INSTITUTO
UNIVERSITÁRIO
DE LISBOA

Strategic problem solving adoption and its impact in companies' success

João Filipe Loureiro da Costa

Master in Applied Management

Supervisor:
Dr. Leandro Pereira, Assistant Professor with Habilitation,
ISCTE - IUL

November 2022

BUSINESS
SCHOOL

Department of Marketing, Operations and Management

Strategic problem solving adoption and its impact in companies' success

João Filipe Loureiro da Costa

Master in Applied Management

Supervisor:
Dr. Leandro Pereira, Assistant Professor with Habilitation,
ISCTE - IUL

November 2022

Abstract

Today's world is characterized by a fast paced, constantly evolving environment, presenting companies and business managers with more complex, uncertain and urgent challenges than ever before. In order to remain relevant, companies need to be alert, permanently identifying and addressing potential threats and opportunities. Permanent transformation plays a determinant role for companies who strive and are successful. However, more than just solutions definition or decision-making processes, it is of the utmost importance to understand how companies identify, analyze, prioritize and overcome these challenges. Due to its nature, strategic problems often entail a much higher risk than recurrent or at least known problems, thus becoming critical to analyze how business managers approach such problems. For that matter, building on prior research of complex problem solving, this study allowed to identify the type of approaches adopted to address strategic problems and the factors that have a greater influence in the approach application.

Keywords

Strategy, problem solving, decision-making, complex problems

JEL Classification

M10, O21

Resumo

O mundo de hoje é caracterizado por um contexto dinâmico, em constante evolução, apresentando desafios cada vez mais complexos, incertos e urgentes às empresas. Por forma a permanecerem relevantes, as empresas necessitam de estar permanentemente alerta, identificando e endereçando potenciais ameaças e oportunidades. A transformação permanente tem um papel determinante nas empresas que vingam e atingem o sucesso. Não obstante, mais do que processos de definição de soluções e tomada de decisão, é fundamental perceber como é que as empresas identificam, analisam, priorizam e superam estes desafios. Tipicamente, devido à sua natureza, os problemas estratégicos acarretam um risco muito superior do que problemas recorrentes ou pelo menos conhecidos, tornando-se assim crítico analisar de que forma os gestores de negócio abordam tais problemas. Deste modo, partindo de uma base de pesquisa prévia, efetuada no âmbito da resolução de problemas complexos, este estudo permitiu identificar que tipos de abordagem são adotadas no sentido de endereçar problemas estratégicos e que fatores que têm uma maior influência na aplicação dessa mesma abordagem.

Palavras-chave

Estratégia, resolução de problemas, processos de decisão, problemas complexos

Classificação JEL

M10, O21

Contents

1. Introduction 1
2. Literature Review 4
   2.1. Problem solving process 4
   2.2. Problem identification 5
   2.3. Problem analysis 7
   2.4. Solutions definition 8
   2.5. Solution prioritization and selection 9
   2.6. Capabilities, cognitive styles, approaches and stakeholders 10
3. Research Methodology 14
   3.1. Main issues, research questions and research objectives 14
   3.2. Research instrument 17
4. Results and Discussion 19
   4.1. Sample characterization 19
   4.2. Results analysis and discussion 22
5. Conclusions and Recommendations 38

Bibliography 40

Glossary

VUCA – Volatility, Uncertainty, Complexity and Ambiguity

UDE – Negative or undesirable effect

TRIZ – Theory of inventive problem solving

IFR – Ideal final result

SPS – Systematic problem solving approaches

IPS – Intuitive problem solving approach

1. Introduction

In today's fast-moving business environments, firms have to quickly respond to changes and constantly seek opportunities to learn and improve (Mohaghegh and Furlan, 2020), coping with complexity is central to human decision-making (Simon et al., 1987).

The management world is increasingly guided by the creation of a common purpose, serving the ecosystem's stakeholders and conducting unique experiences while creating economic and social value, however the life cycle of organizations has never been so short. Permanent transformation is a mandatory principle and pillar of survival (Pereira et al., 2021).

It is essential to gain a better understanding of how problems can be solved and decisions made in order to become a more productive society and a society able to deal with the many complex problems in the world. People are frequently inconsistent in their choices between present and future. New problems arise because human tastes and priorities change over time and each problem is a new case, because no person or firm are the same, neither the circumstances (Simon et al., 1987).

This remains true nowadays, with the World Economic Forum identifying Complex Problem Solving as one of the most important job skills for the future (World Economic Forum, 2020).

According to Dörner and Funke (2017), real world problems feature open boundaries and have no well-determined solution, requiring different cognitive processes. While well-defined problems have clear set of means for reaching a precisely described goal, ill-defined problems have no clear problem definition, their goal state is not defined clearly, and the means of moving toward the goal state are not clear. The typical attributes of complex systems are the complexity of the problem situation, the connectivity and dependencies between the variables, the dynamics of the situation, the intransparency about the variables and their values, and the goal conflicts on different levels of analysis. This mixture of features is similar to VUCA. Therefore, if a system is predictable and stable, can be solved through linear equations or learning, and the same strategy can be applied in different situations, it should not be evaluated under the label of complex problem solving. Complex problem solving is a collection of self-regulated psychological processes and activities necessary in dynamic environments to achieve ill-defined goals that cannot be reached by routine actions. Creative combinations of knowledge and a broad set of strategies are needed. Solutions are often more bricolage than perfect or optimal. The problem solving process combines cognitive, emotional, and motivational aspects, particularly in high-stakes situations. Complex problems usually involve knowledge-rich requirements and collaboration among different persons.

In addition to it, strategic problem solving can be described as a cyclical investigation where problem formulation emerges from analytical iterative cycles, where, even if

organizations reach an initial definition of the problems, their complexity and uncertain nature often demands a reexamination of the way problems are defined. This requires organizations to slip back from resolution to identification phase and re-collect more specific and less ambiguous data, allowing to effectively formulate problems, thereby mitigating the uncertainty associated with its nature (Mohaghegh and Furlan, 2020).

Complementary, while developing an approach for collaborative creative problem solving, Steiner (2009) divides problems into three categories: simple, complicated and complex. Simple problems consists of a small amount of elements, with relatively little interaction and tendency towards stability. Complicated problems are similar to simple problems, but consists of comparatively more elements with more interaction. Such problems can be solved by applying standard, routinized methods of problem solving, whereas complex problems are characterized by uncertainty, requiring solutions that are not yet available, are dependent on novelty and might be related to situations for which there is no current awareness, requiring more divergent and creative approaches in order to address the situation. It should be noted that creative problem solving is not the same as a creative process. In spite of being able to act as a driving force behind the development of solutions for complex problems, creativity might also be an undirected act of self-expression. In order to distinguish between routine problem solving, creative problem solving and creative processes, three criteria are identified: initial event, process characteristics and novelty of the outcome.

Through problem solving, factors often classed as obstacles to growth can be turned into advantages. Hugo and Garnsey (2005) showed that growth in new firms is driven by problem solving practices, responding to new opportunities and enlisting the support of others. The difficulties faced by new firms provide the stimulus to create the required competence that propels their growth.

Furthermore, the problem solving approach may enable an effective aggregated view of both resources, dynamic capabilities and governance perspectives. The unit of analysis (the problem) and behavioral assumptions (bounded rationality and opportunism) of the former encompass those found in the three perspectives (Nickerson et al., 2012).

Despite what is mentioned above, the strategy field has often focused on explaining returns from implementing traditional rational strategies but not on where those strategies come from. There are multiple substantial challenges to the systematic generation of novel strategies (e.g. cognitive limitations and uncertainty). Decision centric – as opposed to problem centric – models of strategy making have emphasized decision-making processes for choosing among existing alternatives, leaving out essential steps of problem finding, problem formulating, and problem solving (Rindova and Martins, 2021).

As such, the key research objective of this study is to attempt to identify what factors influence business managers approach selection, when facing a strategic problem, and how

do they adapt their behavior depending on the complexity, uncertainty and urgency of the problem.

This objective arose from an holistic analysis of ten (10) prior research issues and seeks to better understand and further develop the existing knowledge about the following questions: How do companies set the agenda of problem solving? To what extent do companies adopt scientific problem solving processes? Which factors have a greater impact towards the application of a systematic approach? Can unfamiliarity affect the type of capabilities selected to solve problems? Does the outlook of the situation affect the problem solver judgment? What reasons influence the problem solving governance framework? To what extent do problem solvers promote a collaborative and interactive process? What kind of mechanisms do companies use to solve conflicts? Which kind of stakeholder management model do companies use? To what extent do companies adopt a joint problem solving process?

In order to enable a comprehensive view of the subject, the study is structured as follows. A first chapter providing a broad perspective of the existing problem solving literature, breaking it down into an overview of the process, the main phases towards problem resolution and the types of capabilities, cognitive styles, stakeholders management and approaches used within problem solving. Subsequently, a second chapter with the description of the research methodology, the main issues, research questions and objectives that led to this study and the research instrument used to gather the necessary empirical evidence. Finally, two last chapters with an extensive and inclusive analysis of the interviews' findings, as well as the identification of the research limitations and recommendations for future fields of work.

2. Literature Review

2.1. Problem solving process

In order to explore the methodological gap of method selection for managerial problem solving in an organization, Szarucki (2013) proposed a methodological approach that enables managers to compare and select methods most suited to the needs and limitations of the particular problem. The proposed method takes place in two phases: determine and evaluate a problem situation; select a method for problem solving. The first of the two phases consists of the following: identifying a problem to solve, analyzing the problem, evaluating the problem's importance, and determining the conditions of problem solving. The second phase covers the following research steps: defining the set of problem solving methods, identifying the methods' assessment criteria and their verification, assessment of the methods with regard to the selected criteria, selecting an appropriate method.

Effective problem solving for complex issues requires an approach capable of addressing the uncertain dynamic behavior that is characteristic of complex problems. Keating et al. (2001), proposed a framework for systemic analysis, comprising four phases: problem system framing; bounding problem system solution; idealized problem system design; problem system redesign. The first consists in developing a detailed understand of the problem system (as design, as performed and the gap between them), environment and required information. The second establishes the purpose and objectives, the attributes and the performance criteria for the system solution. The third consists in developing an idealized system solution subject to minimal constraints of operational viability and technological feasibility. The last phase aims to produce a system re-design based on failure modes and effects analysis, considering the problem, the problem context and the organization context, prior to deployment.

Pereira et al. (2021), also proposed a scientific management problem solving process, based on facts and in a rigorous methodical process. In summary, the following steps illustrate the exercise of solving complex problems: define de problem, analyze the causes, generate solutions, evaluate each solution, select, implement and validate effectiveness. The process begins with defining the problem, in a concrete, specific and isolated manner. The second step is considered the most important exercise in the process, which is the search for causes, based on facts, in particular diverse sources, which will allow connecting points, finding perspectives, in a permanent question-hearing binomial, which can be more formal or informal, more structured or less, more qualitative or quantitative, depending on circumstances and context. After collecting the causes, it is important to establish the vision of the whole in a summary way, answering the question, why this problem happens, and ensuring that the information makes sense thus contributing assertively to the understanding of the problem. Once this is finished, it is important to analyze the problem causes, by breaking the problem

into sub-problems, or analyzing it in various ways. To walk through the problem, helps to elevate the intellectual domain on it. After identifying the causes, the process of proposing solutions begins, in particular by basing the proposals on the causes, and denying them, countering them, mitigating them, transferring them or accepting them. Each strategy results in a simple or multiple action plan, depending on whether the causes are interdependent or independent. It should also be noted that not all solutions may be feasible from the point of view of resources or time required, as well as effectiveness. Therefore, it is necessary to consider the pros and cons of each solution so that it fits the requirements or restrictions of the organizational or personal context of the manager.

Another framework, the theory of inventive problem solving (TRIZ), was developed to support engineers and natural scientists solving inventive problems by using the knowledge of former inventors. Problem solving within TRIZ can be described using a four elements model: analyze the specific problem in detail; match the specific problem to an abstract problem; on an abstract level, search for an abstract solution; and finally if an abstract solution was found, transform this solution into a specific solution for the specific problem. During this process, TRIZ can support the problem-solver by accumulating innovative experiences and providing access to effective solutions independent of application area. For each step, TRIZ offers a comprehensive set of tools to analyze and solve problems in different perspectives (Moehrle, 2005). TRIZ approach can be helpful overcoming psychological inertia and generating new and even breakthrough ideas. In contrast to many existing service design methods that rely heavily on previous specific knowledge and experience, TRIZ rely on its knowledge base even when problem solvers are not experienced (Chiang et al., 2005).

Despite the existence of different methods for systematic problem solving, they all agree upon a set of logically connected steps (Mohaghegh and Furlan, 2020): problem definition; problem analysis; solution design and alternatives evaluation; and solution selection for the primary goal of solving the problems fundamentally and keeping them from recurring.

2.2. Problem identification

The very first steps of problem solving processes are the least understood. What brings problems to the head of the agenda? How can it be represented in a way that facilitates it solution? The task of setting an agenda is of the utmost importance because both individuals and institutions have limited capabilities of dealing with multiple tasks simultaneously. Often fire-fighting replaces planning and deliberation when new problems arise (Simon et al., 1987).

If the problem solver has inaccurately defined the core problem, probably he is almost necessarily working on the wrong solution. Considering this, in order to uncover and define the core problem, the theory of constraints can be used through a process comprising four

steps: identify a list of negative or undesirable effects (UDEs) that keep an organization from doing its best job; generate three conflict clouds from the list of UDEs; construct a generic conflict cloud from the three clouds; and build a current reality tree that shows both the core conflict and how it inevitably leads to the UDEs that are being experienced by the customer. Companies routinely struggle with the UDEs but frequently fail to address the core problems that are driving customer dissatisfaction. The three UDE clouds shed light on the individual conflicts that produce each of the UDEs. The generic cloud pools the three clouds into the generic conflict that is the ultimate source of all the UDEs. The current reality tree exposes the core problem derived from the core conflict and verifies the logical cause-and-effect relationships that result in all of the UDEs (Cooper and Loe, 2000).

Bhardwaj et al. (2018) stated that to frame a problem in the ambiguity, uncertainty, complexity, incomplete information, and high stakes of dynamic strategic situations can be challenging. The problem can be framed in multiple ways with each leading to a different outcome. Framing is therefore crucial. Thinking, insight, judgment and time are required. However, there are two human tendencies that that applies to problem solving, which together comprise the plunging-in bias: diving into generating solutions without a good understanding of the problem and without determining how best to tackle it. It is possible to “de-bias”, but this first requires an awareness of its existence, the circumstances in which it is likely to occur, and the role it plays. In order, to alleviate the plunging-in bias the authors propose a complementary use of three frameworks, therefore addressing different aspects of it. The Problem Faceting Framework to understand the phenomenon and frame the problem. Since several people and organizations can benefit strategic problem solving, the Who-What Matrix to identify which key players should play which roles. Finally, the Question Tree, to be thoughtful about what data to gather and analyses to perform.

Mello et al. (2022) also proposed a combined use of SWOT analysis, to identify strategic problems, with GUT matrix, for identifying a priority level result of each problem listed, allowing to quantify decisions and enhance competitiveness. The first, used to analyze and compose the diagnosis of the internal and external environment of the company, by analyzing its Strengths, Weaknesses (internal environment), Opportunities and Threats (external environment). The second, a simple and objective method to quantify and score the analyzed components of the problems according to their priority level, considering three parameters: Gravity/Severity, Urgency and Tendency.

TRIZ tools can also be used in order to analyze a system (company, system, etc) and identify the problem. The application of substance-field analysis facilitates the understanding of a situation and the detection of problematic elements or interactions. Complementary, the ideality matrix allows the user to identify any obstacles to a certain desired evolution to the system (Boavida et al., 2020).

Conversely, if we consider the definition of a viable strategy for a company, the identification of the target comprises three major steps. The identification of opportunities and risks in the environment, the identification and evaluation of the company strengths and weaknesses, and finally, the search and analysis of management values, in order to identify behavioral constraints or motivations may will influence the degree to which the strategic choice is implemented (Bower, 1982).

2.3. Problem analysis

The way in which problems are represented has much to do with the quality of found solutions (Simon et al., 1987).

Analysis of problems causes play a major role in solution in solution formulation, because if the causes are rigorously identified, the solution will be easier to work with. There are multiple techniques available to analyze the causes, most of them originated in the area of quality, for instance, the Ishikawa Technique, the Technique of the Five Whys, the Problem Breakdown Technique and the Pareto Technique. From the point of view of statistical analysis, it is relevant to appreciate the causes and confront them in terms of relationship, in order to understand whether or not they are correlational. In case there is correlation, it may become easier to intervene from the point of view of the solution, since there is potential for a solution to solve more than one cause simultaneously. If the causes are unrelated then it is necessary to develop several solutions, at least one for each cause (Pereira et al., 2021).

Considering the TRIZ toolkit, the analysis of the problem can be performed using the Contradictions tool, followed by the use of a Contradiction Matrix, in order to transform the concrete problem into an abstract problem. A contradiction occurs when three conditions are fulfilled: there is a desired function in a system; there is a conventional mean to realize this function; and the realization is opposed by harmful factors (Moehrle, 2005). TRIZ contradiction matrix comprises 39 engineering parameters but it lacks an effective method to analyze the analogical relationship between the 39 TRIZ engineering parameters and the characteristic features of individual service sectors. Hence, Su et al. (2008), developed a systematic framework, in order to correlate the 39 TRIZ engineering parameters with the service determinants of individual service sectors, and effectively achieve inventive results. The first step consists in defining the scope of the problem and identify the service sector under which it is classified. Second, the problem solver must extract the determinants which affect customer satisfaction in the specified sector. Third, he has to develop a parameter corresponding table for the specified sector, which has to be evaluated by a group of experts and validated by more than half of them. Finally, feasible solutions must be generated through the TRIZ contradiction matrix.

2.4. Solutions definition

If the problem causes are accurately diagnosed, it is of the utmost importance that the solutions correspond in terms of effectiveness and assertiveness, to deny their occurrence and inhibit them. Among the various potential strategies of responses to the causes, four (4) main possibilities are identified: avoiding / eliminating the problem, but its feasibility greatly depends on the context; mitigating the problem, reducing its effects; transferring the problem to more capable entities; or accept it and simply be aware of the problem (Pereira et al., 2021).

Traditionally, the practice of developing new services has mostly depended on the generic tools of idea generation, such as brainstorming, lateral thinking, or the mind mapping methodology of experienced practitioners. Thus, the initial state of the generation of new ideas, especially in response to issues of unknown causes and search directions, is frequently limited to overcoming the psychological inertia, which is inherent in human thinking in order to generate creative results. Due to the intangibility of services, it is difficult to verify the applicability of these services before launching them. In response, among the corporate structures and processes that have been efficiently developed and implemented, TRIZ has been validated by researchers in terms of its effectiveness in creating and improving new products through a number of successful process models (Su et al., 2008).

One of the many tools in the field of TRIZ, specifically regarding the definition of solutions, is the Inventive Principles, which allows the connection of abstract problems with abstract solutions. These principles offer a different degree of abstraction, and several of them are divided into two to five sub-principles. The problem-solver can apply them by looking over them and using his intuition for the best fitting principle, or he can use the contradiction matrix to lead him to inventive principles, which had been applied in similar abstract problems. Having identified the inventive principles, as abstract solutions of the abstract problem, the problem solver will have to find concrete solution concepts, therefore applying the inventive principles to the concrete problem. It should be note that TRIZ does not replace an inventor’s natural creativity, but leads it in some predefined direction. Using knowledge from former inventions, gives starting points for similar research in other fields and the opportunity to organize creativity workshops, stimulating the creativity of both individual and group problem solvers (Moehrle, 2005). Another advisable TRIZ tool is the Nine Window creative technique, which consists in a table with nine entries, separated in three categories (supersystem, system and subsystem) and three time periods (past, present and future). The table must be filled with descriptions, in order to contextualize the addressed problem under external and internal environments, allowing an analysis of its historical path and desired future progression (Boavida et al., 2020).

Steiner (2009) identified different sources of creativity, each one of them being seen as a function of several factors, and the interplay between these single factors and between the different creativity systems form the basis for potential creative performance, thus enhancing the capability to generate solutions to complex problems. The identified creativity types are: individual, collective, organizational and open creativity. Open creativity differentiates itself from organizational creativity as it refers to an open system, with the involvement of further potential stakeholders outside of the system's borders. It also suggests that the higher the complexity and need for change, innovation and sustainability, the grater the demand for individual and collective creativity.

Complementary, Rindova and Martins (2021), proposed a creative, design-centric, interactive approach to develop novel strategies, which can assist tackling complex, ambiguous, and ill-structured problems by combining intentions, exploration, and stakeholder engagement in a structured process. The process begins by articulating shaping intentions, which define a broad direction of exploration and create means-end coherence. Second, design without final goals, with iterative activities of imaginative generation of multiple provisional solutions and selection through problem-solution matching. Third, promote stakeholder dialogue and co-creation, in order to validate value-creating potential and to co-design complementarities. The designed solutions must possess certain characteristics, namely, novelty (distinctive; producing pathways for changing the status quo) and value-creating potential (validated utility and desirability within the target environment).

2.5. Solution prioritization and selection

It is important to establish a match among the identified strategic alternatives, present and potential corporate competence and management values. Actual and potential competence should be directed toward those feasible alternatives, which have the potential of satisfying management aspirations, at acceptable levels of risk, in a manner that will not violate management values (Bower, 1982).

Furthermore, Shaikh (2016) research focused in what practices allow organizations to achieve better outcomes by making better strategic decisions, identifying that best strategic decisions are associated to the presence of quality debate, as opposing to worst strategic decisions, which are related to the absence of quality debate. Another finding, points to the fact that worst or wrongly approved decisions are related to factors that curtail debate: Halo effect of decision champion, potential challengers behavior (by resisting change indirectly or when differences are too great to allow quality debate) and when a debate seems unnecessary (decision seems a no brainer, safety net feeling or previous quality of debate). In spite of that, there is an inbuilt bias to avoid debate. Decision champions seek to minimize resistance and

the other decision-making team members try to avoid debate if it makes them appear foolish. In order to surpass this issue, it is proposed that executives need to be alert to identify lack of debate, and instead, try to encourage input, debate and challenges, and that team members should not be intimidated, no matter how insignificant the concerns may seem.

Besides these components, in Su et al. (2008) research, it is noted that the prioritization of developed solutions must include certain criteria, which must be graded, in order to make the final decision. The proposed criteria are time, cost and manpower support.

Although GUT matrix considers different parameters (Gravity/Severity, Urgency and Tendency), it can also be used to quantify and score the analyzed components and prioritize them (Mello et al., 2022). Another additional evaluation component might be the comparison between the generated solutions and the Ideal Final Result (IFR), an implementation-free description of the situation after a problem has been solved, in which, the best idea should be the one closest to the state of ideality (Chai et al., 2005).

Furthermore, companies and organizations are increasingly adopting non-economic performance measures for their activities, to achieve a positive environmental impact or sustainable performance. Considering this, Boavida et al. (2020) proposed the application of TRIZ methodology combined with Eco-Compass tool, in order to be able to prioritize generated solutions, under certain pre-established values of sustainability parameters. The connection between the methodologies is done through the contraction matrix, combining certain engineering parameters with Eco-Compass six variables: mass intensity, potential risk to human and environmental health, energy intensity, waste reuse, resource conservation and service/function longevity. Then, the generated solution can be evaluated in terms of the six environmental parameters, comparing the obtained solution with a base scenario. Depending on the available information, the assessment can be performed either qualitatively or quantitatively. This allow solutions to be obtained systematically and to present a performance increase of certain environmental parameters, thus promoting sustainable innovation.

2.6. Capabilities, cognitive styles, approaches and stakeholders

Ritala et al. (2016), examines capability rigidity in situations in which dynamic capabilities start to lose their relative applicability, that is, unpredictable disruptions resulting in the rapid emergence of unfamiliar problems that must be identified and solved quickly. While organizational capabilities represent a firm’s and its managers’ ability to reliably solve familiar problems involving a little or no change, dynamic capabilities address problems that evolve with industrial and environmental change, referring to a firm’s and its managers’ ability to change organizational resources and capabilities over time by adding, reconfiguring, refining, or abandoning them. Despite the notion of change throughout dynamic capabilities theory, all

organizational capabilities, including the dynamic ones, are relatively rigid when facing notably unfamiliar problems, which are defined as unexpected and urgent complications, opportunities, and issues whose resolutions lie outside the firm's readily available routine and solution space. Unfamiliar problems, involving high degrees of unexpectedness and urgency, can become central for organizations' survival and competitiveness. Defined in terms of a non-routinized, non-patterned, non-repeatable search for options in organizing a given activity, ad hoc problem finding and problem solving processes sometimes represent the most feasible way to solve unfamiliar problems. Such processes are largely composed of novel, unique elements and actions, where change is not dependent on the organization's prior conceptions or heuristics of how to change, how to interpret weak signals, or how to act in certain situations, requiring managers to step far out of their comfort zones. For unfamiliar problems, ad hoc processes have a relative advantage over dynamic capability based processes. This advantage increases with the degree of unexpectedness and the urgency of the problem. It also suggests that the degree of detachment from existing organizational and dynamic capabilities is positively related to the problem finding and solving performance. Additionally, if problems are decomposable into sub-problems, the complementary deployment of dynamic capabilities and ad hoc processes increases the problem finding and solving performance. Firms facing and addressing many unfamiliar problems over time in a certain domain can develop a broader base of dynamic capabilities and if they successfully find and solve many unfamiliar problems over time achieve superior long-term performance compared to those that encounter fewer unfamiliar problems.

Four macro-trends of competencies were identified in order to enable effective management, "problem solving", "personal management", "working with others", and "development and technological use". These competencies focus not only on economic value, by producing newer and better products or services, but also on social value, by developing skills and interpersonal relationships (Pereira et al., 2021).

Furthermore, Mohaghegh and Furlan (2020) address the differences between intuitive (IPS) and systematic (SPS) problem solving approaches, identifying the main supporting factors to adopt SPS, both in operational and strategic domains. IPS is based on intuitive reasoning with minimal cognitive efforts and uses short-term remedies, heuristics, and prompt fixes to temporarily solve the problem. SPS relies on analytical reasoning and requires deliberative cognitive efforts to fundamentally solve the problems at their root-cause with the help of structured actions thus preventing their reoccurrence. Although IPS is helpful for short-term success, as heuristics simplify the problem complexity and assist individuals to solve the problem temporarily, it fails to contribute to long-term improvements. SPS is identified with better quality and more robust solutions to avoid problem recur and achieve sustainable solutions. Based on the analysis, the authors identify seven factors that may lead to successful

adoption of SPS. First, the nature of problem with SPS being recommended for ill-structured problems. Second, time as SPS should not be rushed. Third, relevant and valid information availability is necessary. Fourth, a collaborative culture also facilitates SPS adoption. Fifth, transformational leadership is identified as being able to enhance the commitment of the operators. Sixth, SPS is more likely to be successful when learning infrastructures are established and maintained in the organization. Seventh, the environmental dynamism, especially in high-velocity environments, where SPS allows to gather the valid and necessary information to mitigate the external uncertainty.

A number of researches have examined the relationship between decision styles, behaviors and firm performance, identifying that managers perceive and solve problems in different ways, depending on their preferred problem-solving style. For research purposes, individuals can be conceptualized as falling on a continuum of extreme adaptor to extreme innovator, bringing different viewpoints and approaches to solving administrative and other organizational problems. Adaptors tend to be conservative, taking a problem as initially defined and developing solutions within currently accepted guidelines. Their behavior and solutions tend to reinforce these guidelines because they generally concentrate on the refinement of existing frameworks. Innovators see the guidelines as part of the problem and often incorporate new and untried processes into their solutions. When examining problem solving styles of entrepreneurs and the influence of their problem solving style on business operations, it is possible to identify that, usually, entrepreneurs tend to be more innovative than general managers of large organizations. More adaptive founders are more likely to continue operating the business as time passes than more innovative founders. Innovative entrepreneurs tend to have initiated a greater number of new ventures than entrepreneurs who are more adaptive. Entrepreneurs who are more adaptive tend to spend more time on administrative activities, while more innovative entrepreneurs tend to spend more time developing new products or services (Buttner and Gryskiewicz, 1993).

In their problem-solving perspective of the service business, Ritala et al. (2011) also identified a relationship between the co-creation intensity (or need for knowledge sharing) with the nature of the services and its related problems. Co-creation intensity is related to the type of need and solution that the customer is looking for, and it can be more transactional, repeated, with less knowledge sharing requirements, or it can be unique, more cooperative, requiring high levels of co-creation intensity. On the other hand, the nature of the problem is related to the level of specific knowledge required to solve it, and it can be homogeneous and routinized, not requiring new knowledge, or unstructured and heterogeneous, requiring new and specific knowledge. Given this, offerings can be classified in a two-by-two matrix: standard (co-creation level is low and the problem is routinized), add-on (co-creation level is high but

the problem is routinized), specific (co-creation level is low but the problem is unstructured) and tailored (co-creation level is high and the problem is unstructured).

Aarikka-Stenroos and Jaakkola (2011) proposed a collaborative framework for problem solving within value co-creation processes, where roles and resources organization, and management of value conflicts, are key activities to maximize the value in use of the implemented solution. Suppliers can be seen as value option advisors, value process organizers, value amplifiers, value experience supporters and possess expert knowledge, diagnosis skills, facilities and professional equipment, experience and objectivity, integrity and ethical codes. Conversely, customers can be seen as co-diagnosers, co-designers, co-producer, co-implementor, co-marketer, co-developer and possess information on needs and context, industry expertise, production material, time, effort and financial resources.

Complementary, in order to enable firms selection on how to govern the interactions among the stakeholders involved in joint value creation activities, so as to ensure cooperation in the face of collective action problems, Bridoux and Stoelhorst (2022) identified three different governance forms that can be used to realize the benefits of joint value creation when managing for stakeholders. The traditional “hub-and-spoke”, the “lead role governance” and “shared governance.” Among others, these three forms require and sustain different types of trust, imply markedly different roles for managers, and will be effective for different types of joint value creation. The hub-and-spoke governance form considers that the firm’s managers claim the right to make decisions, monitor and sanction monitors non-compliance to governance rules. In this model, there is a large range of conflict resolution modes that the firm’s managers can choose from, the distribution of joint value created is negotiated in the firm–stakeholder relationships, the firm’s manager assumes a benevolent patriarch role and there is an interpersonal trust in the firm and its managers. Regarding the lead role governance form, firm’s managers are mandated (by other stakeholders) to make decisions, monitor and sanction monitors non-compliance to governance rules. The leader acts as an arbiter regarding conflict resolution, the distribution of joint value created is negotiated with all the stakeholders, the firm’s manager acts as stewards and there is trust in governance model, the firm and its managers. Finally, in the shared governance model, all stakeholders have relatively equal say regarding decisions, monitoring and sanctioning. Conflicts are resolved in a cooperative mode, the distribution of joint value created is negotiated with all the stakeholders, the firm’s manager is one among many and there is trust in the governance system. Regarding its effectiveness, the hub-and-spoke model can be characterized as having high speed and low accuracy and legitimacy. The lead governance model as having moderate speed, accuracy and legitimacy, and shared governance model as having low speed and high accuracy and legitimacy.

3. Research Methodology

The purpose of this research is to identify what factors influence business managers approach selection when facing a strategic problem, and how do they adapt their behavior depending on the complexity, uncertainty and urgency of the problem. Thus, a qualitative analysis approach was selected in order to enable a comprehensive collection of relevant information and its consequent analysis. The methodology first considered the identification of relevant issues arising from previous research, followed by conducting semi-structured interviews with open-ended questions based on the identified issues, and finally, by applying data mining techniques, in order to identify patterns, extract insights and enable an in depth analysis of the collected data.

The target was to capture real life experiences of top managers within the complex, dynamic and fast environmental context of corporate world, hence twenty-two business managers were invited to participate in the research, with the interviews being focused on actual strategic problems, already addressed by those managers.

3.1. Main issues, research questions and research objectives

1. Simon et al. (1987), p. 30 – "Setting agendas and framing problems are two related but poorly understood processes that require special research attention…"
    a. Research question – How do problem solvers identify and prioritize problems to be solved?
    b. Research objective – Identify how companies set the agenda of problem solving.
2. Pereira et al. (2021), p. 15 – "The model presented needs to be further tested. Consequently, there is a need for future research to validate the proposed framework in real life problems within different contexts. The model was designed for management or business problems, and an intensive application in these contexts should be done in order to obtain a nonbiased validation. The model should be also tested in a different set of contexts, such as economic, social, and environmental or others, to unveil possible sub-configurations and tuning for each different condition."
    a. Research question – What kind of process do companies usually adopt in order to address and solve strategic problems?
    b. Research objective – Identify to what extent do companies adopt scientific problem solving processes.
3. Mohaghegh and Furlan (2020), p. 1055 – "The main findings of this study suggest that the adoption of IPS and SPS is contingent upon organizational and environmental

contexts. Therefore, there is a need for further empirical analysis to investigate the efficiency and effectiveness of problem-solving behavior modes at the presence of contingent factors."

   a. Research question – Which factors have a greater impact when selecting the problem solving method?
   b. Research objective – Identify which factors can affect the most the application of a systematic problem solving approach.

4. Ritala et al. (2016), p. 773 – "More research is needed to further refine the proposed logic on managerial decision-making given unfamiliar problems. Open questions include to what extent managers are able to make conscious choices and how effective those choices are in the long run."
   a. Research question – To what extent does the outlook timeframe (long run or short term) influences the selection of an approach to solve the problem?
   b. Research objective – Identify if unfamiliarity can affect the type of capabilities selected to solve problems.
5. Dörner and Funke (2017), p. 08 – "The initial emphasis on analyzing how humans deal with complex, dynamic, and uncertain situations has been lost. What is subsumed under the heading of CPS in modern research has lost the original complexities of real-life problems. From our point of view, the challenges of the 21st century require a return to the origins of this research tradition. We would encourage researchers in the field of problem solving to come back to the original ideas."
   a. Research question – Do problem solvers adapt their behavior when opposite (positive or negative) outlooks are expected for each problem?
   b. Research objective – Identify if the problem solver judgment is affected by the outlook of the situation.
6. Bhardwaj et al. (2018), p. 296 – "How do problem formulation and solution option generation differ when working individually versus in groups, both of which reflect aspects of corporate reality?"
   a. Research question – To what extent is the problem solving governance framework affected by the urgency, complexity and uncertainty of the problem?
   b. Research objective – Identify the reasons that influence problem solving governance framework.
7. Shaikh (2016), p. 34 – "Debate, scrutiny, and conflict have very negative connotations, whereas decisiveness and decision speed are favored, thereby creating a pull of gravity towards acceptance of a decision proposal. Does a member of the team have the chutzpah to challenge the perceived wisdom in the room at the time a decision is

being made or does the decision champion have the guts to become vulnerable and open to his / her thinking to scrutiny?"

   a. Research question – What are the roles of the problem solving team members and type of interactions expected to happen between them?
   b. Research objective – Identify to what extent do problem solvers promote a collaborative and interactive process.

8. Simon et al. (1987), p. 30 – "The resolution of conflicts of values (individual or group) and inconsistencies in beliefs will continue to be highly productive directions of inquiry…"
   a. Research question – How do companies address conflicts when solving strategic problems?
   b. Research objective – Identify what kind of mechanisms do companies use to solve conflicts.
9. Bridoux and Stoelhorst (2022), p. 231 – "We encourage others to further develop stakeholder theory as a platform to integrate the knowledge accumulated in the many subfields in management. Researchers across these many subfields evoke the same mechanisms (trust, reciprocity, collective identity) to explain why actors cooperate, regardless of whether these actors are individuals or groups, and regardless of whether these actors are inside or outside traditional firm boundaries. If researchers attempt such a synthesis, we believe that they will likely identify additional governance forms, some of which may be context specific, but some of which may be relevant across subfields."
   a. Research question – What kind of mechanisms do companies use in order to identify incorporate stakeholders needs?
   b. Research objective – Identify what kind of stakeholder management model do companies use, depending on their business sector and context.
10. Aarikka-Stenroos and Jaakkola (2011), p. 24 – "Not only is value dyadic, but also network actors impact value creation , and thus the exploration of joint problem solving for value between network actors could provide interesting multi-actor perspectives in future research."
   a. Research question – What role do stakeholders play within the problem solving process and value creation?
   b. Research objective – Identify to what extent do companies adopt a joint problem solving process.

3.2. Research instrument

The interviews were structured to last between thirty to forty minutes and were conducted using a script comprising three (3) sections, with a total of eighteen (18) questions.

The first section of the script intends to characterize the interviewee and the company by collecting the following data:

1. Interviewee work location
2. Interviewee gender
3. Interviewee business title
4. Number of years managing the company or business unit
5. Company's sector
6. Company's last fiscal year (2021) turnover

The second section aims to contextualize the problem, with three (3) questions being formulated:

1. What was the most relevant strategic problem that you already had to manage or solve?
2. In what context did this situation occurred and how was it identified?
3. What made this situation standout from others and become a priority?
    a. Related to the first research objective – Identify how companies set the agenda of problem solving.

The last section of the questionnaire comprises nine (9) exploratory questions that allow to address the remaining research objectives, thus enabling to identify what factors influence business managers problem solving process selection and how do they adapt their behavior depending on the problem:

1. What was the used process to address and solve the problem?
    a. Related to the second research objective – Identify to what extent do companies adopt scientific problem solving processes.
2. Which were the factors with a bigger influence in the problem solving method selection, and why?
    a. Related to the third research objective – Identify which factors can affect the most the application a systematic problem solving approach.
3. How was the approach selection impacted by the outlook timeframe of that situation?
    a. Related to the fourth research objective – Identify if unfamiliarity can affect the type of capabilities selected to solve problems.
4. Would you have selected a distinct approach if the problem context or outlook were different?

    a. Related to the fifth research objective – Identify if the outlook of the situation affects the problem solver judgment.

5. What was the selected governance model to manage the problem solving process, and to what extent was it affected by the complexity, uncertainty and urgency of the problem?
    a. Related to the sixth research objective – Identify the reasons that influence problem solving governance framework.
6. If a collaborative governance model was selected, which were the roles and expected interactions between the participants?
    a. Related to the seventh research objective – Identify to what extent do problem solvers promote a collaborative and interactive process.
7. Which mechanisms were applied in order to address opinion or conflict values emerged throughout the problem solving process?
    a. Related to the eighth research objective – Identify what kind of mechanisms do companies use to solve conflicts.
8. Which mechanisms are usually used to identify and incorporate all stakeholders (internal and external) needs?
    a. Related to the ninth research objective – Identify what kind of stakeholder management model companies use, depending on their business sector and context.
9. What is the stakeholders' role within the problem solving and value creation process?
    a. Related to the tenth research objective – Identify to what extent to do companies adopt a joint problem solving process.

4. Results and Discussion

The following chapter aims to provide a comprehensive characterization of the interviewed population and an extensive analysis of the collected evidence, trying to answer all the proposed research objectives, thus allowing to identify how business managers react to complexity, uncertainty and urgency of strategic problems, and what are the factors with a greater influence in the selected approach.

4.1. Sample characterization

Based on the collected data, the present section intends to provide an extensive characterization of the twenty-two (22) interviewees, and comprises seven (7) segmentation variables: gender; work location; type of business title; range of years managing the company or business unit; company sector; range of company turnover; and finally, the type of problem.

Regarding the first variable, gender, it was possible to collect eighteen (18) responses from men, and four (4) from women, each representing 82% and 18% of the responses, respectively.

Additionally, interviewed business managers are mainly based in Portugal, accounting for seventeen (17) of the twenty-two (22) interviews. The remaining five (5) interviews were conducted to business managers located in the UK, with three (3) interviews, and in the USA and Germany, with one (1) interview each. This represents a rate of 77% of the respondents working in Portugal.

Furthermore, out of the twenty-two (22) interviews, nineteen (19) of them were conducted to business managers working in business services, and only three (3) working in industry related companies. Business managers working in banking and financial services, or consulting services, represent 50% of the entire sample, with seven (7) and four (4) responses, respectively.

Table 1 - Interviewees sector of activity

Sector of activity	Sub-sector	Respondents	Percentage
Services	Banking and Financial Services	7	31,82%
	Consulting Services	4	18,18%
	Gaming	1	4,55%
	Legal Services	1	4,55%
	Marketing and advertising	1	4,55%
	Private Equity	1	4,55%
	Public Institute	1	4,55%
	Social Innovation	1	4,55%
	Software as a Service	1	4,55%

Sector of activity	Sub-sector	Respondents	Percentage
	Software Development	1	4,55%
Industry	Retail	1	4,55%
	Oil & Gas	1	4,55%
	Power & Utilities	1	4,55%
Total		**22**	**100,00%**

The interviews targeted business managers holding senior or top management positions within the companies, with eleven (11) responses for each of the categories. From all of the identified business titles, the most representative ones were board members and head of unit, with seven (7) and six (6) responses, respectively.

Table 2 - Interviewees seniority level

Seniority level	Business title	Respondents	Percentage
Top-management	Board Member	7	31,82%
	Partner	2	9,09%
	Senior Vice-President	2	9,09%
Senior-management	Head of Unit	6	27,27%
	Senior Manager	3	13,64%
	Director	2	9,09%
Total		**22**	**100,00%**

The sample is also characterized by 86% of the individuals managing the company or business unit for less than 5 years, more precisely, 45% between one (1) and two (2) years, and 41% between three (3) and four (4) years.

Table 3 - Time managing the company or business unit

Number of years	Respondents	Percentage
Between 1 and 2 years	10	45,45%
Between 3 and 4 years	9	40,91%
5 or more years	3	13,64%
Total	**22**	**100,00%**

The sample shows an even distribution of responses considering the companies turnover, nonetheless, respondents working in companies with a turnover above 500 million € were the most representative ones, with 32%.

Table 4 - Companies turnover in 2021

Companies turnover range	Respondents	Percentage
Less than 10 M €	6	27,27%
Between 10 M and 99 M €	3	13,64%
Between 100 M and 499 M €	6	27,27%
More than 500 M €	7	31,82%
Total	**22**	**100,00%**

Through the analysis of the responses, it was possible to contextualize the problems faced by business managers within three (3) categories: business expansion, business contraction and organizational development. Business expansion related problems, were the most representative ones, with 45%, followed by business contraction related problems, with 32%, and finally, organizational development problems, with 23% of the responses.

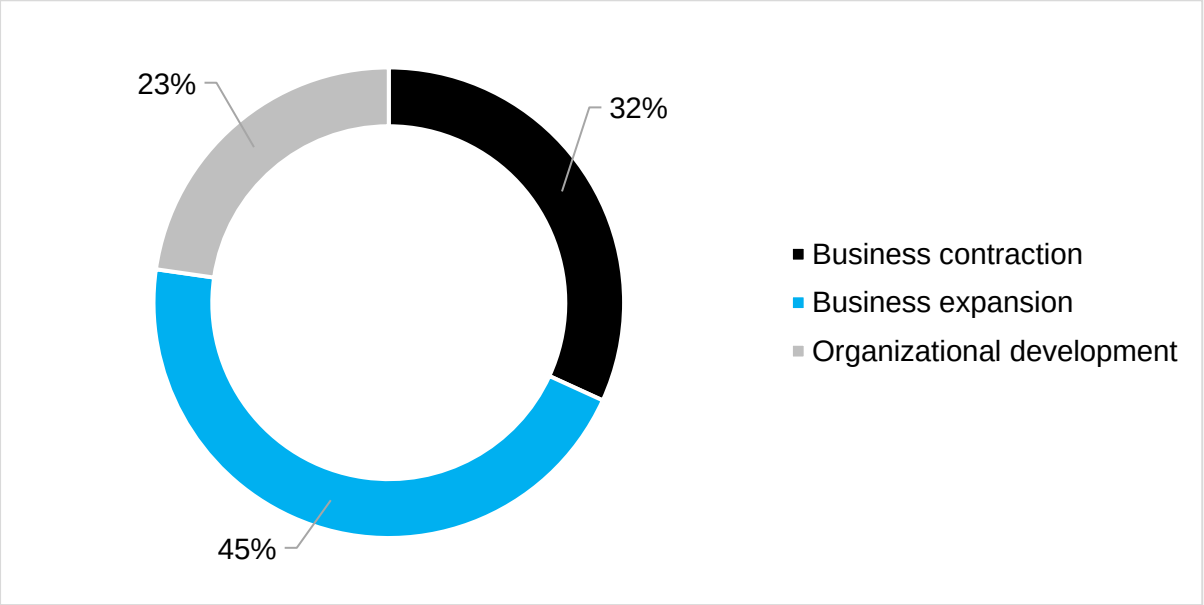

Figure 1 - Context of the problems

Finally, the three (3) categories were further segmented into thirteen (13) problem clusters, with the six (6) most mentioned problems representing 68% of all the analyzed cases: new products (18%), HR management (14%) and new markets, company's structure, company's resolution and business efficiency (9% each).

Table 5 – Problems characterization

Problem context	Problem Cluster	Respondents
Business expansion	New product	4
	Company structure	2
	New market	2
	Merger of companies	1
	New headquarters	1
Business contraction	Company resolution	2
	Business divestment	1
	Capacity to fulfil demand	1
	Market share	1
	Merger of companies	1
	Partial externalization	1
Organizational development	HR management	3
	Business efficiency	2
Total		**22**

4.2. Results analysis and discussion

In order to enable a comprehensive understanding of the results, first, this study presents an overall analysis of the captured insights, identifying the frequency and co-occurrence of words in the entire sample.

The analysis of words' frequency allows to identify a prevalence of nouns related to problems affecting a company, requiring the need to consider its business context (market), stakeholders and team, in order to apply a process to achieve a decision. To mention that problems are often associated to new, different, necessary and strategic situations, and the most mentioned verbs unveil an apparent course of action towards the resolution of the problem, by identifying, defining, creating, making, working and ensuring, but also by adopting an inclusive approach, by involving, allowing and considering.

Table 6 - Interviews word frequency

Nouns	Frequency	Adjectives	Frequency	Verbs	Frequency
Company	125	New	63	Make	61
Problem	96	Different	45	Identify	51
Process	94	Necessary	29	Define	48
Decision	88	Strategic	28	Involve	42
Team	86			Ensure	36
Stakeholders	73			Work	34
Need	71			Allow	31
Market	67			Create	31
				Consider	30

Complementarily, the interviews co-occurrence of words allows to identify an apparent relationship between several actions, which take place during the problem solving process, as can be seen in the highlighted blue square, in the figure below.

It is possible to verify that problems are related to a need or opportunity, which requires a process, involving both the team and other stakeholders, in order to identify, analyze, discuss, create, define a solution, and to make a decision.

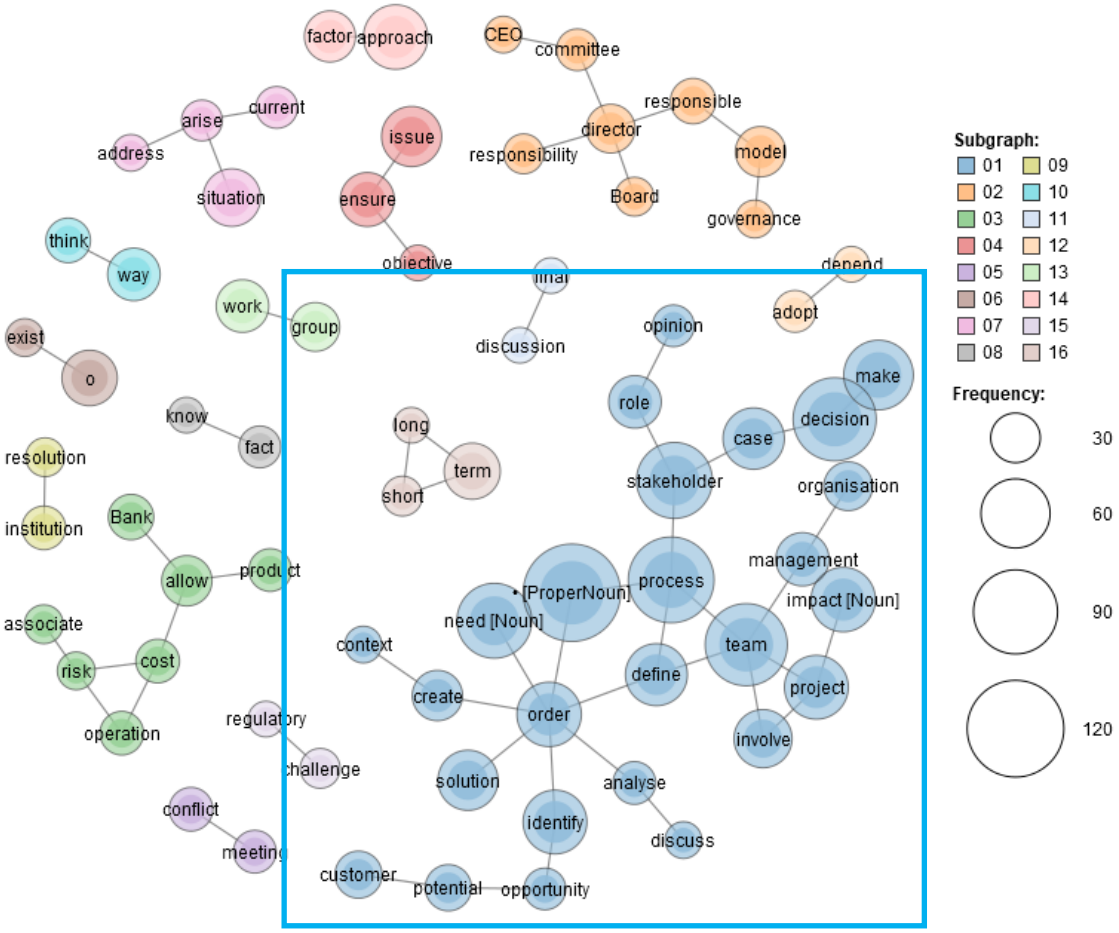

Figure 2 - Interviews co-occurrence of words

Objective no.1

The **first research objective is to verify how companies set the agenda of problem solving**, therefore business managers were requested to identify the criteria used both to identify the problem and to prioritize it.

Regarding the problem identification, five (5) criteria were mentioned, with the most representative one being the business context (39%), followed by previously defined business plan guidelines (26%), together accounting for 65% of the used criteria.

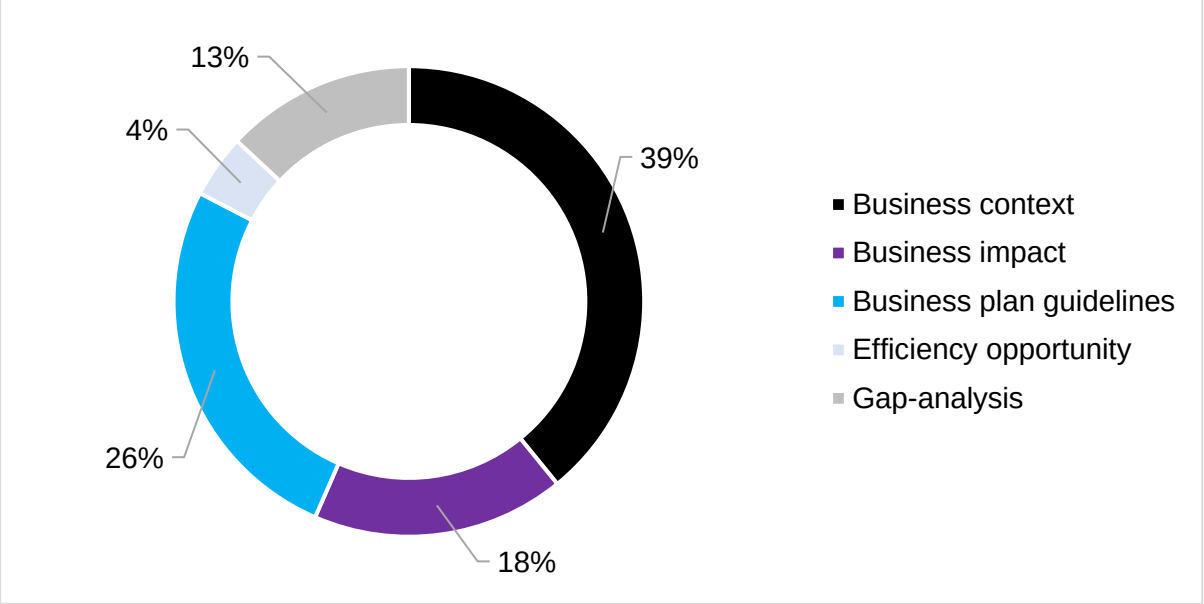

Figure 3 - Criteria used to identify the problem

Additionally, in terms of the problem prioritization, business managers mentioned eleven (11) criteria. The problem's business impact accounts for 41% of all the criteria, followed by the growth opportunity presented by it, with 15%.

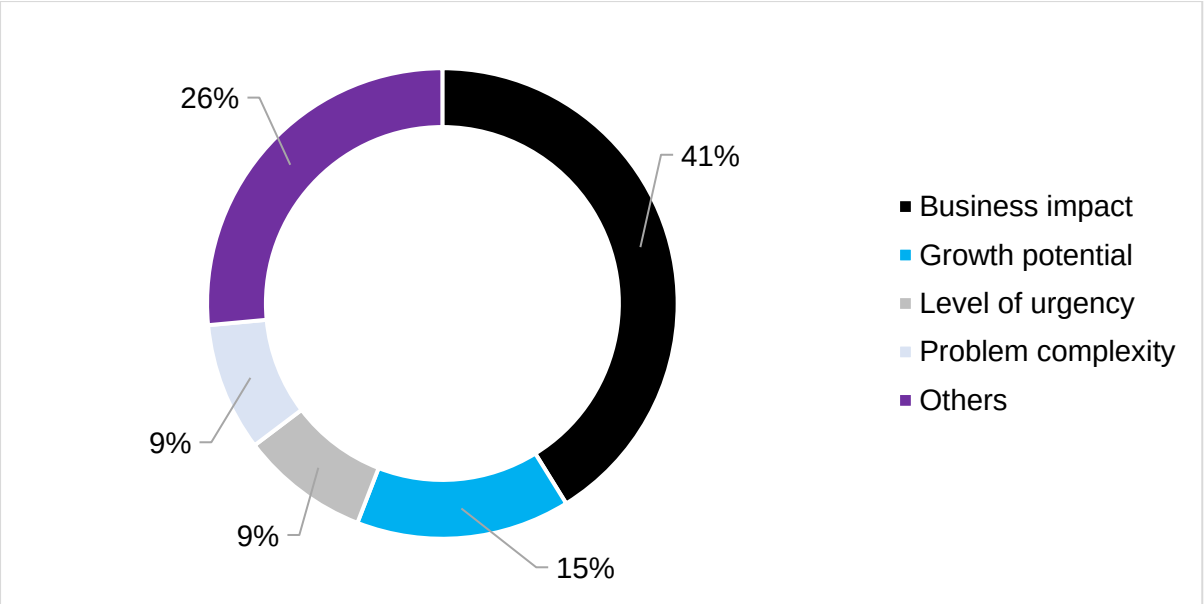

Figure 4 - Criteria used to prioritize the problem

According to Simon et al. (1987), the very first steps in the problem solving process are the least understood. What brings and should bring problems to the head of the agenda is of the utmost importance, because both individuals and organizations have limited capacities for dealing with many tasks simultaneously. This may lead to some problems receiving full

attention, while others are incorrectly neglected, because when new problems arise, “fire-fighting” usually replaces planning and deliberation.

Based on the collected evidence, it was possible to verify and understand that, in today’s world, the dynamism of the context and the problem’s impact in a company’s activity, both play a significant role in setting the problem solving agenda.

Objective no.2

The **second research objective aims to verify if companies adopt scientific approaches for problem solving**. In order to be able to answer this question, business managers were asked to describe the process used by the company, while addressing the problem, and subsequently, several data mining techniques were applied to identify process stages’ trends in the observed sample.

First, answers were analyzed and segmented by type of approach, being labeled as structured or unstructured and as intuitive or systematic approaches (Mohaghegh and Furlan, 2020). From this segmentation, it was possible to identify that 73% of the participants followed a structured approach, of which, 55% using a systematic method and 18% doing it intuitively. The remaining 27% followed an unstructured and intuitive approach.

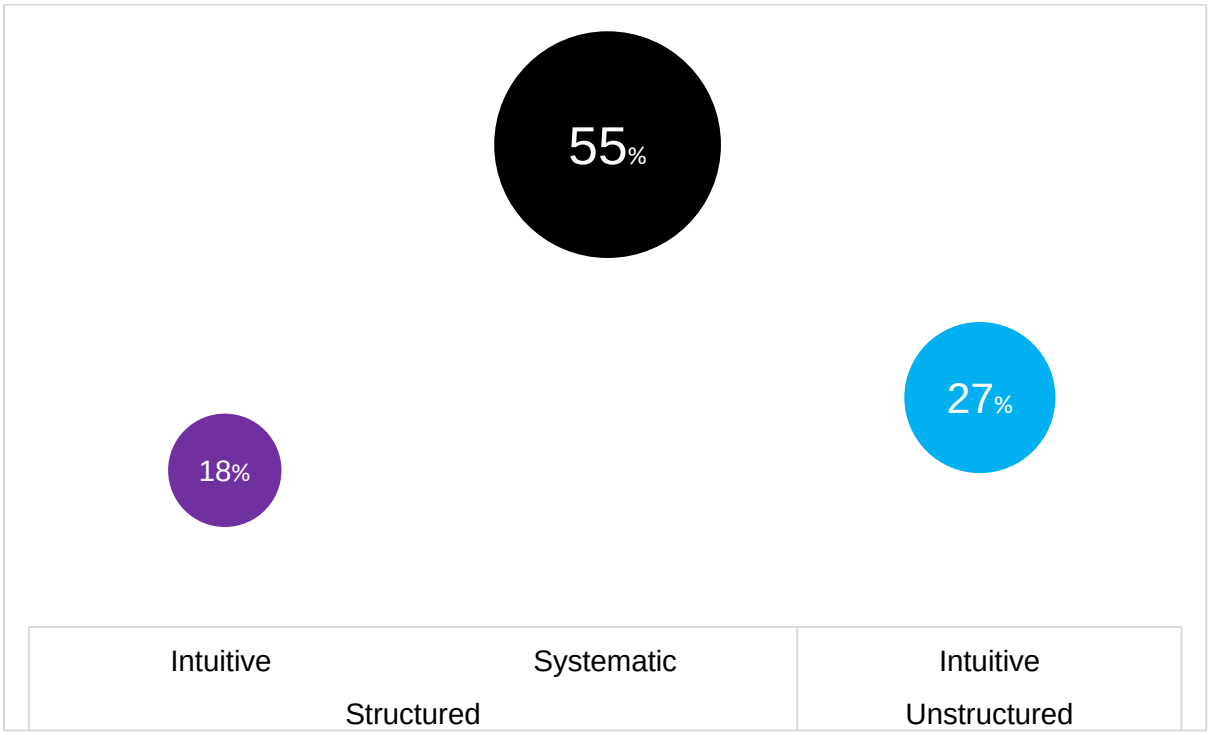

Figure 5 - Type of process used to solve the problem

Second, an identification of the most frequent process phases was performed, by analyzing the frequency of actions/verbs mentioned in the observed sample, being possible to verify that actions like “identify”, “analyze”, “define” and “create” were the most prevalent ones. Except for one (solution selection), the most frequent verbs are in line with the commonly agreed set of logically connected steps of systematic problem solving: problem definition; problem analysis; solution design and alternatives evaluation; and solution selection (Mohaghegh and Furlan, 2020).

Table 7 – Most frequent process phases – Frequency of verbs

Word	Define	Identify	Analyze	Create
Frequency	18	15	11	11

Word	Make	Understand	Consider	Ensure
Frequency	11	9	8	8

An analysis of the process phases co-occurrence of words allows to get a similar result (as highlighted in the figure below), being possible to verify that in order to address a problem, there is the need to deploy a process including the identification of the problem, collection of information, analysis of the problem and definition of a solution.

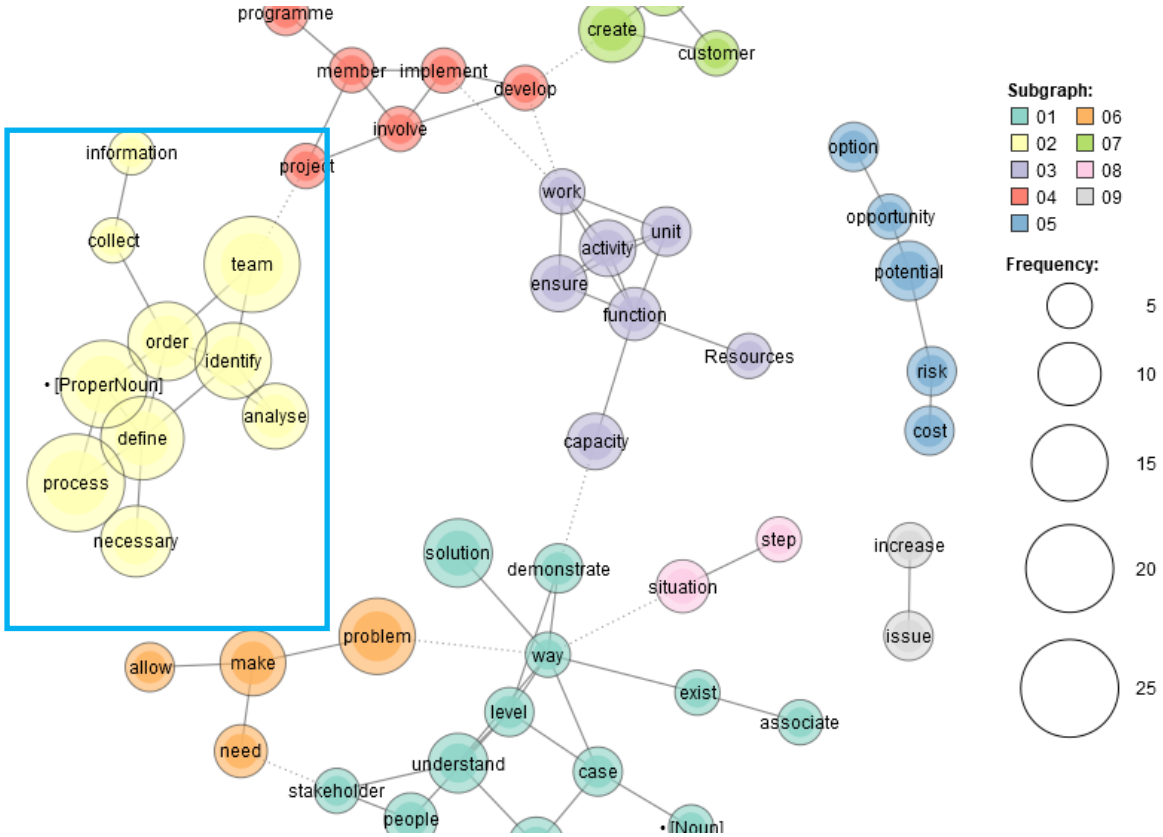

Figure 6 - Process phases co-occurrence of words

Based on Pereira et al. (2021) proposed framework for complex problem solving, it is possible to verify that structured approaches usually consider several staged phases, of which, the problem definition, the analysis of causes, generation of solutions and their evaluation and selection.

However, based on the performed research, it was possible to verify that, in spite of a considerable adoption of structured approaches, following most of the above-mentioned phases, usually companies and business managers tend to neglect the evaluation and selection of solutions.

Objective nº3

The **third research objective intends to identify the factors that have a greater impact in the problem solving implemented approaches**. From the collected evidence, it was possible to identify a total of twelve (12) factors, of which, the most relevant ones are the nature of the problem, the business context, the existence of learning infrastructures, the organizational culture and the presence of a transformational leadership, representing 69% of the mentioned criteria.

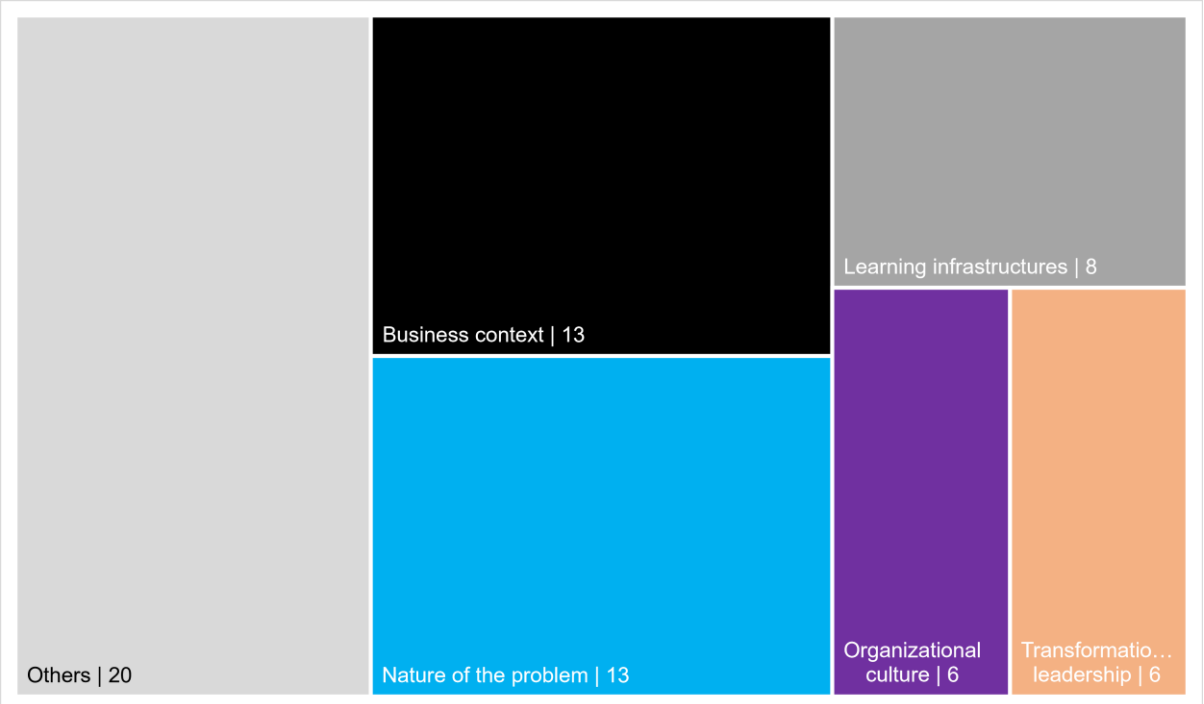

Figure 7 - Most relevant factors influencing the approach

The nature of the problem and the business context, combined, represent 39% of the mentioned criteria, and the learning infrastructures, organizational culture and

transformational leadership account for more 30%. Regarding the two (2) most frequent factors, the nature of the problem was mentioned mainly due to the problem complexity and uncertainty, and the business context, due to the environmental dynamism. Moreover, learning infrastructures were mentioned due to the need of involved stakeholders' experience, multiplicity of visions and capacities, and finally, organizational culture and transformational leadership were mentioned, respectively, for the need of a cohesive and collaborative culture, and for the leaders' mindset, agenda and behavior.

Table 8 - Detailed influencing factors

Influencing factors	Frequency
Business context	13
Nature of the problem	13
Learning infrastructures	8
Organizational culture	6
Transformational leadership	6
Time availability	5
Impact in business success	4
Information availability	4
Stakeholders expectations	2
Urgency	2
Required investment	1
Strategic guidelines	1
Total	**65**

Mohaghegh and Furlan (2020) research suggests that the main supporting factors of SPS are nature of the problem, time availability, information availability, collaborative culture, transformational leadership, organizational learning infrastructures and environmental dynamism.

This is largely confirmed by the performed research, especially when analyzing answers from managers who adopted systematic approaches, with 92% of the mentioned factors being the same as the ones suggested by Mohaghegh and Furlan.

Table 9 - Factors influencing the selected approach to managers who followed a systematic approach

Influencing factors to managers who followed SPS	Frequency	Percentage
Business context	7	18,92%
Nature of the problem	7	18,92%
Learning infrastructures	6	16,22%
Time availability	4	10,81%
Transformational leadership	4	10,81%
Information availability	3	8,11%

Influencing factors to managers who followed SPS	Frequency	Percentage
Organizational culture	3	8,11%
Impact in business success	1	2,70%
Strategic guidelines	1	2,70%
Urgency	1	2,70%
Total	**37**	**100,00%**

Objective no.4

The **fourth research objective intends to clarify the impact of unfamiliarity / time horizon in the selected approach**, and a first analysis of the issue shows a balance between business managers who believe that it would not affect the process (52%), and the ones who believe it would (48%).

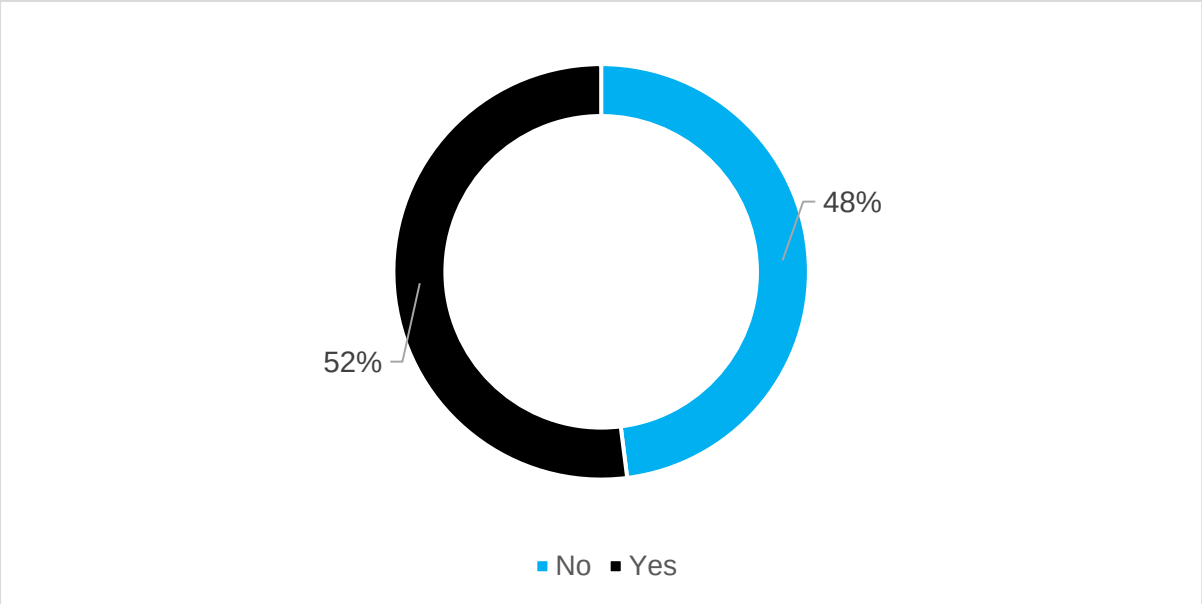

Figure 8 - Perception of the time horizon affecting the approach

However when the responses are segmented, it is possible to verify that the perception of business managers regarding the impact of the time horizon is affected by the amount of time managers had to solve the problem. Managers who had considerable time to solve the problem, tend to believe that the time horizon would not affect the approach (82%), while managers who had limited time to address the problem, tend to say that it would (79%).

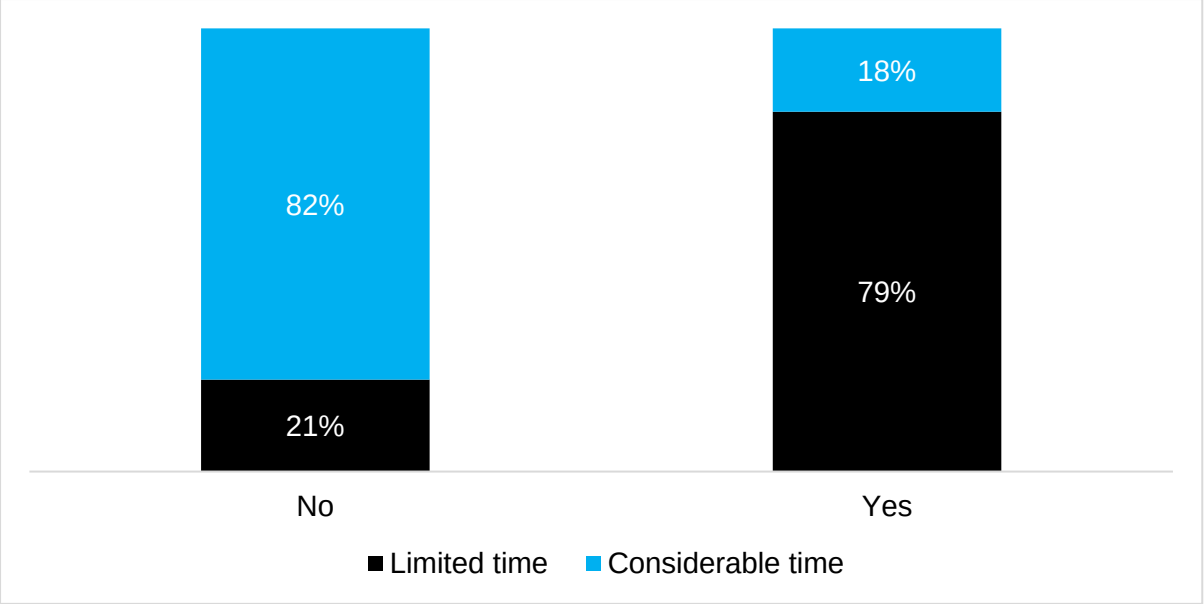

Figure 9 - Impact of the time horizon, segmented by available time

Ritala et al. (2016) proposed a taxonomy of unfamiliar problems along the dimensions of the degree of unexpectedness (i.e., lack of preparedness) and urgency (referring to time pressure) and suggested that more research was needed to verify how business managers adapt given unfamiliar problems and to what extent are they able to make conscious choices.

Based on the collected evidence, even not being possible to assure that unfamiliarity and the underlying time horizon influence the selected approach, given the variance of answers, depending on the available time to solve the problem, it is reasonable to assume that there is an high probability that they do.

Objective no.5

The **fifth research objective was designed to try to verify if the problem's outlook also influences the approach.** As for the previous objective, a first analysis indicates that the majority of the participants, 62%, believe that it does not affect the approach, and only 38% believes that it does. However, when a more detailed analysis is performed, it is possible to verify that for half of the participants who said "no" had a "but" which can unconsciously be influencing the approach.

If the "no, but" was accounted as a "yes", then the results would change to 69% of the participants saying that the outlook of the problem affects the approach, and only 31% saying that it doesn't affect the problem solving process.

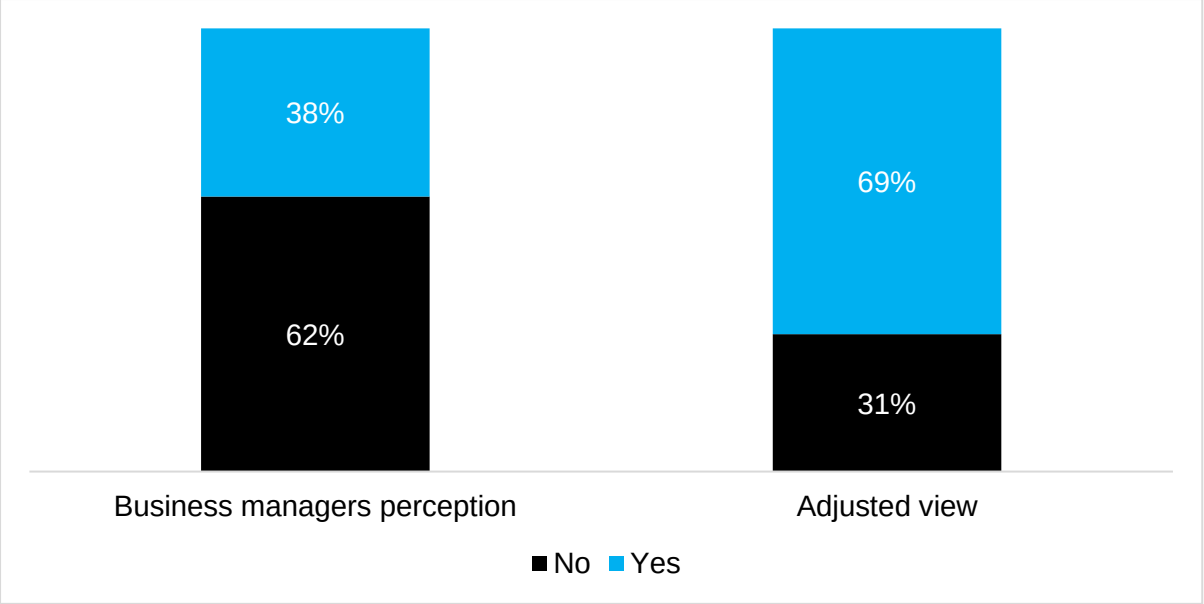

Figure 10 – Perception if the outlook affects the approach

Considering the collected evidence, the most relevant factors affecting the approach are the different kind of solution that would have to be developed (5), the different factors that would be influencing the problem (4), the different criteria that would have to be considered (2) and the different objectives that would have to be achieved.

Table 10 - Perspective of managers who said that it does not affect the approach "but"

Impacts the approach?	How?	Frequency
No, but	Different criteria to evaluate	2
	Different factors influencing	2
	Different objectives	2
	Can increase satisfaction	1
	Could have lower pressure	1
	Easier to achieve objective	1
Total		**9**

Table 11 - Perspective of managers who said that it affects the approach

Impacts the approach?	How?	Frequency
Yes	Different type of solution	5
	Different factors influencing	2
	Different phases	1
	Deeper phases	1
	More phases	1
	Different impact in business	1
Total		**11**

According to Dörner and Funke (2017), complex problem solving is a collection of self-regulated psychological processes, necessary in dynamic environments to achieve ill-defined goals, by combining cognitive, emotional and motivational aspects, particularly in high-stakes situations.

Performed research allowed to reinforce this statement by verifying that, even unconsciously, business managers tend to adapt their approach when fundamental factors, such as the problem's resolution outlook, change.

Objectives no.6 & no.7

The **sixth and seventh objectives aim to understand if business managers promote a collaborative and interactive process, and the reasons that influence the problem solving governance framework.** It was possible to verify that all the participants stated that a collaborative and interactive model was adopted in order to address the problem.

Figure 11 - Type of governance model

Nonetheless, truly collaborative models (represented by working groups or designated teams working along to solve the problem), only account for 22% of the adopted approaches. Mainly, strategic problems were addressed using hierarchical models, with the tone being set by the board. Board level committees account for 22%, and top down-approaches for 52% of the adopted models.

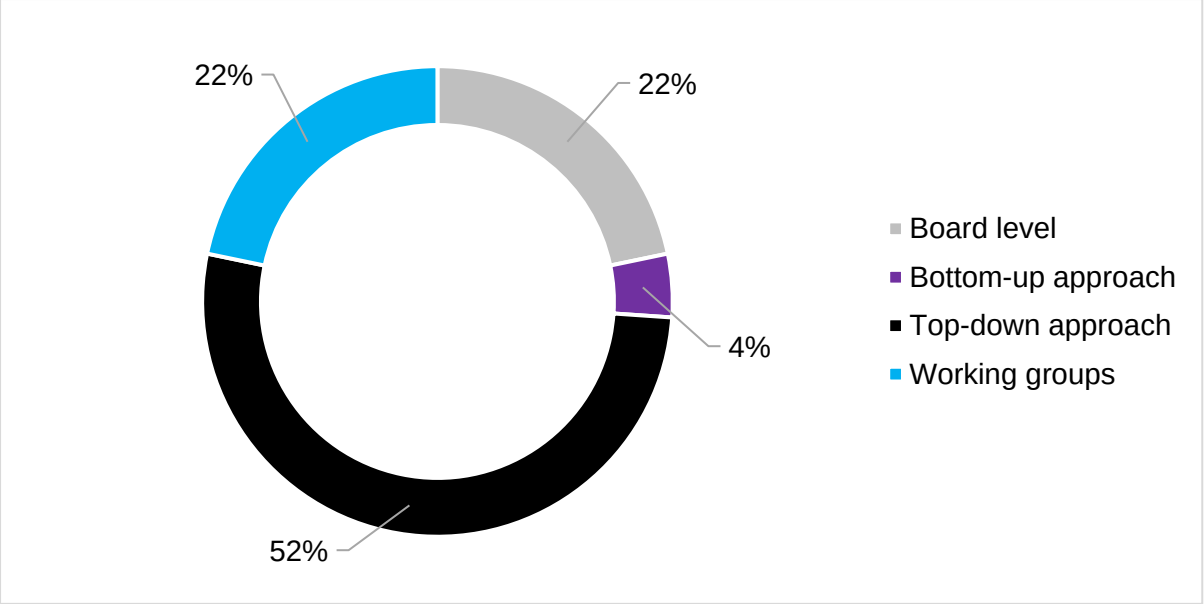

Figure 12 - Adopted governance structure

Bhardwaj et al. (2018) stated that future research should evaluate whether the adoption of individual or group frameworks, the characteristics of group members and the nature of their interaction affect problem solving. Furthermore, Shaikh (2016) concluded that debate and scrutiny have very negative connotations, whereas decisiveness and decision speed are favored, thereby creating a pull of gravity towards acceptance of a decision proposal.

Based on the observed sample, it is plausible to assume that governance models are affected by the impact of the problem in the business, since these problems tend to highlight a more active and visible business leaders' intervention. Nonetheless, all participants mentioned the adoption of collaborative governance models, in order to address strategic problems, thus opposing part of Shaikh conclusion, that debate and scrutiny have negative connotations. However, as verified in the objective no.2, apparently companies promote debate and discussion to analyze problems, but tend to neglect the evaluation and selection of solutions.

Objective nº8

The **eighth objective intends to verify what kind of mechanisms companies use in order to solve conflicts** (of interests, values, or opinion misalignments) that may arise during the problem solving process. As stated by Simon et al. (1987), the resolution of conflicts should be a relevant direction of inquiry. Following this suggestion, performed research allowed to verify that 55% of companies adopt formal mechanisms to address conflicts, while 45% adopt informal mechanisms.

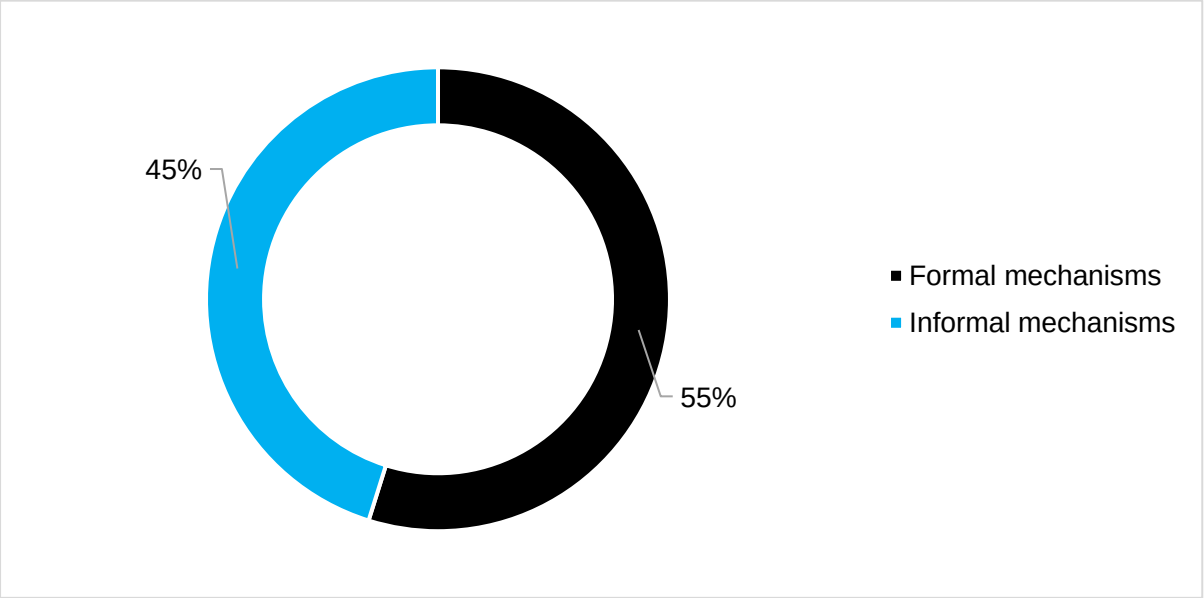

Figure 13 - Type of available mechanisms to address conflicts

It was also possible to verify that, regardless of being formal or informal, most of the mechanisms are associated to preventive approaches, trying to avoid conflicts occurrence, with 67% of the mentioned methods. Conversely, reactive approaches account for 33% of the mentioned methods.

Moreover, a combined perspective of type of mechanism and nature of the mechanism allowed to highlight that companies that have formal mechanisms in place, tend to show a balance between reactive and preventive approaches, while companies that adopt informal mechanisms, usually apply them in order to prevent conflicts.

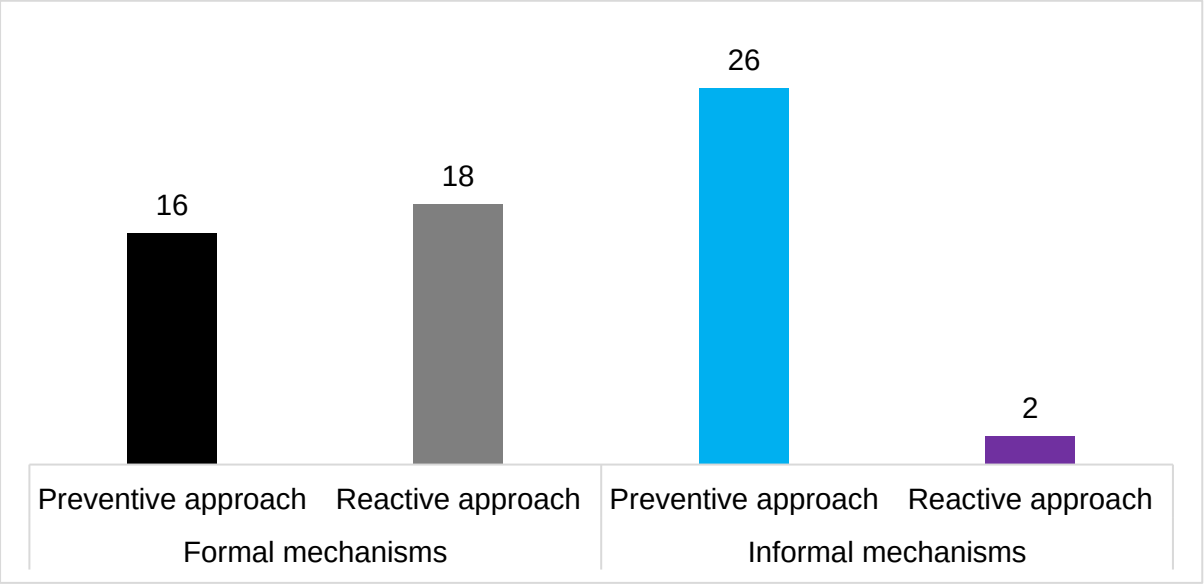

Figure 14 - Type of approaches associated to those mechanisms

From the collected evidence, it was possible to verify that preventive approaches are usually related to three (3) main factors: holding recurrent meetings; culture of the company; and synthesis capacity. These three (3) factors, together, account for 85% of the verified preventive approaches.

Meetings represent 38% of the preventive methods, and are related to the continuous monitoring of the problem solving process, thus allowing to bring together all key stakeholders and an early identification of potential future risks and conflicts. Business culture also plays an important role, with 30% of the preventive methods, by promoting a constructive attitude, an healthy environment, a sense of common good and by ensuring that everyone's opinion is taken into account. The third factor, synthesis capacity, with 14% of the preventive methods, is related to the ability of consistently present status reports, action plans and clear scenarios, in order to make sure that everyone is aligned and has the same level of information.

Conversely, reactive approaches are mainly related to the existence of established decision processes in order to address identified conflicts. From the collected evidence, hierarchical decision accounts for 55%, and voting processes for 30% of the reactive approaches.

Table 12 - Methods applied to address conflicts

Type of approach	Method	Frequency
Preventive approach	Meetings	16
	Culture	14
	Synthesis	6
	Robustness	2
	Assessments	1
	Communication	1
	Dynamism	1
	Monitoring	1
Reactive approach	Hierarchy	11
	Voting	6
	Meetings	2
	Process	1
Total		**62**

Objective nº9

In order to address Bridoux and Stoelhorst (2022) recommendation, to further explore cooperation among interdependent actors, whose interests are not fully aligned, the **ninth**

objective was designed to verify what kind of stakeholders management models companies use, by identifying which mechanisms are available to identify and incorporate their needs in the problem solving process.

It was possible to verify that most companies use proactive mechanisms to incorporate stakeholders' needs, accounting for 86% of the ten (10) identified methods. Consultation initiatives and requirements' monitoring are the most common methods, representing 39% and 19% of the observed sample, respectively.

Consultation initiatives are usually related to a one-of reach out to the stakeholders, trying to gather their insights, needs, concerns and expectations regarding the problem requiring attention.

Conversely, requirements' monitoring is usually associated with established recurrent mechanisms, as holding regular meetings with stakeholders, in order to manage expectations, validate progress and verify if everyone's needs are being correctly taken into account.

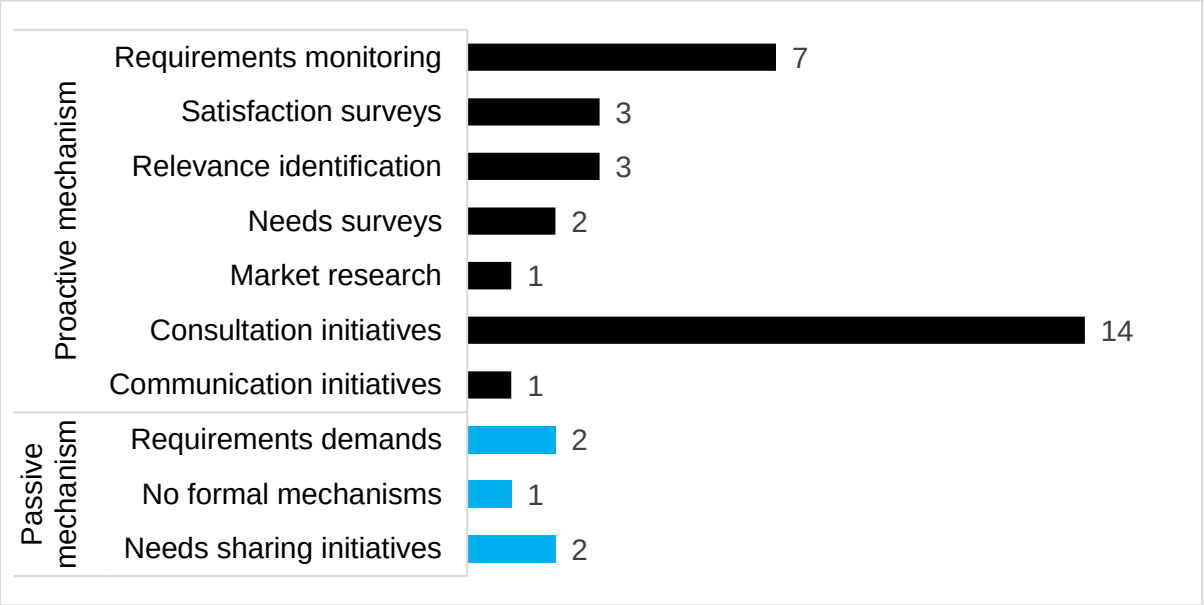

Figure 15 - Type of available mechanisms to include stakeholders' needs

Objective no.10

The **tenth objective aims to verify to what extent companies adopt a joint problem solving process**, by identifying stakeholders' roles within the problem solving process. It was possible to verify that joint problem solving approaches (by actively including stakeholders in the process), only account for 31% of the answers. Additionally, 9% of the answers also mentioned the use of stakeholders in order to validate the solutions before implementing them.

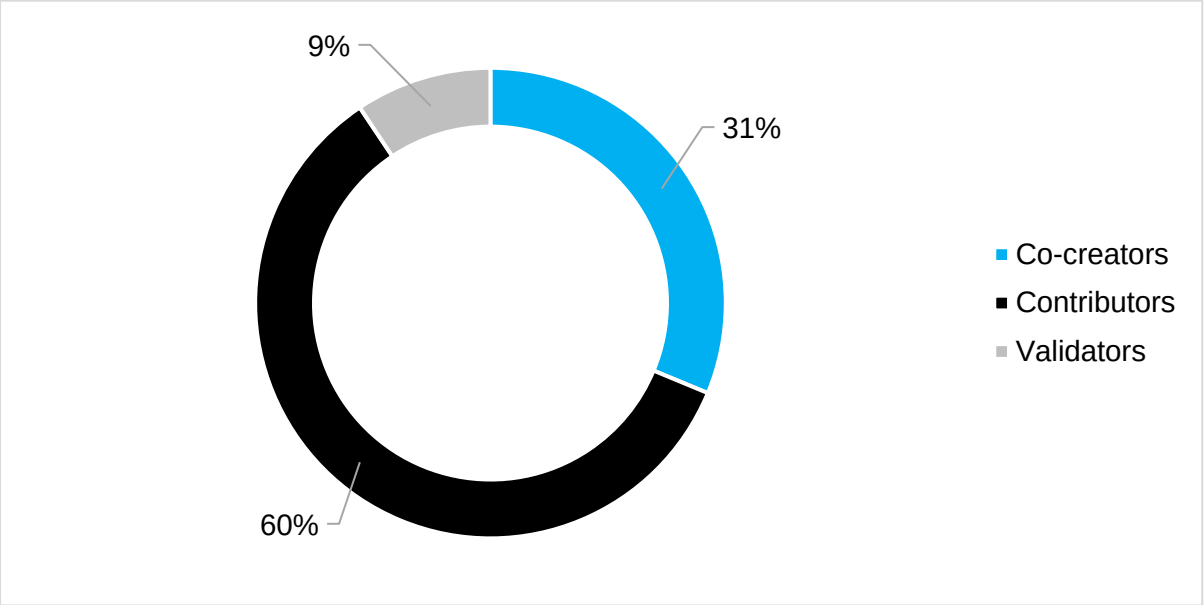

Figure 16 – Stakeholders' roles within the problem solving process

Aarikka-Stenroos and Jaakkola (2011) suggested that the exploration of joint problem solving for value between network actors could provide interesting multi-actor perspectives, but collected evidence shows that most companies still see other stakeholders as mere contributors to the problem solving process.

However, within companies that adopt joint value creation processes, it was possible to verify that usually business partners, followed by other business units affected by the problem and customers, take the co-creator role.

Table 13 - Who are the validators and co-creators?

Roles	Who?	Frequency
Co-creators	Business partners	4
	Other business units	3
	Customers	2
	Regulators	1
Validators	Business partners	1
	Customers	1
	Suppliers	1
Total		**13**

5. Conclusions and Recommendations

This study allowed to support the hypothesis that business managers adapt their behavior under the presence of the complexity, uncertainty and urgency usually associated to strategic problems, thus influencing the selected approach to address them.

Performed research verified that problems are usually related to a need or opportunity, requiring a process that involves both the team and other stakeholders, in order to identify, analyze, discuss, define and create a solution, and to make a decision.

It was possible to identify a tendency towards the adoption of systematic approaches to solve strategic problems, following structured processes that include the identification of the problem, the analysis of the problem and the definition of solutions, but lacking the final phase of solutions prioritization and selection. Therefore, making it plausible to assume that generally companies follow a path of developing a single solution, instead of exploring several possibilities, before selecting the most adequate one.

Based on the collected evidence, it was also possible to verify that the dynamism of the context and the problem's impact in a company's activity play a significant role in setting the problem solving agenda.

Additionally, when requested to identify the factors that have a greater impact in the selected approach, business managers stressed out the nature of the problem and the business context, as the most relevant factors when facing a strategic problem.

Moreover, based on the identified bias regarding the impact of the problem's time horizon and its resolution's outlook, even if it is not possible to assure that these criteria affect the selected approach, it is reasonable to assume that there is an high probability that they do.

Conversely, concerning the problem solving governance model, it was transversely mentioned that collaborative and interactive models were adopted to address the problems. However, these models were usually implemented at a Board level or following a top-down approach, making it plausible to assume that governance models are affected by the impact of the problem in the business, leading business leaders to a more active role.

From another point of view, regarding the resolution of conflicts that may arise during the problem solving process, it also was possible to verify that companies, that have formal mechanisms in place, tend to show a balance between reactive and preventive approaches. On the other hand, companies that adopt informal mechanisms usually applied them in order to prevent conflicts. Additionally, regardless of being formal or informal, most of the mechanisms are associated to preventive approaches, trying to avoid conflicts occurrence.

Finally, it was possible to verify that most companies use proactive mechanisms to incorporate stakeholders' needs, both by using one-of reach outs and recurrent methods, but

at the same time, most companies don't use joint value creation processes to address problems.

Nonetheless, performed research followed an empirical approach, thus requiring future studies to expand its range of analysis, gathering evidence from a broader population, and by doing it, enhancing its statistical relevance and representativeness of certain parameters.

This study was focused in past successfully solved problems, thus requiring future studies to mitigate potential bias of what is considered successful and how different factors (such as the time horizon and the outlook) affect the approach, by evaluating different strategic problems addressed by a business manager.

The observed sample was characterized mainly by business services, specially banking, financial services and consulting services, thus not evaluating a wide range of services and industries. Moreover, most responses were obtained from business managers based in Portugal and from male business managers, thus requiring future studies to consider more comprehensive and diverse target samples.

Additionally, the study was focused in the process of solving problems, but it would also be relevant to monitor and measure the solution's implementation success, to analyze how its outcomes are incorporated in future related problems and to what extent is the problem solving process an iterative process.

Bibliography

Aarikka-Stenroos, L. and Jaakkola, E. (2011), Value Co-Creation in Knowledge Intensive Business Services: A Dyadic Perspective on the Joint Problem Solving Process, Industrial Marketing Management, Vol. 41, p. 15-26, DOI: 10.1016/j.indmarman.2011.11.008

Bhardwaj G., Crocker, A., Sims, J. and Wang, R. (2018), Alleviating the Plunging-In Bias, Elevating Strategic Problem-Solving, Academy of Management Learning & Education, Vol. 17, No. 3, p. 279-301, DOI: 10.5465/amle.2017.0168

Boavida, R., Navas, H., Godina, R., Carvalho, H. and Hasegawa, H. (2020), A Combined Use of TRIZ Methodology and Eco-Compass Tool as a Sustainable Innovation Model, Applied Sciences, Vol. 10, No. 3535, DOI: 10.3390/app10103535

Bower, J. (1982), Solving the Problems of Business Planning, The Journal of Business Strategy, Vol. 2, No. 3, p. 32-44

Bridoux, F. and Stoelhorst, J. (2022), Stakeholder Governance: Solving the Collective Action Problems in Joint Value Creation, Academy of Management Review, Vol. 47, No. 2, p. 214-236, DOI: 10.5465/amr.2019.0441

Buttner, H. and Gryskiewicz, N. (1993), Entrepreneur's Problem-Solving Styles: An Empirical Study Using the Kirton Adaptation / Innovation Theory, Journal of Small Business Management, p. 22-31, https://www.researchgate.net/publication/285897938

Chai, K., Zhang, J. and Tan, K. (2005), A TRIZ-Based Method for New Service Design, Journal of Service Research, Vol. 8, No. 1, p. 48-66, DOI: 10.1177/1094670505276683

Cooper, M. and Loe, T. (2000), Using the Theory of Constraints' Thinking Processes to Improve Problem-Solving Skills in Marketing, Journal of Marketing Education, Vol. 22, No. 2, p. 137-146

Dörner, D. and Funke, J. (2017), Complex Problem Solving: What It Is and What It Is Not, Frontiers in Psychology, DOI: 10.3389/fpsyg.2017.01153

Hugo, O. and Garnsey, E. (2005), Problem Solving and Competence Creation in the Early Development of New Firms, Managerial and Decision Economics, Vol. 26, p. 139-148. DOI: 10.1002/mde.1208

Keating, C., Kauffmann, P. and Dryer, D. (2001), A Framework for Systemic Analysis of Complex Issues, Journal of Management Development, Vol. 20, No. 20, p. 772-784

Mello, J., Pinto, B. and Mello, A. (2022), SWOT analysis and GUT matrix for business management and problem solving: an application in a Brazilian case study, Management Letters 22/01, p. 81-93, DOI: 10.5295/cdg.211472jv

Mohaghegh, M. and Furlan, A. (2020), Systematic Problem Solving and Its Antecedents: A Synthesis of the Literature, Management Research Review, Vol. 43, No. 9, p. 1033-1062, DOI: 10.1108/MRR-06-2019-0284

Moehrle, M. (2005), What is TRIZ? From Conceptual Basics to a Framework for Research, Creativity and Innovation Management, Vol. 14, No. 1, DOI: 10.1111/j.1476-8691.2005.00320.x

Nickerson, J., Yen, C. and Mahoney, J. (2012), Exploring the Problem Finding and Problem Solving Approach for Designing Organizations, Academy of Management Perspectives, p. 52-72, DOI: 10.5465/amp.2011.0106

Pereira, L., Santos, R., Sempiterno, M., Costa, R., Dias, Á. and António, N. (2021), Pereira Problem Solving: Business Research Methodology to Explore Open Innovation, Journal of Open Innovation: Technology, Market and Complexity, Vol. 7, No. 84, DOI: 10.3390/joitmc7010084

Rindova, V. and Martins, L. (2021), Shaping Possibilities: A Design Science Approach to Developing Novel Strategies, Academy of Management Review, Vol. 46, No. 4, p. 800-822, DOI: 10.5465/amr.2019.0289

Ritala, P., Andreeva, T., Kosonen, M. anda Blomqvist, K. (2011), A Problem-Solving Typology of Service Business, The Electronic Journal of Knowledge Management, Vol. 9, No. 1, p.37-45, ISSN 1479-4411

Ritala, P., Heiman, B. and Hurmelinna-Laukkanen, P. (2016), The Need for Speed - Unfamiliar Problems, Capability Rigidity, and Ad Hoc Processes in Organizations, Industrial and Corporate Change, Vol. 25, No. 5, p. 757-777, DOI: 10.1093/icc/dtw028

Simon, H., Dantzig, G., Hogarth, R., Plott, C., Raiffa, H., Schelling, T., Shepsle, K., Thaler, R., Tversky, A. and Winter, S. (1987), Decision Making and Problem Solving, Interfaces, Vol. 17, No. 5, p. 11-31, DOI: 10.1287/inte.17.5.11

Shaikh, K. (2016), What Made the Difference between Senior Executives' Best and Worst Strategic Decisions? Factors Influencing Effective Strategic Decision-Making at the Executive Level, Decision Sciences Institute, http://hdl.handle.net/2186/ksl:2006058286

Steiner, G. (2009), The Concept of Open Creativity Collaborative Creative Problem Solving for Innovation Generation – a Systems Approach, Journal of Business and Management, Vol. 15, No.1

Su, C., Lin, C. and Chiang, T. (2008), Systematic Improvement in Service Quality Through TRIZ Methodology: An Exploratory Study, Total Quality Management, Vol. 19, No. 3, p. 223-243, DOI: 10.1080/14783360701600662

Szarucki, M. (2013), Model of Method Selection for Managerial Problem Solving in an Organization, Business, Management and Education, Vol. 11, No. 1, p. 168-187, DOI: 10.3846/bme.2013.10

World Economic Forum (2020), These Are the Top 10 Job Skills of Tomorrow – And How Long It Takes to Learn Them, https://www.weforum.org/agenda/2020/10/top-10-work-skills-of-tomorrow-how-long-it-takes-to-learn-them/