cars in 2018
23 901 M€ (252 663 MSEK) in 2018

e. **Percentage of production for the automotive industry:**

100% for the automotive industry

f. **Number of employees:**

43 000 employees

g. **Extra Information:**

Volvo Cars is a passenger car manufacturer focused on the high end, secure and quality cars. It was founded in 1927 in Gothenburg – Sweden.

Since 2010 that is owned by Zhejiang Geely Holding Group, a Chinese holding, since this change Volvo Cars is in a fast-growing, having doubled his employee in almost six years and opened new facilities in two different countries. Volvo Cars have its primary facilities located in Sweden, but the global presence is more significant, having facilities in Belgium, China and the US.

Joining the fast grow, Volvo Cars is developing and deliver disruptive new services and products that change the car ownership and usage mindset to attend the customer needs. For this, it had created new brands and partnerships to provide these new services and products.

Scania

a. **Name**

Scania Group

b. **Products**

Road and heavy transport trucks, buses and engines for industrial and marine applications

c. **Supply Chain level: Original Equipment Manufacturer, Tier 1, 2 or 3**

   OEM and Tier 1

d. **Quantity of products/revenue per year:**

   87 995 trucks, 8 482 buses, 12 809 engines in 2018
   12 974 M€ (137 126 MSEK) in 2018

e. **Percentage of production for the automotive industry**

   94% for the automotive industry

f. **Number of employees**

   52 103 employees

Sandvik Machining Solutions

a. **Name:**

   Sandvik Machining Solutions

b. **Products:**

   Manufacturing tools, machining solutions for the metalworking

c. **Supply Chain level (Original Equipment Manufacturer, Tier 1, 2 or 3):**

   OEM for the industry

d. **Quantity of products/revenue per year:**

   3 817 M€ (40 343 MSEK) in 2018

e. **Percentage of production for the automotive industry:**

   27% for the automotive industry in 2018

f. **Number of employees:**

   19 284 employees

g. **Extra Information:**

   Sandvik Machining Solutions is a business area of the Sandvik. Sandvik Machining Solutions introduces more than 2 000 new products every year, it is present in more than 150 countries, and it has more than 20 centres worldwide that offer customers, distributors, employees, educators and students' theory-based training, courses, seminars and live demonstrations.

ABB Robotics

a. **Name:**

   ABB Robotics and Discrete Automation

b. **Products:**

Manufacturing of robots, factory automation solutions and software for driving the solutions

c. **Supply Chain level (Original Equipment Manufacturer, Tier 1, 2 or 3):**

OEM and Tier 1

d. **Quantity of products/revenue per year:**

3 231 M€ (3 600 M$) in 2018

e. **Percentage of production for the automotive industry:**

45% for the automotive industry in 2018

f. **Number of employees:**

11 000 employees

g. **Extra Information:**

ABB Robotics is a business area of the Swedish and Swiss ABB Group. ABB Robotics is a leading supplier of industrial robots and robot software, equipment and complete application solutions. It is present in 53 countries, and it has installed more than 400,000 robots, supported by the broadest service network and offering in the industry.

CaetanoBUS

a. **Name:**

CaetanoBus – Fabricação de Carroçarias, SA

b. **Products:**

Manufacture of buses and coaches for city, airport, medium and long journeys and tourism

c. **Supply Chain level: Original Equipment Manufacturer, Tier 1, 2 or 3:**

OEM – Original Equipment Manufacturer

d. **Quantity/weight of products per year:**

400 to 600 buses/coaches per year but has a capacity for producing 840 buses per year

e. **Percentage of production for the automotive sector**

100% for the automotive industry

f. **Number of employees**

1 030 employees

g. **Extra Information**

CaetanoBus is a company owned by Salvador Caetano Group, a Portuguese automotive producer, distributor and seller that operates mainly in Portugal, Spain, Germany and England and Africa.

DF – Elastomer Solutions

a. **Name:**

DF – Elastomer Solutions, LDA

b. **Products:**

Rubber and rubber-to-plastic components produced by injection

c. **Supply Chain level: Original Equipment Manufacturer, Tier 1, 2 or 3:**

Tier 1 and Tier 2

d. **Quantity of products/revenue per year:**

114 million parts in 2018

e. **Percentage of production for the automotive industry**

100% for the automotive industry

f. **Number of employees**

483

g. **Extra Information**

Founded as Diehl – Fapobol in 1994 in Portugal. Currently has an additional production plants in Slovakia, Morocco and Mexico.

INAPAL Plásticos, SA

a. **Name:**

INAPAL Plásticos SA – Leça do Balio

b. **Products:**

Manufacture of components and systems in thermosetting composite materials and thermoplastics, module assembly and sequencing.

c. **Supply Chain level: Original Equipment Manufacturer, Tier 1, 2 or 3:**

Tier 1 and Tier 2

d. **Quantity of products/revenue per year:**

585 670 parts/year in the facility in Leça do Balio

e. **Percentage of production for the automotive industry**

95% for the automotive industry

f. **Number of employees**

325 employees

g. **Extra Information**

INAPAL Plásticos was a 100% family company that was recently acquired by the Teijin Group, a Japanese industrial group. Currently, the company is under significant management changes due to this recent transition.

Sakthi Portugal

a. **Name:**

Sakthi Portugal SA

b. **Products:**

Critical safety components in nodular iron for the automotive industry and machining of these components

c. **Supply Chain level: Original Equipment Manufacturer, Tier 1, 2 or 3:**

Tier 1 and Tier 2

d. **Quantity of products/revenue per year:**

88 000 tons of cast iron components in 2018

118 M€ in 2018

e. **Percentage of production for the automotive industry**

100% for the automotive industry

f. **Number of employees**

750 employees

g. **Extra Information**

Sakthi Portugal is an enterprise owned by the Sakthi Group, an Indian conglomerate group. The company is under a significant expansion with the building of a production centre that holds an innovative “white and clean” cast iron foundry, an aluminium injection foundry and a machining and component assembly centre.

APPENDIX C FINAL ORGANISATION REPORT

U.PORTO FEUP FACULDADE DE ENGENHARIA UNIVERSIDADE DO PORTO

SANDHOLM ASSOCIATES

FINAL ORGANISATION REPORT

ORGANISATIONAL EXCELLENCE BENCHMARKING STUDY

SWEDISH AND PORTUGUESE ORGANISATIONS OF THE AUTOMOTIVE INDUSTRY

STUDY CONDUCTED UNDER THE DEVELOPMENT OF THE MASTER THESIS PROJECT - AUGUST 2019

AUTHOR

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SUPERVISION

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Faculty of Engineering of University of Porto - Portugal

Professor Lars Sörqvist
Sandholm Associates AB - Sweden
KTH - Royal Institute of Technology - Sweden

CONCERNING COMPANY

...

HOSTS:	DATE OF THE VISIT :
...	...
GUESTS:	**PLACE OF THE VISIT:**
...	...

THE COMPANY: ...
IS CODED AS: ...

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1. THE SURVEY

IDENTIFICATION OF THE ORGANISATION

- **a.** Name
- **b.** Products
- **c.** Supply Chain level: OEM, Tier 1, 2 or 3
- **d.** Quantity/weight of products per year
- **e.** Percentage of production/revenue for the automotive sector
- **f.** Number of employees
- **g.** Extra information

ORGANISATIONAL EXCELLENCE SURVEY

1. **Quality Organisation**
   - **a.** How is organised the structure of the Quality Management System of the company?
   - **b.** How is the focus for Quality on the executive level?
   - **c.** Which training/knowledge have the employees in the quality departments?
   - **d.** Which are the company policies?

2. **Certifications and Awards**
   - **a.** Which certifications of standards related to Quality System the company has?
   - **b.** Which awards related to Quality had the company received?

3. **Leadership**
   - **a.** How is the leadership committed with quality, continuous improvements and excellence?
     - **i.** Following up the quality and continuous improvement of managers on all levels
     - **ii.** Training in quality and continuous improvements on management level
   - **b.** How is quality/continuous improvement present in the strategies/goals defined by the leadership?
   - **c.** How the company project their future?
     - **i.** Long/short time perspective

4. **Employee**
   - **a.** How do you make sure of the awareness of quality, continuous improvements and the Quality Management System of each employee?
     - **i.** Training of employees in quality and continuous improvements
     - **ii.** Quality culture
   - **b.** How the company involve all the employees in the Quality Culture and Continuous Improvement?
     - **i.** Employee satisfaction
     - **ii.** Participation and involvement
     - **iii.** Recognition and compensation

iv. Ideas, creativity and suggestions

5. **Customer**
   a. Does the company have a policy in Customer focus?
   b. How the company develop this policy?
      i. Treatment of information about the customer's needs
      ii. Customer satisfaction and loyalty
   c. How the company involve the customers in the development of the products/needs?

6. **Suppliers**
   a. Which are the Suppliers Quality policies?
      i. Finding good suppliers
      ii. Assessing and auditing of suppliers
   b. How do you develop a long-term relationship with the suppliers?
      i. Following up suppliers
      ii. Partnership and improvement work
      iii. Suppliers satisfaction

7. **Knowledge and Training**
   a. Which are the standards for universal competence in quality and continuous improvements?
   b. How do you develop the training and knowledge of quality?
      i. Internal or external training
   c. How is the company involved in partnerships with universities and researchers?

8. **Processes**
   a. Does the company have a process-oriented policy?
   b. Which methods are used to define the processes?
      i. Process definition
      ii. Process maps
      iii. Value Stream Maps
      iv. Risk Management
   c. Which methods are used to control the processes?
      i. Measurements/KPI's and analysis of processes
      ii. Control of variations and SPC
   d. How the company incorporate the Lean flow and Lean thinking in the process?
   e. How is Quality present in the development of new products? Which methods are used to the development?
   f. How is Quality present in the other structures of all organisation?
      i. Market and selling
      ii. Manufacturing
      iii. Purchasing
      iv. Administration

9. **Continuous Improvement**
   a. How is the organisation of continuous improvement work (teams, cross-functional projects, etc.)?
   b. How do these teams/projects work? Which methodologies and tools, they use and have available?
      i. Employee participation
      ii. Roles and responsibilities
      iii. Coaches/facilitators (like Black Belts)
      iv. Improvement partnership with suppliers
      v. Use of Six Sigma
   c. What is the view of the leadership for continuous improvements?
      i. Improvement and quality culture
   d. How does the company deal with innovation?

10. **Results**
   a. How the company measure the results (financial, customer, processes, employee, suppliers, etc.)?
   b. How are the Improvement results?
   c. How the company measure the Quality results and the maturity of the Quality?
   d. How are the changes in effectiveness and efficiency?
   e. How the company analyse the results?

2. PARTICIPATING ORGANISATIONS

Swedish Organisations

- Volvo Cars
- Scania
- Sandvik Machining Solutions
- ABB Robotics

Portuguese Organisations

- Caetano BUS
- DF - Elastomer Solutions
- INAPAL Plásticos
- Sakthi Portugal

2.1. Identification of the companies

Volvo Cars

a. Name:

Volvo Cars Group

b. Products:

Passenger Cars

c. Supply Chain level (Original Equipment Manufacturer, Tier 1, 2 or 3):

Original Equipment Manufacturer

d. Quantity of products/revenue per year:

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e. Percentage of production for the automotive industry:

100% for the automotive industry

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g. Extra Information:

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Since 2010 that is owned by Zhejiang Geely Holding Group, a Chinese holding, since this change Volvo Cars is in a fast-growing, having doubled his employee in almost six years and opened new facilities in two different countries. Volvo Cars have its primary facilities located in Sweden, but the global presence is more significant, having facilities in Belgium, China and the US.

Joining the fast grow, Volvo Cars is developing and deliver disruptive new services and products that change the car ownership and usage mindset to attend the customer needs. For this, it had created new brands and partnerships to provide these new services and products.

Scania

a. **Name**

Scania Group

b. **Products**

Road and heavy transport trucks, buses and engines for industrial and marine applications

c. **Supply Chain level: Original Equipment Manufacturer, Tier 1, 2 or 3**

OEM and Tier 1

d. **Quantity of products/revenue per year:**

87 995 trucks, 8 482 buses, 12 809 engines in 2018
12 974 M€ (137 126 MSEK) in 2018

e. **Percentage of production for the automotive industry**

94% for the automotive industry

f. **Number of employees**

52 103 employees

Sandvik Machining Solutions

a. **Name:**

Sandvik Machining Solutions

b. **Products:**

Manufacturing tools, machining solutions for the metalworking

c. **Supply Chain level (Original Equipment Manufacturer, Tier 1, 2 or 3):**

OEM for the industry

d. **Quantity of products/revenue per year:**

3 817 M€ (40 343 MSEK) in 2018

e. **Percentage of production for the automotive industry:**

27% for the automotive industry in 2018

f. **Number of employees:**

19 284 employees

g. **Extra Information:**

Sandvik Machining Solutions is a business area of the Sandvik. Sandvik Machining Solutions introduces more than 2 000 new products every year, it is present in more than 150 countries, and it has more than 20 centres worldwide that offer

customers, distributors, employees, educators and students' theory-based training, courses, seminars and live demonstrations.

ABB Robotics

a. **Name:**

ABB Robotics and Discrete Automation

b. **Products:**

Manufacturing of robots, factory automation solutions and software for driving the solutions

c. **Supply Chain level (Original Equipment Manufacturer, Tier 1, 2 or 3):**

OEM and Tier 1

d. **Quantity of products/revenue per year:**

3 231 M€ (3 600 M$) in 2018

e. **Percentage of production for the automotive industry:**

45% for the automotive industry in 2018

f. **Number of employees:**

11 000 employees

g. **Extra Information:**

ABB Robotics is a business area of the Swedish and Swiss ABB Group. ABB Robotics is a leading supplier of industrial robots and robot software, equipment and complete application solutions. It is present in 53 countries, and it has installed more than 400,000 robots, supported by the broadest service network and offering in the industry.

CaetanoBUS

a. **Name:**

CaetanoBus - Fabricação de Carroçarias, SA

b. **Products:**

Manufacture of buses and coaches for city, airport, medium and long journeys and tourism

c. **Supply Chain level: Original Equipment Manufacturer, Tier 1, 2 or 3:**

OEM - Original Equipment Manufacturer

d. **Quantity/weight of products per year:**

400 to 600 buses/coaches per year but has a capacity for producing 840 buses per year

e. **Percentage of production for the automotive sector**

100% for the automotive industry

f. **Number of employees**

1 030 employees

g. **Extra Information**

CaetanoBus is a company owned by Salvador Caetano Group, a Portuguese automotive producer, distributor and seller that operates mainly in Portugal, Spain, Germany and England and Africa.

DF - Elastomer Solutions

a. **Name:**

DF - Elastomer Solutions, LDA

b. **Products:**

Rubber and rubber-to-plastic components produced by injection

c. **Supply Chain level: Original Equipment Manufacturer, Tier 1, 2 or 3:**

Tier 1 and Tier 2

d. **Quantity of products/revenue per year:**

114 million parts in 2018

e. **Percentage of production for the automotive industry**

100% for the automotive industry

f. **Number of employees**

483

g. **Extra Information**

Founded as Diehl - Fapobol in 1994 in Portugal. Currently has an additional production plants in Slovakia, Morocco and Mexico.

INAPAL Plásticos, SA

a. **Name:**

INAPAL Plásticos SA - Leça do Balio

b. **Products:**

Manufacture of components and systems in thermosetting composite materials and thermoplastics, module assembly and sequencing.

c. **Supply Chain level: Original Equipment Manufacturer, Tier 1, 2 or 3:**

Tier 1 and Tier 2

d. **Quantity of products/revenue per year:**

585 670 parts/year in the facility in Leça do Balio

e. **Percentage of production for the automotive industry**

95% for the automotive industry

f. **Number of employees**

325 employees

g. **Extra Information**

INAPAL Plásticos was a 100% family company that was recently acquired by the Teijin Group, a Japanese industrial group. Currently, the company is under significant management changes due to this recent transition.

Sakthi Portugal

a. **Name:**

Sakthi Portugal SA

b. **Products:**

Critical safety components in nodular iron for the automotive industry and machining of these components

c. **Supply Chain level: Original Equipment Manufacturer, Tier 1, 2 or 3:**

Tier 1 and Tier 2

d. **Quantity of products/revenue per year:**

88 000 tons of cast iron components in 2018

118 M€ in 2018

e. **Percentage of production for the automotive industry**

100% for the automotive industry

f. **Number of employees**

750 employees

g. **Extra Information**

Sakthi Portugal is an enterprise owned by the Sakthi Group, an Indian conglomerate group. The company is under a significant expansion with the building of a production centre that holds an innovative “white and clean” cast iron foundry, an aluminium injection foundry and a machining and component assembly centre.

3. RESULTS ANALYSIS

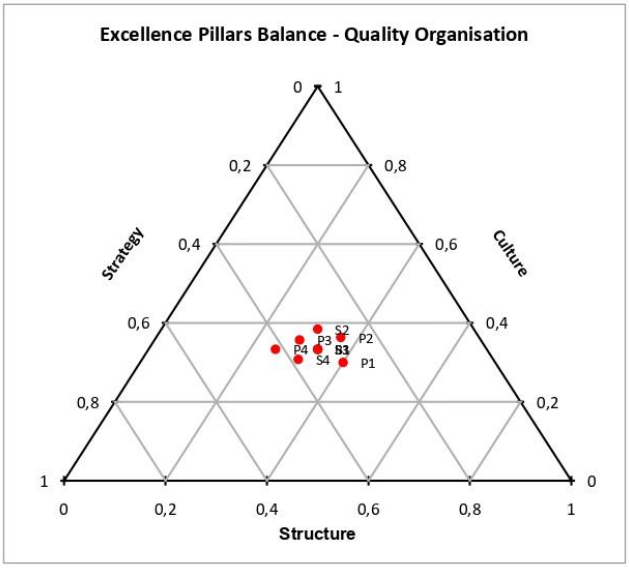
3.1. Criteria Discussion

3.1.1. Quality Organisation

Five of the organisations have a final score higher than 4, which means that they have a well build Quality Organisation. Through, the ternary diagram analysis, it is possible to conclude that it exists variation in focus on the deployment of the Excellence Pillars. The values are between 0,25 and 0,40. The Structure pillar was the one with a lower focus.

It is notable that the level obtained by the P1 and P2 organisations, that is more than 1 point below the other companies.





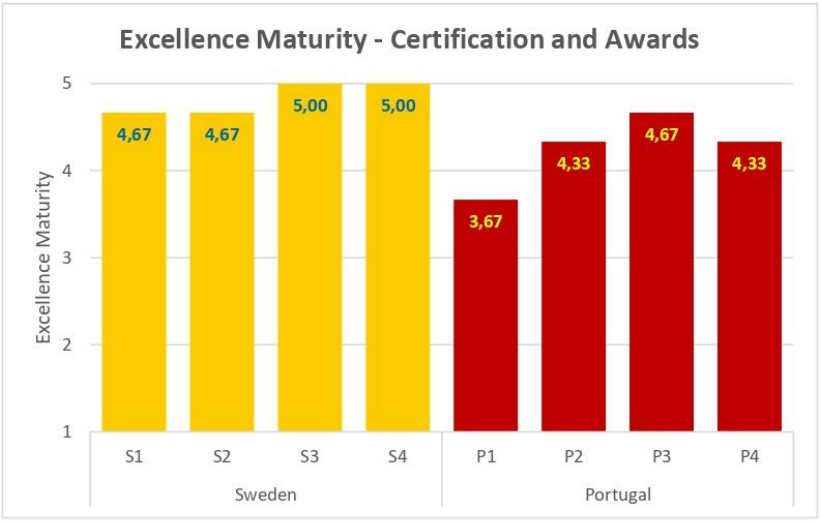
BEST PRACTICES

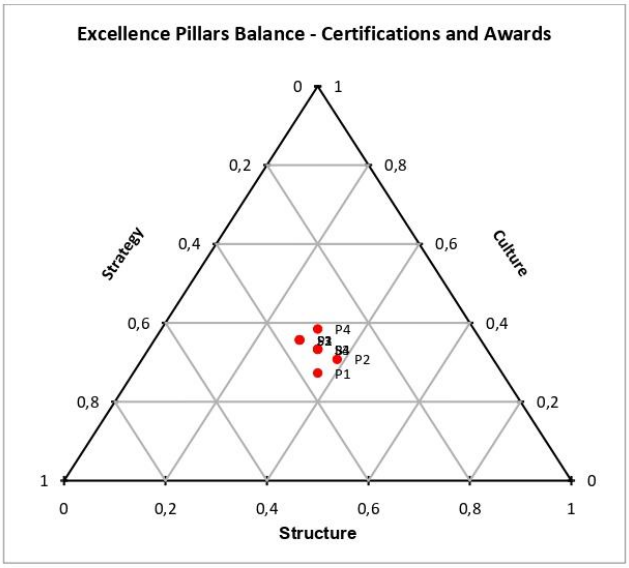
- The executive managers drive the Quality focus at the governance level, the chief director of Quality Management reports directly to the COO or even to the CEO of the company, and they have the full support from the executive leadership;
- The CEO is the main booster of Quality and Excellence, having it deployed in every activity of the company. The tactics for quality deployment are concrete and applicable throughout the company structure. The final objective is to have Quality present in the entire organisation and every action of the employees, suppliers, customers, etc.;
- The quality organisation isn't confined to the members of the "Quality Team/Department" but spread in the entire company. All the employees have the responsibility for taking care of quality in their tasks. In each team (from shift team to executive management) there is a qualified person in the field of the quality policies of the company, regarding the working issue of the group, this person could be an operator with and better quality training or awareness.

3.1.2. Certification and Awards

Excepting the company P1, all the companies have a good final score, that is higher than 4, and the balance between the focus in the Excellence Pillars is very well distributed, being between 0,28 and 0,39.

The company P1 has a lower criterion score of 3,67 that is almost 1,5 points below the best in class company. The Structure pillar was the one with a smaller focus.





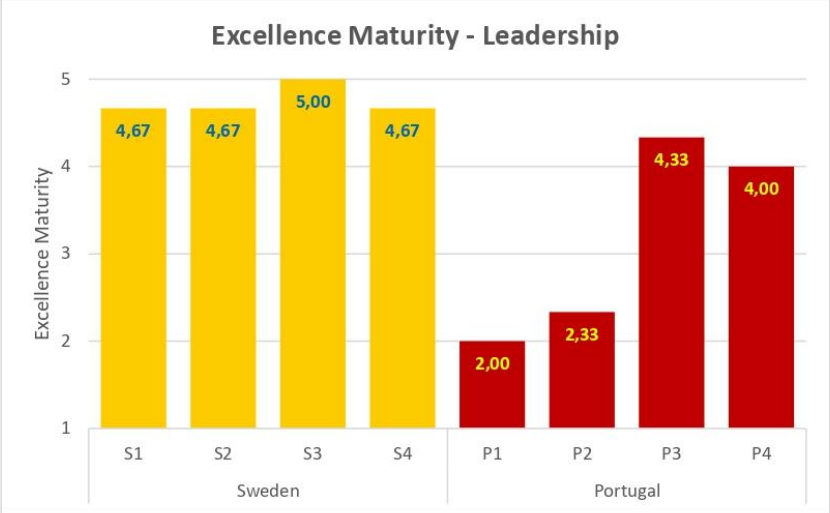
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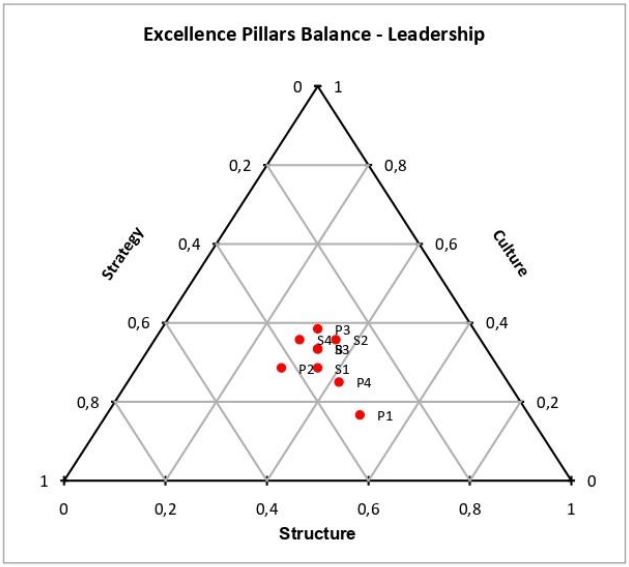
- It is mandatory to have the standards ISO 9001 or IATF 16949, ISO 14001, certification EMAS and OSHAS 18001;
- There is a company that has been distinguished with Excellence Awards.

3.1.3. Leadership

The Swedish companies have a similar score, higher than 4,6, compared with the Portuguese companies score.

The companies P1 and P2 have a shallow score being 2,00 and 2,33, respectively. With the analysis of the ternary chart, it is possible to conclude that the company P1 has a lack of focus in the development of the Culture and a substantial focus on the development of the Structure. For the company, P2 is visible a stronger focus on the Strategy. Both companies should balance the focus on the Excellence Pillars for having sustainable leadership.





BEST PRACTICES

- The executive management is wholly committed with quality, continuous improvements and excellence for the entire organisation. For this, it is developed a strong Quality Culture that is present in all the management activities and levels, and it is also instilled, by the middle managers in every employee. The necessity of this culture is to guarantee the presence of the Quality in each task that is made by the operators and each decision that is taken by the top managers. So, they ensure continuous improvement and excellence;
- The custom build structure also supports the Quality Culture;
- The leadership is also compromised in thinking with a long-term perspective and define strategies and goals for the future. For that, the leadership needs to drive the

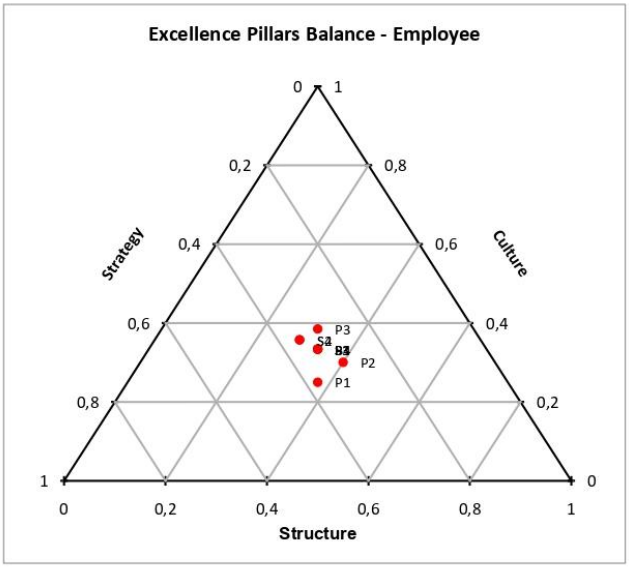
provision of an excellent product and service to the customers and establish useful and mutually beneficial partnerships with the employees, suppliers and society.

3.1.4. Employee

The Swedish companies have a similar score, higher than 4,6. The companies P1 and P2 have a low score between 2,67 and 3,33.

The balance between Excellence Pillars is quite good, being between 0,29 and 0,40.





BEST PRACTICES

- All the employees are very capable of the task they are doing, and the processes are very well known. For this, the employees need to have the training and precise

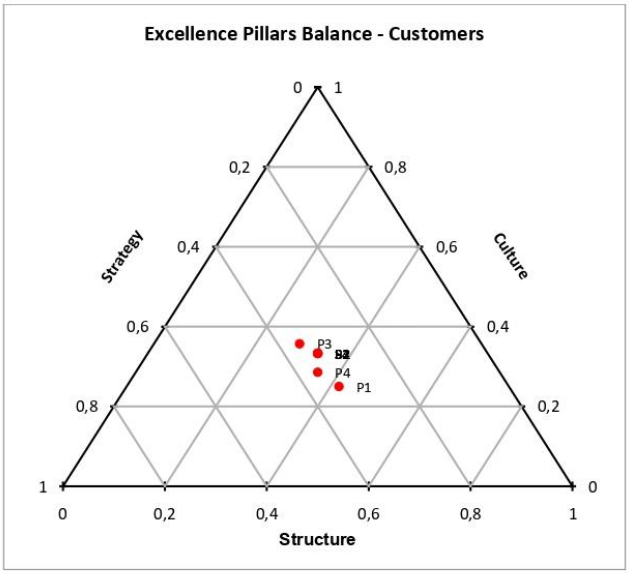
instructions for how to make the task. Also, the procedures must be simple and error-proof. The employees are aware of the Quality Culture and think in continuously improve the tasks;

- Workers must have the needed and best technical skills. For the Quality Culture that the leadership pursue, all the employees are involved and make part of it, so beyond the technical skills, it is essential to have managerial skills too. All the managers, even the small team managers, receive training for managing and dealing with the team and in quality and continuous improvement. With this training, provided by higher managers or specialists, employees become aware of quality policies, driven from the leadership. So, they can manage the teams in the best way considering the principles: take care of the employee satisfaction (besides the regular surveys that are made); never blame an operator for a problem or mistake that might happen; all the employees and teams are involved, and all the actions are transparent;
- The employees are aware of the continuous improvement and give the right feedback about the mistakes and problems, suggestions for improvements in their tasks. The operators solve the issues and offer ideas that might come up in the production's lines. Only if the problem persists a specialist from the Manufacturing Engineering division is requested to help.

3.1.5. Customer

All the companies had a good score, being higher than 4,50 and the Swedish companies have a 5,00 score, the maximum. The ternary chart shows a very balanced focus on the Excellence Pillars. It is possible to conclude that the development of this criterion is conducted in a very sustainable way.



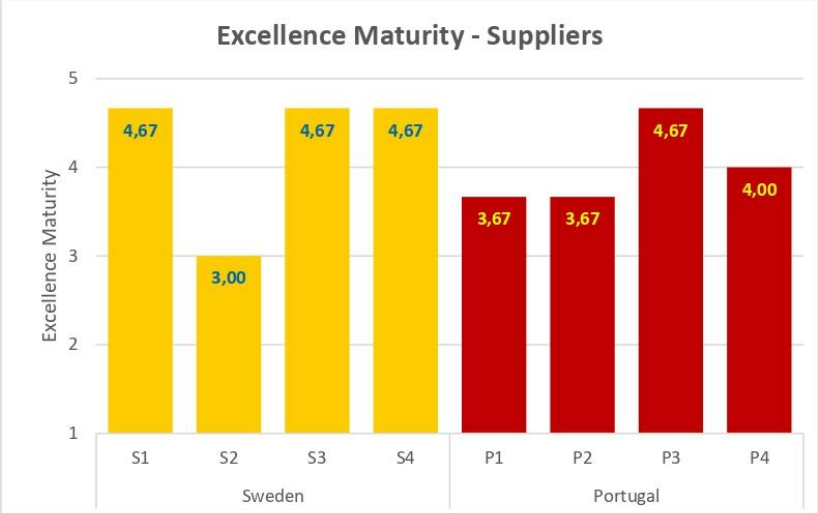


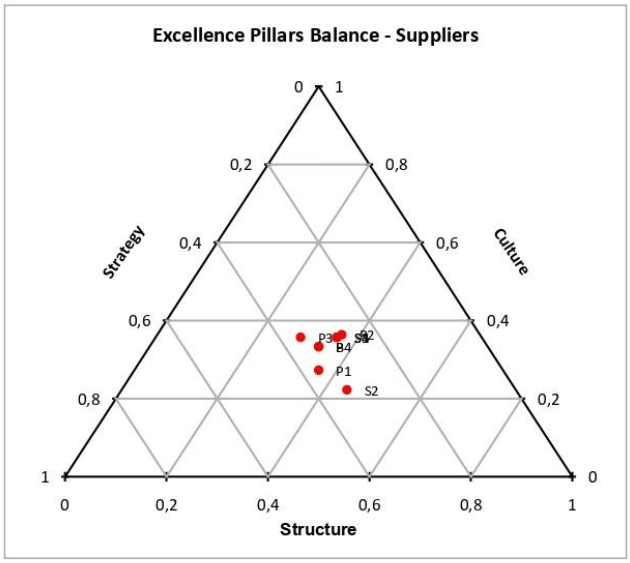
BEST PRACTICES

- The leadership define strategies to make sure that each employee is aware that the final products are for customers/people, and their wants must be fulfilled;
- Collect essential data from each customer. Audit every customer satisfaction, and it's continuously asking for feedback and product performance and relate this with customer loyalty;
- All the information is treated and provided to the team that has an interest in it, from the product design, development to the shop floor operators. The team could use to evaluate if the job they make contribute to customer satisfaction and is used to improve the products or processes;
- The collected information is used by the development teams to improve the products. It is also essential to introduce and develop new/disruptive changes and technologies in the final products. It is common to have some selected customers to analyse the ideas of the developers and to evaluate the products before going to market.

3.1.6. Suppliers

There the S2, P1 and P2 have a low score. With the analysis of the ternary diagram it is possible to conclude that the S2 company need to focus more on the development of the culture with the suppliers.



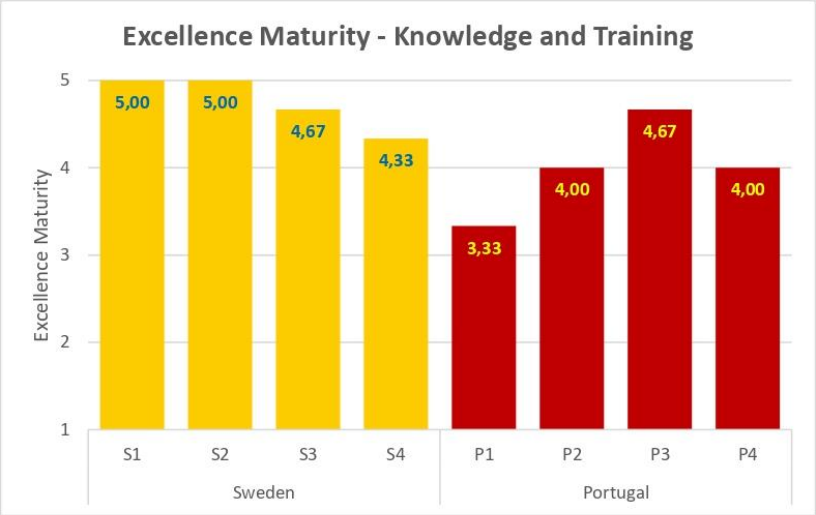


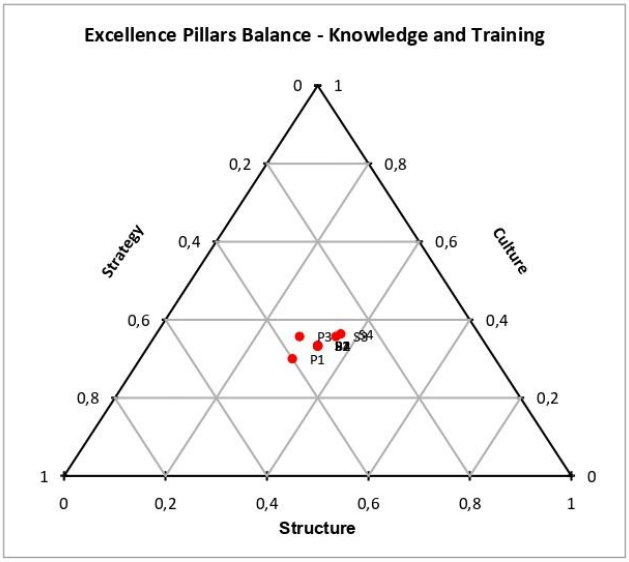
BEST PRACTICES

- The suppliers are certified according to ISO 9001 and ISO 14001. For the suppliers that aren't certified, the company helps them in this process;
- The company has a well-defined and public suppliers' policy, a selection methodology and an audit methodology;
- Regular visits are scheduled to maintain a close relationship with the suppliers;
- The company invites the suppliers when they have training sessions or seminars for the employees about quality, quality management and excellence;
- For maintaining a mutually beneficial relationship, the company deploys a Supplier Development Plan.

3.1.7. Knowledge and Training

The companies have a high score, above 4, except P1 company that has a score of 3,33. With the analysis of the ternary diagram is concluded that exists the right balance between the Excellence Pillars; the balance is between 0,27 and 0,36.





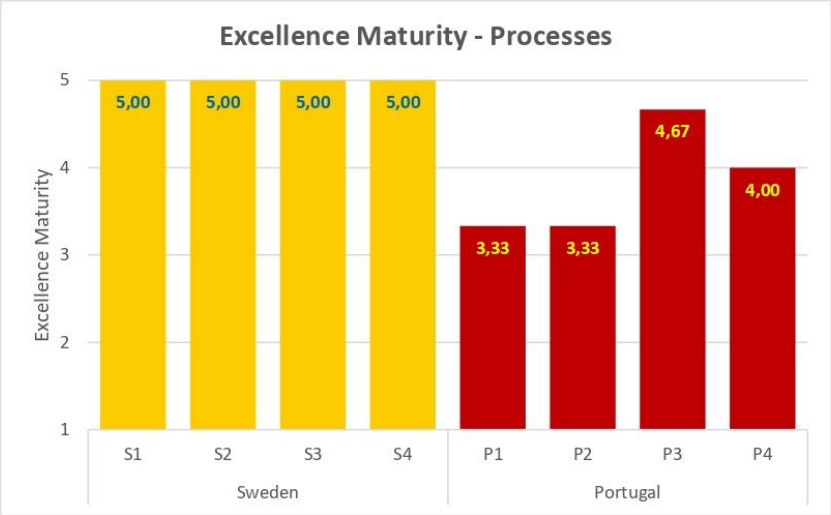
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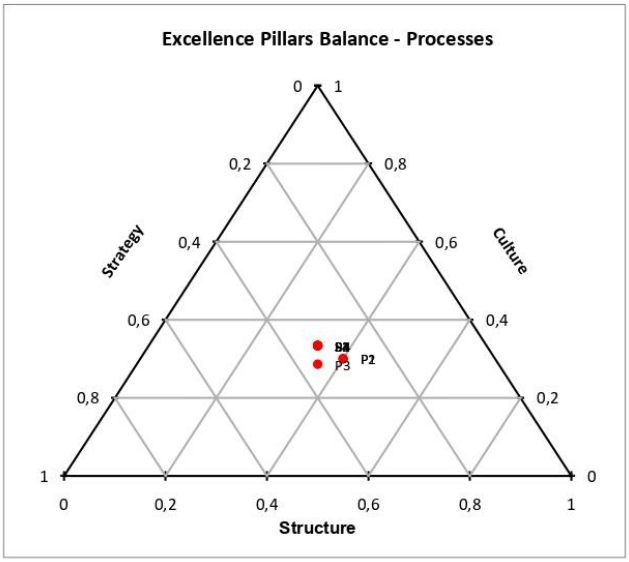
- Beyond the necessary training, the employees are a Lean Six Sigma White Belt and have regular Quality Management training;
- Every employee and operator must up three levels of autonomy for the process that they are doing. For upgrading the level, they fulfil a practical and theoretical exam;

- From the team and shift managers to the executive managers, all have regular management, soft skills and quality training and are examined according to these skills;
- The company establish partnerships with institutes, universities to developing research programs to import innovation.

3.1.8. Processes

All the Swedish companies have the maximum score on this criterion, and the P3 company also has an excellent score of 4,67. By analysing the ternary diagram is possible to conclude that it exists a right balance between the Excellence Pillars being between 0,29 and 0,40.



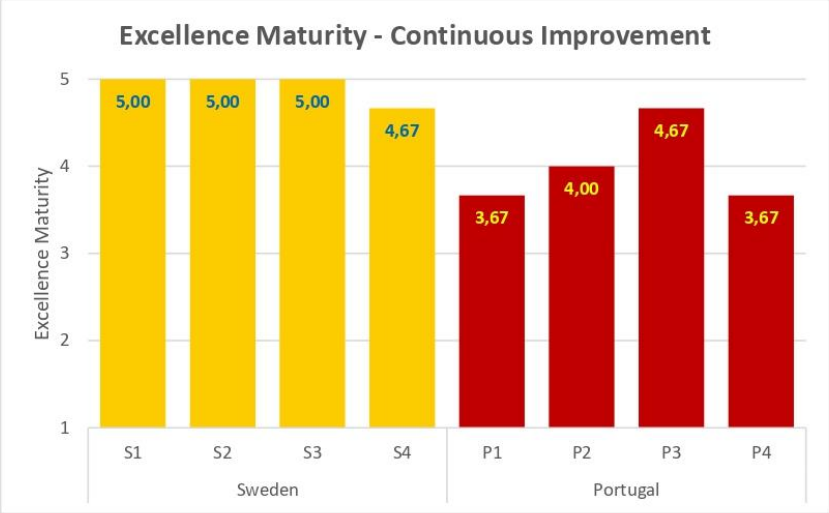


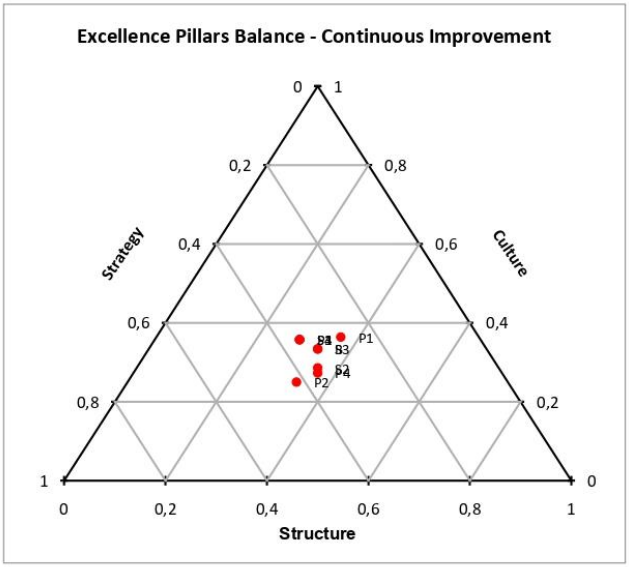
BEST PRACTICES

- The Management System is based on a process approach. Not only the production processes but also all the processes from the product development, financial management, to marketing, etc. have a well-defined way of doing every task. This management system also focusses on the deployment of the quality policies in the different functions of the company;
- The lean thinking, lean methodologies and tools are present in every task that the employees do, in every product and process development to minimise the waste. The most used tools are the Process Maps and Value Stream Maps;
- The company designs the processes with a lean flow and continuous flow thinking;
- The processes are controlled by the analysis of the KPI's. This analysis is automatic and in real-time. The KPI's are compared with the expected values. The processes are controlled under SPC methods;
- There are several following up meetings with the factory managers throughout the day for analyse the KPI's, plan and deploy the necessary actions. The executive managers are present in some of these meetings, at least once a week, or have an appropriated way of continuously check the KPI's of the production;
- Each process manager has a following up meeting with the operators every hour, and the company has the objective stop with the following up meetings and allowing the process manager to make constant following up with the operators;
- The information is available for all the employees, a performance KPI analyses of each operator is done, and personalised corrective actions are implemented in case of bad results.

3.1.9. Continuous Improvement

In this criterion, the Swedish companies and the P3 company have a very good score. The balance of the Excellence Pillars is good being between 0,29 and 0,42.





BEST PRACTICES

- It exists an internal procedure for the development of Continuous Improvement Projects, and this procedure could be triggered by an employee, KPI's and customer suggestions;
- Exists a writing official channel where every employee could suggest improvement actions and it should have an answer in 48h;
- In every following up meeting in the shop floor, the suggestions from the operators are registered to be analysed;
- The company has an organisation of the meeting schedule that in case of a problem or report from an operator that doesn't get resolved by the engineering teams and all the management hierarchy is reported to the global executive management team

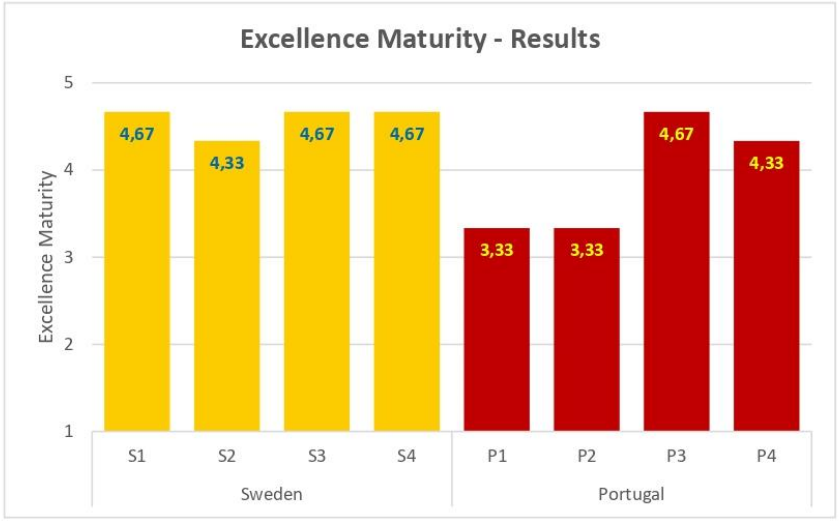
in one week through noun urgent communication channels. There is a fast and agile reaction for solving the problem;

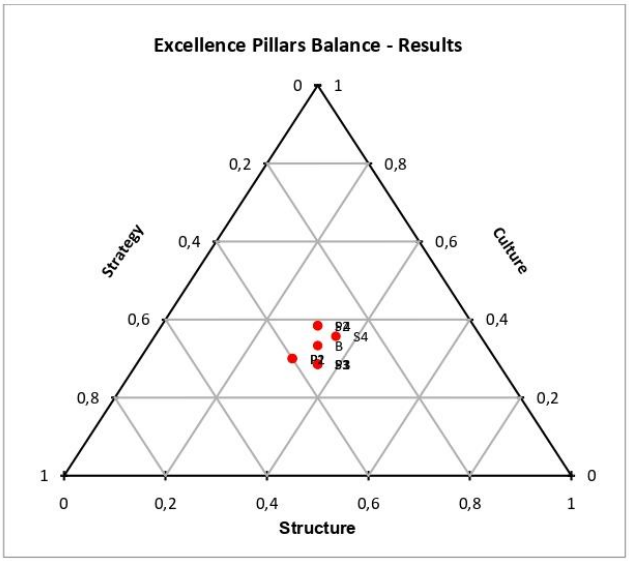
- The company involves the operators in the development of the continuous improvement projects and encourage through compensations the employees to suggest and enrol in continuous improvement actions;
- There are several coaches, with Lean Six Sigma training, that are included in the continuous improvement teams;
- All the continuous improvement projects and fast problem-solving situation are registered in the company informatic system and are followed by all the managers in the various factories around the globe and are discussed in the weekly quality managers global meetings. When an improvement is made, and the project ends, the rest of the factories are obliged to implement the same improvement.

3.1.10. Results

The companies have a good score except the P1 and P2. By the ternary diagram, we can conclude that the Excellence Pillars are balanced, having a balance between 0,27 and 0,40.

No company had a score of 5, which means there is room for improvement in the quality results and the influence of the quality.



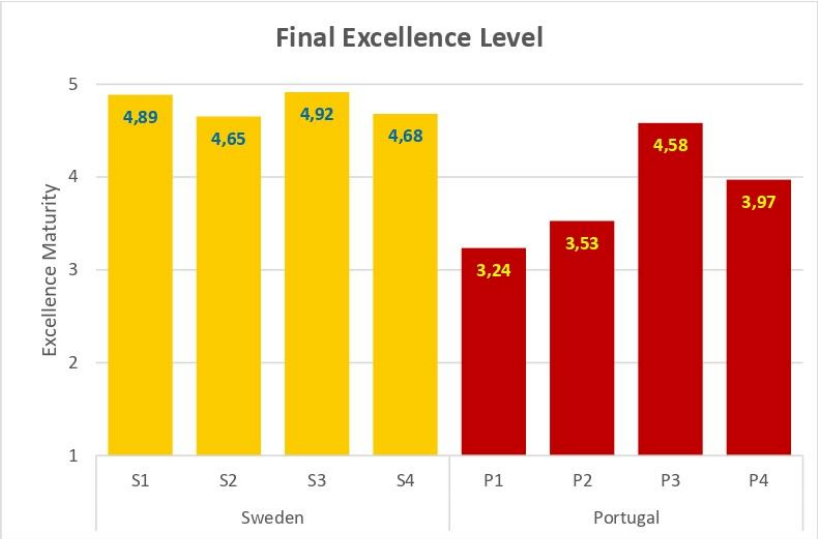


BEST PRACTICES

- The results are measured according to the goals defined in the strategic plans, the main measures are available for the employees and are registered in various types of wallboards;
- The company measures:
  - Financial results
  - Customer satisfaction and claims
  - Employees satisfaction and happiness
  - Supplier satisfaction
  - OEE
  - Processes efficiencies
- The company makes internal audits and assessments according to excellence and management models.

3.2. Excellence Maturity Level Discussion

The Swedish companies have a higher organisational excellence level. For enhancing their level, the companies must work in developing the Suppliers and Results criteria where they have lower scores. Generally speaking, the Portuguese companies have a lower organisational excellence score. Except for the P3, the Portuguese companies need to focus on the improvement of the Quality Organisation, Leadership, Employee and Results criteria.


Final Excellence Level
Excellence Maturity
5
4
3
2
1
4,89
4,65
4,92
4,68
3,24
3,53
4,58
3,97
S1
S2
S3
S4
P1
P2
P3
P4
Sweden
Portugal