

The relative importance of a change agents' competencies to project management approaches

A importância relativa das competências de um agente de transformação para as abordagens de gerenciamento de projetos

La importancia relativa de las competencias de un agente de cambio para los enfoques de gestión de proyectos

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Abstract

Managing projects for success requires a mix of competencies, whether interpersonal, technical, cognitive, and these competencies may explain variations in project performance. In this context, it is challenging to determine the relative importance of change agent competencies for each project management approach. This article aims to present the relative importance of ten competencies of change agents in relation to project management approaches. Through an online questionnaire with change agents, followed by a fuzzy Topsis multicriteria analysis, was identified the degree of belonging of each competence to each project management approach. We identified that team management and project management competencies are essential in the respondent's opinion when using predictive approaches, while leadership and technical competencies are essential for hybrid approaches. For the agile approach, communication skills, flexibility, social skills, problem-solving skills, reliability and professionalism, conflict management and technical competencies were considered essential.

Keywords: Competencies; Competence; Skills; Project management approach; Change agent; Agile.

Resumo

Gerenciar projetos para o sucesso requer uma combinação de competências, sejam elas interpessoais, técnicas, cognitivas, e essas competências podem explicar variações no desempenho do projeto. Nesse contexto, é um desafio determinar a importância relativa das competências dos agentes de transformação para cada abordagem de gerenciamento de projetos. Este artigo tem como objetivo apresentar a importância relativa de dez competências dos agentes de transformação em relação às abordagens de gerenciamento de projetos. Através de um questionário online com agentes de transformação, seguido de uma análise multicritério *fuzzy* Topsis, foi identificado o grau de pertencimento de cada competência a cada abordagem de gerenciamento de projetos. Identificamos que as competências de gestão de equipes e gerenciamento de projetos são essenciais na opinião do entrevistado quando se utilizam abordagens preditivas, enquanto as competências de liderança e técnicas são essenciais para abordagens híbridas. Para a abordagem ágil, habilidades de comunicação, flexibilidade, habilidades sociais, habilidades de resolução de problemas, confiabilidade e profissionalismo, gestão de conflitos e competências técnicas foram consideradas essenciais.

Palavras-chave: Competências; Competência; Habilidades; Abordagem de gestão de projetos; Agente de transformação; Ágil.

Resumen

La gestión de proyectos para el éxito requiere una combinación de competencias, ya sean interpersonales, técnicas, cognitivas, y estas competencias pueden explicar las variaciones en el desempeño del proyecto. En este contexto, es un desafío determinar la importancia relativa de las competencias de los agentes de cambio para cada enfoque de gestión de proyectos. Este artículo tiene como objetivo presentar la importancia relativa de diez competencias de los agentes de cambio en relación con los enfoques de gestión de proyectos. A través de un cuestionario en línea con agentes de cambio, seguido de un análisis multicriterio difuso Topsis, se identificó el grado de pertenencia de cada competencia a cada enfoque de gestión de proyectos. Identificamos que las competencias de gestión de equipos y gestión de proyectos son esenciales en la opinión de los encuestados cuando se utilizan enfoques predictivos, mientras que las competencias técnicas y de liderazgo son esenciales para los enfoques híbridos. Para el enfoque ágil, se consideraron esenciales las habilidades de comunicación, flexibilidad, habilidades sociales, habilidades para resolver problemas, confiabilidad y profesionalismo, manejo de conflictos y competencias técnicas.

Palabras clave: Competencias; Competencia; Habilidades; Enfoque de gestión de proyectos; Agente de cambio; Ágil.

1. Introduction

In the literature, it is possible to find different ways to group competences (e.g., Tett et al., 2000; Shao, 2018; Meirelles, Tereso, & Santos, 2019). The German school, for example, groups competences into domains, ranging from four to eight competencies domains (Anke & Ringeisen, 2021), others group competencies by their characteristics, which can be hard skills, represented by technical competencies, or soft skills, when related to interpersonal competencies (Silva et al., 2019; Stevenson & Starkweather, 2017). Thus, determining a set of standard competencies becomes challenging (Anke & Ringeisen, 2021).

Followers of the American School of Competence define competencies as an underlying characteristic of an individual that is causally related to superior performance in a job or situation (Crawford & Nahmias, 2010). In the business context, we can define competencies as a set of behaviours to achieve work-related skills that provide performance. These competencies can be organized in conceptual frameworks (Bartram, 2005; Tett et al., 2000), facilitating the comparability and evaluation of conceptual works (Anke & Ringeisen, 2021).

Behaviours are understood as the smallest observable part of competence, which can be grouped by similarity in competence domains, which can be associated with a certain work profile, adapting according to need (Anke & Ringeisen, 2021), hence the need to obtain multiple competencies, allowing optimization given the need, in addition to the fact that a multiskilled professional may be preferred by companies (Gomar et al., 2002).

The project management career, due to the evolution of the theme, has several studies related to the competencies of successful project managers. They are assigned the budget, scope, stakeholders, and schedule management as main characteristics, being the basis for the knowledge structure (Bourne & Walker, 2004). Unlike planning-oriented approaches, where the competencies of change agents are well documented, the competencies in agile approaches are still under study and theoretical consolidation (Anke & Ringeisen, 2021). We emphasize that the name of change agent used here refers to the one who initiates or maintains a change effort, whether it is a project manager, agile manager, scrum master or similar.

Far beyond a project management approach, agility has been discussed as a cultural aspect of the company, somehow putting pressure on action at all levels (Kafila et al., 2020). In addition, according Gandomani et al. (2020), there are opportunities to understand the role of a change agent considering agile methodologies, there is an opportunity gap for study project managers on agile context.

Regarding the competences of change agents in agile environments, the importance of the competences of leadership, decision-making, cooperation and interaction was perceived, strengthening the need for an entrepreneurial profile and focused on performance (Anke & Ringeisen, 2021). In addition to these points, the encouragement of self-organization and team management capacity also follow in the literature as characteristics of this approach (Gandomani et al., 2020). Gandomani et

al. (2020), in their research, attribute to change agents, in agile environments, the roles of manager or scrum master, team member, servant leader, supervisor, protector, program manager, local project manager, product managers, mentor.

The objective of the mentor role assigned to the change agent, in agile environments, is related to the ability to encourage the team to practice self-management, the development of employees by recognizing and better reflecting on their needs, making them able to plan their own development (Anke & Ringeisen, 2021), reinforcing those managerial and emotional competencies are important for agile leadership (Geoghegan & Dulewicz, 2008).

Likewise, and with equal intensity, the change agent is asked to demonstrate team member behaviours, being able to work respectfully and cooperatively towards mutual benefit, promoting the exchange of knowledge within the team, ensuring specialization teams (Anke & Ringeisen, 2021; Gandomani et al., 2020; Kafila et al., 2020). In this context, this article aims to present the relative importance of ten competencies of change agents in relation to project management approaches. Therefore, we do this through a questionnaire followed by a fuzzy analysis.

In a previous study, Neto (2020) carried out a systematic literature review of the change agent's competencies and, for the purpose of this article, we used as a model in this review, which suggests communication skills, leadership, flexibility, social skills as the main competences, problem solving, project management skills, reliability and professionalism, conflict management, technical skills, and team management.

This article is justified by its contribution to the discussion of how project management for success requires a mix of competencies, whether interpersonal, technical, cognitive (Pant & Baroudi, 2008), and these competencies can explain variations in project performance to depend on the management approach (Geoghegan & Dulewicz, 2008). Furthermore, we assume that determining the relative importance of change agent competencies for each project management approach remains a challenge, in this way, the objective of this work is to answer the research question "What is the relative importance of change agent competencies when we consider project management approaches?".

2. Methodology

With this article, we seek to gain a better understanding of the importance of the change agent competencies, who works in different approaches to project management. We use a mixed research method divided into three stages. In the first stage, we carried out a survey, using linguistic variables to classify the importance of competencies for change agents in each project management approach, followed by the application of fuzzy Topsis logic to identify the relative importance of these competencies in relation to the approaches, and finally, to compare the results with the literature.

As Creswell (2010) suggests, a quantitative or numerical survey can represent trends, attitudes, or opinions of a population by studying a sample of it, and the objective of this study is to test, in a transversal cut, the moment in time when this research takes place, seeking, when comparing with the literature, a predictive validity of the constructs presented in the research. The construction of the questionnaire was based on the list and description of competencies extracted from a literature review, which was also used after the survey was applied to compare the results of the statistical survey of the research with the literature.

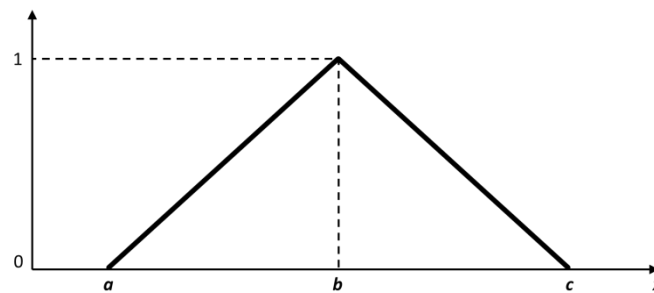
An online questionnaire was conducted, in Portuguese, through Google Forms in the period from 08 to 14 May 2021, with 82 responses, with participants from different levels (from team members to senior executives). After data collected in the survey, we follow with the application of fuzzy Topsis logic analysis. Fuzzy logic was introduced by Zadeh (1965) to deal with complex problems, using imprecise sources in the decision process, working with sources that are often imprecise to generate inferences, even with vague, ambiguous, or even incomplete data.

To define a fuzzy set \tilde{A} , we can mathematically use an association function $\mu_{\tilde{A}}(x)$, representing how much x is

compatible with the set \tilde{A} , and each element of x in the universe of discourse X ends up representing a real number varying between zero and one, and being represented by the function $\mu_{\tilde{A}}(x): X \rightarrow [0,1]$, this number may belong to more than one fuzzy class in different degrees of membership (Dursun & Karsak, 2010).

The pertinence function can be defined from the perspective of the research participant, or in a standardized way, such as trapezoidal, Gaussian, and triangular shapes (Chen & Hwang, 1992), which we used in this research. Being a triangular fuzzy set, it can be defined by a tripod with points in a set (a, b, c) , as shown in Figure 1, where $a_n \leq b_n \leq c_n$ (Dursun & Karsak, 2010).

Figure 1: Triangular fuzzy representation of an \tilde{A} number.



Source: Dursun & Karsak, (2010).

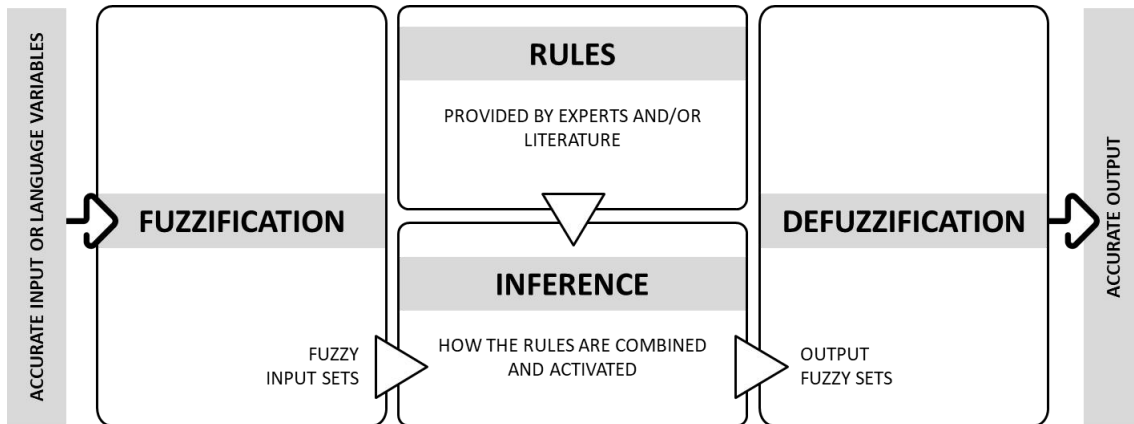
Fuzzy logic uses linguistic variables that represent the values that give names to fuzzy sets, such as "climate" which can be classified by the words "hot", "warm" and "cold", and the values can be represented by pertinence functions. As in set theory, it is possible to add logical connectives (no, and, or), delimiters (parentheses) or modifiers (very, little, slightly, extremely) to grade the results (Chen & Hwang, 1992).

The fuzzy process steps consist of precise inputs or non-fuzzy data source linguistic variables (background) derived from measurements or a set of data that should be mapped into fuzzy sets, making it possible to evolve to the fuzzification step (Barros et al., 2016).

The applied rules can be extracted from numerical data or using experts as a source, constituting an important step in the process, as they directly interfere in the fuzzy system performance. Thus, an "if...then" structure is used to achieve the so-called modus ponens (from the Latin, as a way of saying) in the defuzzification process (Barros et al., 2016). Once the rules are defined, the inference step is where the fuzzy sets operation takes place, with the combination of antecedents, rules, and the generation of the generalized modus ponens depending on this step.

It is worth noting that, for this article, we do not use rules, since the results obtained guided the ordering decision considering the best and worst solutions regarding the Euclidean distance of the points in relation to the approaches to in the next step, where defuzzification is applied to interpretation of information using techniques such as the mean of the maximums. The values are calculated by the two extremes of the universe of the membership function, being related to the division of the value in the universe that makes up the area of the curve of the pertinence function. These results provide the precise (consequential) outputs required for practical applications of the model (Barros et al., 2016), as shown in Figure 2.

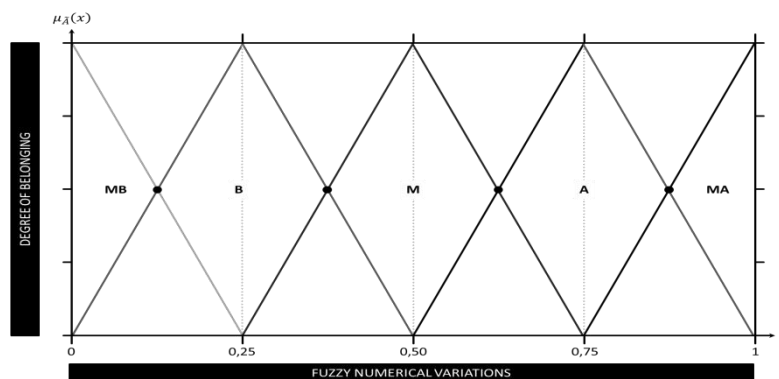
Figure 2: Representation of linguistic variables.



Source: Barros et al. (2016).

Figure 3 represents a fuzzy set graph where the vertical axis (y) represents the degree of belonging within the universe set of X, while the horizontal axis (x) represents the scale of linguistic variations that represent the fuzzy numerical variations. It is noteworthy that, for each intersection of sets, the fuzzy points are established between the linguistic variables, and each numerical variation represents a fuzzy set.

Figure 3: Triangular fuzzy representation of an \tilde{A} number.



Source: Dursun & Karsak, (2010).

Table 1 shows the linguistic variables and their respective fuzzy numbers that were used in the conversion, in step 2.

As a unit of analysis, we focus on the competencies needed by the change agent in relation to the project management approach. The change agent classification is used to refer to project managers, agile master, scrum master or similar profiles responsible for managing projects in the various management approaches available.

Table 1: Linguistic variables for assigning weights and evaluating candidates and approaches.

Linguistic Variable	Initials	Fuzzy number
Essential	MA	(7; 9; 9)
Important	A	(5; 7; 9)
Medium Importance	M	(3; 5; 7)
Low Importance	B	(1; 3; 5)
Irrelevant	MB	(1; 1; 3)

Source: Authors (2022).

It is worth noting that the definition of change agent is suggested because it is aligned with the assumed role, where the responsibility to manage resources with a focus on delivering objectives, which is the role assigned to the manager. We associate the responsibility to act and maintain a change effort to this main actor, whether internal or external to the company (Kendra & Taplin, 2004).

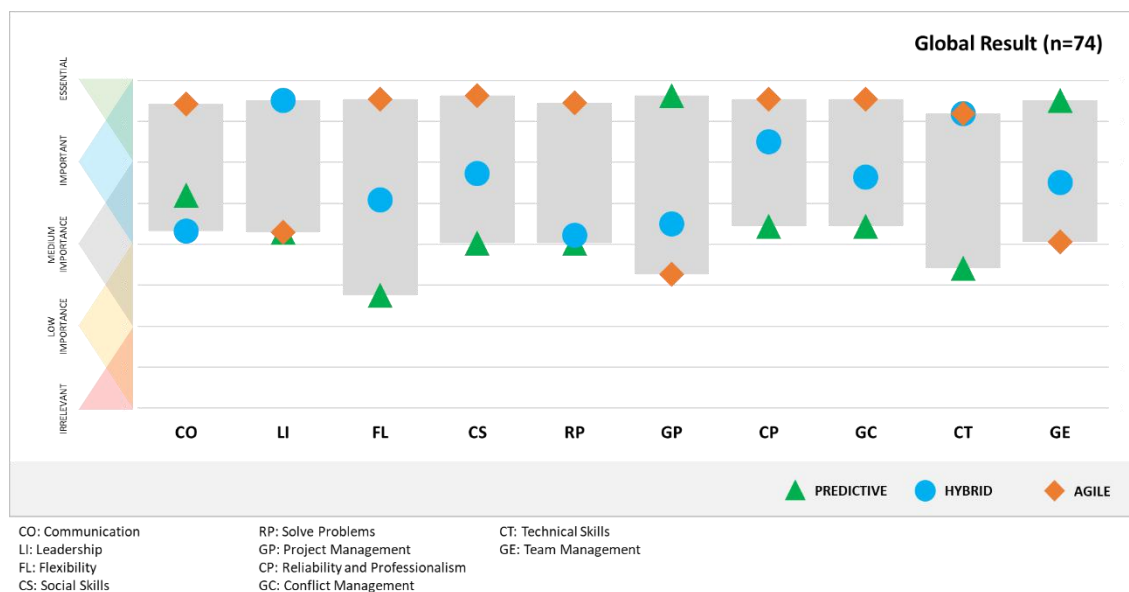
3. Results and Discussion

Data analysis demonstrates that 74.4% of respondents worked on projects that use the predictive approach, while 59.8% have already worked on hybrid approaches, and 58.5% on Agile approaches. More than 90% of respondents are between 31 and 60 years old, with most of the sample are between 31 and 40 years old (53.7%). The main positions held are analysts (32.9%), supervisors (32.9%) and managers (13.4%). Respondents were predominantly residents of the state of São Paulo (70%), 27% from other Brazilian states, and 3% from other Portuguese-speaking countries.

All respondents related to skills for project management analysis. We discuss the results of the analysis of communication skills, leadership, flexibility, social skills, problem solving, project management skills, reliability and professionalism, conflict management, technical skills, and team management.

According to the overall result of the survey, it is noted that most agile project management competencies are opposite to the competencies needed for projects that use predictive approaches as shown in Figure 4, even when we consider the seniority of the appraisers.

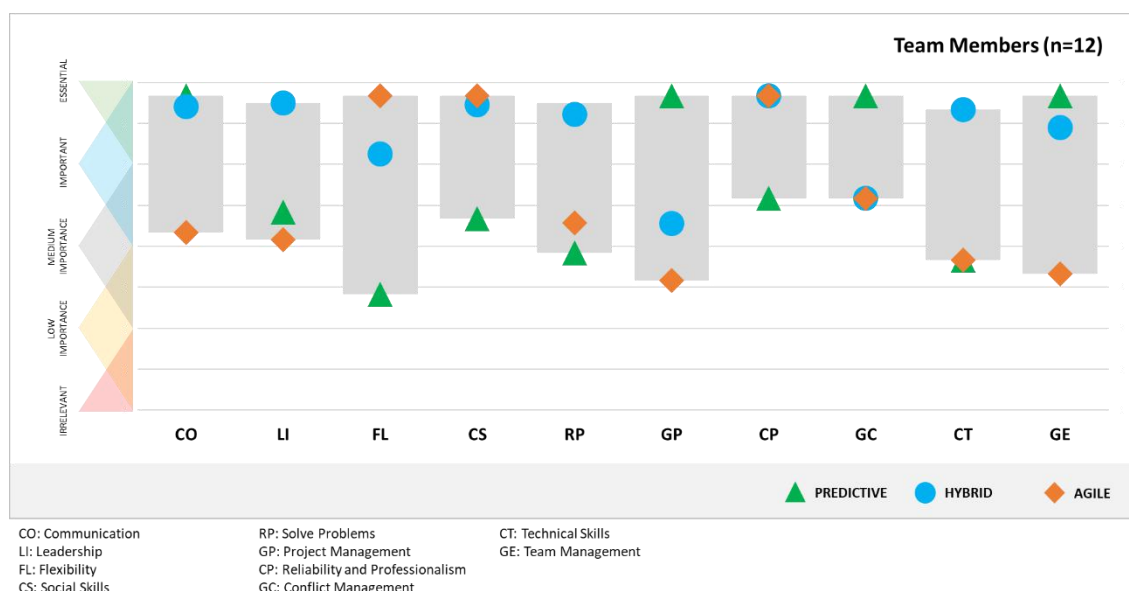
Figure 4: Overall result of competencies by approach – overview.



Source: Authors (2022).

Below, we will explore competence by competence, considering the seniority of the evaluators and the approaches, presented in Figures 5, 6 and 7, although perceptions of the competencies and practices valued by change agents differ in relation to their seniority (Crawford & Nahmias, 2010).

Figure 5: Overall result of competencies by approach – team members view.



Source: Authors (2022).

Team members understand that project management, conflict management, team management and communication skills are essential for the predictive model of project management, while for the hybrid approach the skills of communication, leadership, social skills, problem solving, reliability and professionalism and technical skills are essential, finally, for the agile approach, flexibility, social skills and reliability and professionalism are essential items.

Figure 6: Overall result of competencies by approach – middle management view.



Source: Authors (2022).

Unlike team members, middle management understands that, except for the project management competence, all others are essential for the predictive approach, while for the hybrid approach only the leadership competence and for the predictive approach the management competence itself of projects were considered essential.

Figure 7: Overall result of competencies by approach – senior management view.



Source: Authors (2022).

Senior management assesses that the essential skills for the change agent in the predictive approach are leadership, project management, conflict management and team management, for the agile approach, communication, flexibility, problem solving skills were considered essential. Problems, responsibility and professionalism and technical knowledge, while in the

hybrid approach the selected core competencies were communication, leadership, responsibility and professionalism and conflict management.

3.1 Communication

We have adopted as a definition of the communication skill the exchange of accurate, appropriate, and relevant information, from one source to another, in different contexts, using appropriate methods (Alvarenga et al., 2019; Andoh-Baidoo et al., 2011; Ballesteros-Pérez et al., 2011; Ballesteros-Pérez et al., al., 2012). In this context, we asked the importance of this competence for each of the approaches, with the result shown in Figure 8.

Figure 8: Communication.

COMMUNICATION	OVERALL RESULT	TEAM MEMBERS	MIDDLE MANAGEMENT	SENIOR MANAGEMENT
PREDICTIVE	BETWEEN MEDIUM AND IMPORTANT	ESSENTIAL	MEDIUM IMPORTANCE	BETWEEN MEDIUM AND IMPORTANT
HYBRID	MEDIUM IMPORTANCE	ESSENTIAL	IMPORTANT	ESSENTIAL
AGILE	ESSENTIAL	MEDIUM IMPORTANCE	ESSENTIAL	ESSENTIAL

Source: Authors (2022).

Considering the predictive approach, it is possible to notice an evolutionary difference in the perception of the team in relation to middle and senior management, where team members understand as essential the communication skill of change agents, while middle and senior management attribute medium importance to the theme. For the hybrid approach, unlike team members and senior management, who attribute to this competence an essential aspect for the change agent, middle management understands this competence as important.

The agile approach shows a difference between the opinion of middle and top management in relation to the opinion of team members, where managers understand that communication skills are essential while team members understand the importance of communication skills as average. Thus, it is possible to see that, in the agile approach, communication skills are treated as essential in relation to other approaches.

When evaluating communication in the agile approach as essential, we can understand that the predominantly informal, oral, and personal characteristic of communication in this environment makes this competence even more complex, justifying, in a way, this behaviour presented by the respondents in this research (Dingsøyr et al., 2012; Karrbom-Gustavsson & Hallin, 2014; Serrador & Pinto, 2015; Wells, 2012). On the other hand, in the predictive approach, the communication structure is formal, structured, and traceable (Karrbom-Gustavsson & Hallin, 2014; Wells, 2012), especially in complex projects, where the volume of information increases (Zuo et al., 2018).

3.2 Leadership

Even though aspects related to the theme of leadership have evolved over time, Maloney (1986) presented leadership through a framework of behaviours. In this model, it was important to let subordinates know what is expected, treating them as equals, using their ideas (and not decisions) for decision making, setting challenging goals in search of a high level, with the objective of continuous search for better performances.

This definition, which is quite suitable for predictive environments, since autonomy is related to freedom and independence, is no longer so characteristic in agile environments, where the team assumes this role (Anke & Ringeisen, 2021; Gandomani et al., 2020), and the greater the perceived ability to perform the task, the less likely the team will accept more directive leadership (Maloney, 1986). However, empowered leaders motivate teams to activate inactive minds, to take risks and responsibilities, being directly responsible for their results leading projects to success (Cheong et al., 2016; Muller & Turner, 2010).

For the leadership competence, we define it as the ability to manage a team (Alvarenga et al., 2019; Marcusson & Lundqvist, 2015; Pedrosa et al., 2018; Zhang & Fan, 2013), and lead it or succeed (Andoh-Baidoo et al., 2011; Ballesteros-Pérez et al., 2012), always seeking effective leadership (Stevenson & Starkweather, 2010), not confusing it with authority (Fisher, 2011), resulting in Figure 9.

Figure 9: Leadership.

LEADERSHIP	OVERALL RESULT	TEAM MEMBERS	MIDDLE MANAGEMENT	SENIOR MANAGEMENT
PREDICTIVE	MEDIUM IMPORTANCE	MEDIUM IMPORTANCE	MEDIUM IMPORTANCE	ESSENTIAL
HYBRID	ESSENTIAL	ESSENTIAL	ESSENTIAL	ESSENTIAL
AGILE	MEDIUM IMPORTANCE	MEDIUM IMPORTANCE	ESSENTIAL	MEDIUM IMPORTANCE

Source: Authors (2022).

Except for senior management, which attributes to this competence essential, leadership competence are of medium importance for change agents who work in a predictive approach to projects. For the hybrid approach, there is a consensus at distinct levels that the leadership is essential for change agents, while in the agile approach, only middle management attributes this importance to the leadership competence. The other levels attach medium importance.

In the overall result, it is evident that this competence is considered more important in the hybrid approach when compared to the other research approaches. This may be due to the distribution of leadership to the teams, expected in the agile approach, where flexibility, cooperation and decentralization are expected (Dingsøyr et al., 2012; Karrbom-Gustavsson & Hallin, 2014; Serrador & Pinto, 2015). In the predictive approach an autocratic, prescriptive leadership with centralized power seems to be the most adopted path (Karrbom-Gustavsson & Hallin, 2014; Wells, 2012).

3.3 Flexibility

We define flexibility as the ability to live in changing and ambiguous environments (Buckle & Thomas, 2003; Medina & Francis, 2015; Shao, 2018; Skulmoski & Hartman, 2010; Stevenson & Starkweather, 2017), skilfully dealing with uncertainty (Buckle & Thomas, 2003; Gray & Ulbrich, 2017), understanding that the end of the project is not always what was initially designed (Muller & Turner, 2010; Ochieng et al., 2013; Stevenson & Starkweather, 2017), with the result shown in Figure 10.

Figure 10: Flexibility.

FLEXIBILITY	OVERALL RESULT	TEAM MEMBERS	MIDDLE MANAGEMENT	SENIOR MANAGEMENT
PREDICTIVE	LOW IMPORTANCE	LOW IMPORTANCE	BETWEEN LOW AND MEDIUM IMPORTANCE	BETWEEN LOW AND MEDIUM IMPORTANCE
HYBRID	BETWEEN MEDIUM AND IMPORTANT	IMPORTANT	BETWEEN MEDIUM AND IMPORTANT	BETWEEN MEDIUM AND IMPORTANT
AGILE	ESSENTIAL	ESSENTIAL	ESSENTIAL	ESSENTIAL

Source: Authors (2022).

The flexibility of the change agent may have presented the result with the greatest support in the literature, where the agile approach presented an overall result, attributing to this competence an essential factor and the predictive model of low importance, given the characteristics and assumptions of predictability of actions.

The essential factor attributed to this ability in the agile approach is in line with what is presented in the literature, since it is considered in this approach that the requirements change during the project (Bianchi et al., 2018; Boehm & Turner, 2004). These changes are believed to enhance customer satisfaction (Bianchi et al., 2018; Karrbom-Gustavsson & Hallin, 2014; Riesener et al., 2018), since the project objectives are developed throughout the project with the customer influence throughout the development cycle (Karrbom-Gustavsson & Hallin, 2014).

On the other hand, predictive approaches understand that requirements are stable and previously specified (Karrbom-Gustavsson & Hallin, 2014; Wells, 2012), with change being a deviation from the plan, which may represent a problem (Karrbom-Gustavsson & Hallin, 2014; Riesener et al., 2018), where the objectives are specific, measurable, attainable, relevant, and temporal (Karrbom-Gustavsson & Hallin, 2014).

3.4 Social Skills

For social skills, we define as the ability to interact with people (Zarifian, 2000), understanding anxieties and ambitions (Ahsan et al., 2013; Hoegl & Parboteeah, 2006; Medina & Francis, 2015), with charisma and respect, facilitating the relationship with the team (Skulmoski & Hartman, 2010), and with everyone who may exert direct or indirect influence on the project (Ahsan et al., 2013; Hoegl & Parboteeah, 2006; Medina & Francis, 2015), obtained the answers presented in Figure 11.

Figure 11: Social Skills.

SOCIAL SKILLS	OVERALL RESULT	TEAM MEMBERS	MIDDLE MANAGEMENT	SENIOR MANAGEMENT
PREDICTIVE	MEDIUM IMPORTANCE	MEDIUM IMPORTANCE	MEDIUM IMPORTANCE	BETWEEN IMPORTANT AND ESSENTIAL
HYBRID	IMPORTANT	ESSENTIAL	IMPORTANT	BETWEEN IMPORTANT AND ESSENTIAL
AGILE	ESSENTIAL	ESSENTIAL	ESSENTIAL	IMPORTANT

Source: Authors (2022).

For social skills, we noticed an inversion of perception between the view of senior management and other levels, attributing to the predictive and hybrid model degrees of importance greater than that of the agile approach, which, in the opinion of middle management, is essential. Assessing the overall result, the increase in importance as the approach becomes agile is possibly related to the characteristics attributed to this approach, since this competence is composed of (i) social intelligence, which can be associated with agile principles such as people over processes (Beck et al., 2001); (ii) self-awareness; (iii) social awareness; (iv) self-management, as it expects the team to be composed of experts (Boehm & Turner, 2004; Wells, 2012); and (v) relationship management, which speaks to the negotiator role required of the change agent in agile environments, rather than the controller, as it is exercised in predictive approaches (Frame, 2002; Wells, 2012).

3.5 Problem Solving

We define the ability to solve problems as the ability to analytically deconstruct and understand the problem with data and facts (Andoh-Baidoo et al., 2011), collecting information from different sources (Gray & Ulbrich, 2017), evaluating the advantages and disadvantages of each decision made (Muller & Turner, 2010; Skulmoski & Hartman, 2010). The results are shown in the Figure 12.

Figure 12: Problem Solving.

PROBLEM SOLVING	OVERALL RESULT	TEAM MEMBERS	MIDDLE MANAGEMENT	SENIOR MANAGEMENT
PREDICTIVE	MEDIUM IMPORTANCE	MEDIUM IMPORTANCE	MEDIUM IMPORTANCE	MEDIUM IMPORTANCE
HYBRID	MEDIUM IMPORTANCE	ESSENTIAL	MEDIUM IMPORTANCE	BETWEEN MEDIUM AND IMPORTANT
AGILE	ESSENTIAL	MEDIUM IMPORTANCE	ESSENTIAL	ESSENTIAL

Source: Authors (2022).

The ability to solve problems was classified in the predictive model as having medium importance for all groups, while the group of managers attribute this ability to change agents, in the agile approach, as an essential factor. The hybrid approach also presents an evaluation oscillation between the team's opinion and the managers' opinion.

Iterative processes in the agile environment make the need to solve problems an essential competence (Bianchi et al., 2018; Karrbom-Gustavsson & Hallin, 2014). Another factor that completes this view is the short planning cycles, which

resemble the role of the change agent to that of a negotiator, as opposed to the predictive environment, where he acts as a controller (Frame, 2002).

3.6 Project Management

As a project management skill, we define technical knowledge about project management practices (Hoegl & Parboteeah, 2006), such as risk management, scope, deadline, stakeholders (PMI, 2017). The results are demonstrated in Figure 13.

Figure 13: Project Management.

PROJECT MANAGEMENT	OVERALL RESULT	TEAM MEMBERS	MIDDLE MANAGEMENT	SENIOR MANAGEMENT
PREDICTIVE	ESSENTIAL	ESSENTIAL	ESSENTIAL	ESSENTIAL
HYBRID	MEDIUM IMPORTANCE	MEDIUM IMPORTANCE	MEDIUM IMPORTANCE	MEDIUM IMPORTANCE
AGILE	BETWEEN LOW AND MEDIUM IMPORTANCE	BETWEEN LOW AND MEDIUM IMPORTANCE	MEDIUM IMPORTANCE	LOW IMPORTANCE

Source: Authors (2022).

In the same way that flexibility skill is essential for agile approach, project management skills are essential for predictive approach. We stress that this aspect was a consensus at all levels. The same consensus was found for the hybrid approach, but with medium importance. In the literature, it is possible to find studies that propose that project management does not necessarily increase the effectiveness and quality of projects, while some studies show positive results (Meirelles et al., 2019; Skulmoski & Hartman, 2010), others do not identify statistical relevance for this relationship (Crawford & Nahmias, 2010).

These change agents are expected to be able to know tools and instruments so that the agile way of working can be applied independently of the project management approach, especially in software development (Anke & Ringeisen, 2021). Among the advantages related to knowledge of this competence is the ability to turn problems with unclear solutions into something known through project definitions and structuring (Skulmoski & Hartman, 2010).

3.7 Reliability and Professionalism

As reliability and professionalism, we understand how to establish a relationship of trust and respect with the team (Gray & Ulbrich, 2017; Medina & Francis, 2015; Pedrosa et al., 2018; Skulmoski & Hartman, 2010). Ethical integrity and professionalism contribute to building trust (Andoh-Baidoo et al., 2011; Smith et al., 2011), as does a sense of fairness (Ochieng et al., 2013). The results are shown in the Figure 14.

Figure 14: Reliability and Professionalism.

RELIABILITY AND PROFESSIONALISM	OVERALL RESULT	TEAM MEMBERS	MIDDLE MANAGEMENT	SENIOR MANAGEMENT
PREDICTIVE	MEDIUM IMPORTANCE	BETWEEN MEDIUM AND IMPORTANT	MEDIUM IMPORTANCE	BETWEEN MEDIUM AND IMPORTANT
HYBRID	IMPORTANT	ESSENTIAL	IMPORTANT	ESSENTIAL
AGILE	ESSENTIAL	ESSENTIAL	ESSENTIAL	ESSENTIAL

Source: Authors (2022).

Reliability and professionalism were highly valued for change agents working in agile and hybrid approaches, while in the predictive approach it ranged between medium importance and important, respectively. This essential relationship of the change agent with agile approach ends up reflecting what is exposed in the literature on the importance of the team's mutual responsibility for delivery (Karrbom-Gustavsson & Hallin, 2014), reinforcing the team's position to be formed by experts in relationships of trust (Boehm & Turner, 2004; Wells, 2012).

3.8 Conflict management

Conflict management, in this study, was defined as the ability to manage and mediate conflicts or disagreements in a team or group, avoiding personal issues and establishing a relationship of trust between the parties (Fisher, 2011; Muller & Turner, 2010; Zhang & Fan, 2013; Zuo et al., 2018) until corrective actions are taken, without the need to avoid them (Kramer, 2012; Medina & Francis, 2015). We demonstrate the results in Figure 15.

Figure 15: Conflict Management.

CONFLICT MANAGEMENT	OVERALL RESULT	TEAM MEMBERS	MIDDLE MANAGEMENT	SENIOR MANAGEMENT
PREDICTIVE	MEDIUM IMPORTANCE	ESSENTIAL	MEDIUM IMPORTANCE	ESSENTIAL
HYBRID	IMPORTANT	BETWEEN MEDIUM AND IMPORTANT	IMPORTANT	ESSENTIAL
AGILE	ESSENTIAL	BETWEEN MEDIUM AND IMPORTANT	ESSENTIAL	BETWEEN MEDIUM AND IMPORTANT

Source: Authors (2022).

Conflict management appears as the competence with the greatest dissonance of opinions among all the competences evaluated, ranging in all from medium importance to essential. This dissonance may demonstrate little ability to differentiate between approaches.

The timeliness of conflict resolution, again, may be related to the perception of the group, who attributed the agile approach to the essential characteristic. The ability to avoid biases and personal preferences, identifying and managing, can contribute not only to a good environment but also to the success of the project (Andoh-Baidoo et al., 2011; Naqvi et al., 2011; Smith et al., 2011; Zuo et al., 2018).

3.9 Technical skills

Know the business to contribute with technical solutions (Zhang & Fan, 2013), increasing the productivity of the change agent and the team (Alvarenga et al., 2019; Skulmoski & Hartman, 2010). This is because the role of the change agent moves between organizational levels, where technical knowledge asymmetry exists (Stevenson & Starkweather, 2010). The results are shown in Figure 16.

Figure 16: Technical Skills

TECHNICAL SKILLS	OVERALL RESULT	TEAM MEMBERS	MIDDLE MANAGEMENT	SENIOR MANAGEMENT
PREDICTIVE	MEDIUM IMPORTANCE	MEDIUM IMPORTANCE	MEDIUM IMPORTANCE	MEDIUM IMPORTANCE
HYBRID	ESSENTIAL	BETWEEN IMPORTANT AND ESSENTIAL	BETWEEN IMPORTANT AND ESSENTIAL	IMPORTANT
AGILE	ESSENTIAL	MEDIUM IMPORTANCE	BETWEEN IMPORTANT AND ESSENTIAL	ESSENTIAL

Source: Authors (2022).

Technical skills were more valued for the hybrid approaches, while the predictive approach was given medium importance by all levels. The agile approach presents an almost evolutionary scale in relation to the team and top management, demonstrating that managers consider these competencies more important than the team itself considers.

The change agent can act in several areas, and several authors show how knowing the area of expertise can contribute to the project success (Alvarenga et al., 2019; Skulmoski & Hartman, 2010). However, it is also known that the absence of these characteristics may not represent risks to the performance of the projects (Jiang et al., 2007), placing greater importance on conceptual and human skills in relation to technical skills (Patanakul & Milosevic, 2008).

3.10 Team management

For team management, we use the ability to organize and coordinate resources efficiently and effectively (Ballesteros-Pérez et al., 2012; Gray & Ulbrich, 2017; Muller & Turner, 2010), making goals clear, keeping teams in the tasks, as the main definition, having their results presented in Figure 17.

Figure 17: Team Management.

TEAM MANAGEMENT	OVERALL RESULT	TEAM MEMBERS	MIDDLE MANAGEMENT	SENIOR MANAGEMENT
PREDICTIVE	ESSENTIAL	ESSENTIAL	IMPORTANT	ESSENTIAL
HYBRID	IMPORTANT	BETWEEN IMPORTANT AND ESSENTIAL	MEDIUM IMPORTANCE	IMPORTANT
AGILE	MEDIUM IMPORTANCE	BETWEEN LOW AND MEDIUM IMPORTANCE	ESSENTIAL	MEDIUM IMPORTANCE

Source: Authors (2022).

Team management for change agents was assessed as an essential skill for the predictive approach in the opinion of

the team and top management, while the agile approach, for the team, presents a result between low and medium importance, reinforcing the concept of self-managing teams. Team management, from a business perspective, in general, attributes a relationship between people management and resource management, presenting a false sense of control, since this control is only possible if they allow, resulting, in the limit, in loss of productivity (Silva et al., 2019). Nevertheless, management skills are vital for change agents (Toor & Ofori, 2008).

When approaching the management of teams in agile environments, change agents are encouraged to delegate decisions to teams, to increase the speed with which decisions are made, requiring from the leader a degree of trust in the teams (Anke & Ringeisen, 2021), what can be seen in the results of the questionnaire from the team members who attribute the presence of this competence as low or medium importance.

4. Conclusion

In this article we seek to understand the importance of ten different competencies of the change agent, using the fuzzy TOPSIS method, comparing agile, hybrid and predictive approaches to answer the research question “What is the relative importance of change agent competencies when we consider project management approaches?”. To perform the analysis, we conducted an online survey, with 74 participants from different positions and sectors, using the results of this survey as input variables, transforming linguistic variables into data, seeking the pertinence factor to each competence in each approach.

We identified that team management and project management are essential competencies in the respondent’s opinion, while leadership and technical skills are essential for hybrid approaches. For the agile approach, communication skills, flexibility, social skills, problem-solving skills, reliability and professionalism, conflict management and technical skills were considered essential.

A factor that caught our attention was the relative importance of competences according to the level in the organization, demonstrating a possible difference in perception between team members, middle and senior management, this difference may motivate further research to understand the reason for these different perceptions and what are the factors that motivate this divergence, in some cases, including the literature, as is the case of middle management, attributing the competence of managing teams in an agile approach as essential.

As main contributions, we present a map where we discuss the relative importance between project management approaches for change agents. This model can be used in a contextual way, changing the group of priority competencies to suit the needs of companies or assessment, which can be done in future research. Given these results, it is possible for companies to direct the training and develop in teams the essential skills in relation to the project management approach that the company uses, seeking to maximize the results of the projects.

The use of the fuzzy method allows us to capture an importance classification through a linguistic variable, normalize it and order it with the TOPSIS method, in this way we reduce the imprecision that a subjective classification can present, making it possible to use any group of competences, for any professional activity in future studies.

As contributions for practitioners, we understand that there is the possibility of using the fuzzy method to facilitate the capture of information about competencies, turning this process, naturally subjective, into data that can be applied to the reality of companies.

As limitations, we suggest expanding the research base, looking for agents of change with greater coverage of sectors of activity and, as a suggestion, adding a stage of interviews to the research for a better understanding of the phenomenon studied. Future studies could seek a broader coverage of sectors not represented in this research, in addition to investigating, through discussion groups or expert analysis, the perception and justifications for each answer to the questions presented. In

one study, the same questionnaire could be used to evaluate projects in a business portfolio, comparing project needs with the results of this research.

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