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Agile methodologies for the digital transformation of a Colombian telecommunications company

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Abstract: Contemporary business dynamics drive the adoption of agile methodologies as an effective response to rapid market evolution and the need for organizational adaptability. However, implementing traditional environments faces significant challenges, especially for companies rooted in traditional practices, such as telecommunications companies in Colombia. This research project is dedicated to implementing agile methods, specifically Objectives and Key Results (OKR), in a traditional organizational context. It is recognized that challenges arise when attempting to integrate these approaches into organizational contexts that maintain practices rooted in tradition, which hinders the cultural change necessary to achieve the entity's strategic objectives. Presumably, successful implementation of OKRs must facilitate deep cultural transformation, achieve effective alignment with strategic objectives, and proactively address internal objections through engagement and communication strategies. For this purpose, we designed a methodology to implement agility in the technical transformation of a company in the TELCO sector in Colombia, considering the challenges it proposes and seeking to address them methodologically.

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1. Introduction

Among the related cases of problems in the Colombian telecommunications industry, COMCEL S.A. is the most prominent, being a major player in the market in 2011 with an initial market share of 65.34%. Throughout the year, the company's customer base grew, maintaining its dominant position in the telecommunications market. However, in December of the same year, its share fell to 61%, marking a significant change in its market position [1].

COMCEL was founded in 1995 and has been a leading telecommunications company. But by 2013, after transforming into the powerful CLARO COLOMBIA, its share of the national market fell to 58.32%.

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This drop indicates both increased competition with the likes of Movistar, Tigo, and Telefónica, and a sign that its management may need improvement. During the same period, Telefónica's share grew rapidly, reaching 23.92% of the total market [1]. By 2013, CLARO COLOMBIA's competitors continued to grow rapidly, which had a major impact on CLARO, which had lost more than 2 million users in Colombia by the end of that year [2].

Towards the end of 2014, the total number of mobile service users in Colombia continued to experience significant growth, reaching 53,583,664. At the end of the third quarter of that year, there was evidence of a 2.66% increase in the number of mobile service users compared to the previous quarter. This increase translated into an absolute increase of 1,389,652 new mobile service users [3].

As of September 2014, the distribution of the mobile telephony market in Colombia among the different providers of mobile networks and services is configured as follows: COMCEL S.A. holds the largest share with 54.66%, followed by Colombia Telecomunicaciones S.A. E.S.P. with 23.48%. Colombia Móvil S.A. E.S.P. is in third place with 16.22%, followed by Virgin Mobile S.A.S. with 3.18%, and Uff Móvil S.A.S. with 0.78%. Other mobile telephony providers account for the remaining 1.68% of the market [3].

By 2015 the outlook for the telecommunications leader CLARO COLOMBIA continued to be discouraging by the end of this year again presented a decrease at the end of this year its share was 50.54% of what is observed as a substantial decrease in recent years [4].

For the past two decades, the telecommunications sector has been dominated by Claro Compañía. However, in 2016, its market share dropped to 49.34%, and this worrying trend continued in 2017, when its share fell even further, reaching only 47.90%. For the first quarter of 2018, the MinTic reported that Claro had only 46.80% of the market. In contrast, in 2019, a strategic alliance emerged between Tigo and Movistar, Claro Colombia's main competitors, which together accounted for 41.90% of the total market. The formation of this partnership was aimed at creating a consolidated network and strengthening their respective presence in the Colombian market. Faced with this new scenario, there is an urgent need, not only for Claro but for all mobile telephony providers, to adjust and improve their performance. This implies becoming providers with added value and efficient processes that seek to offer end users ease of use, connectivity, payment options, mobility, and portability, among other services [5].

At the end of 2021, Claro retained its position as the main provider in terms of mobile telephony lines in Colombia but continues to show a substantial year-on-year decrease according to the background, by the end of the fiscal year CLARO ends with a total of 35.1 million active lines. It is followed by Movistar, with 18.8 million lines, and TIGO, with 14.5 million lines. In comparison, Virgin has 2.7 million lines in service [6].

By 2023, Tigo, and Movistar will once again ally (Temporary Union) to bid for the 5G spectrum auction in Colombia. Over the last five years, the figures for the TELCO market have remained similar, with CLARO as the current leader with 45.52%, followed by Tigo, and Movistar consolidating 42.83% and 11.65%, respectively, in contrast, the other companies within the TELCO sector occupy a significantly smaller portion of the market. This trend is evident over almost three decades, with CLARO's steady decline and MOVISTAR's and TIGO's continued, albeit slow, growth. These changes in the figures are attributed to factors such as modernization, value propositions, and versatility of services focused on the end user, as well as the speed of response time, among others [7].

However, an important issue arises during this analysis: the speed of adaptability of methodologies in these companies. The implementation of agile methodologies, such as OKR, has become a necessity to manage uncertainty and promote innovation within organizations. However, the implementation of these methodologies in conventional business environments encounters obstacles, including opposition to change, discordance with strategic objectives, and cultural differences [8].

It is essential to address these challenges strategically and thoroughly, as the lack of effective integration of OKR into the existing organizational structure and culture can have significant consequences. These include demotivation and dissatisfaction among employees, as well as decreased performance and productivity. Additionally, failure to achieve the company's strategic objectives could compromise its competitiveness and its ability to adjust in an ever-changing business context [9].

Within this framework, the focus of this study is on gaining an in-depth understanding of the challenges and consequences associated with the implementation of OKR in conventional business environments, such as TELCO companies in Colombia. This comprehensive analysis will identify best practices, effective strategies, and key recommendations to overcome the challenges and maximize the benefits derived from the adoption of OKR in this specific context. In this way, it aims to contribute to the success and competitive sustainability of TELCO companies in Colombia and other organizations facing similar challenges in their transition process towards agile methodologies [10].

The rationale for examining this issue stems from the urgency faced by several companies in the TELCO sector to remain competitive and relevant in a dynamic and changing market environment. The adoption of agile methodologies such as OKR presents itself as a promising response to these challenges, offering to explore the opportunity to increase the agility and adaptability of the company [11]. The company's ability to adapt to the current challenges of the market, especially in TELCO companies in Colombia. In a highly competitive industry subject to rapid change, the ability to adjust is critical to remain relevant and to effectively meet changing customer demands [12].

However, the implementation of OKR in an established organization such as TELCO companies in Colombia is not without its challenges. Resistance to change is a key factor that can hinder the effective adoption of these methodologies. Likewise, challenges are faced in terms of the integration of OKR with the strategic objectives of the organization, change management, and cultural evolution essential for its effectiveness [13].

Therefore, understanding and addressing these issues becomes fundamental to ensure a successful OKR implementation in TELCO companies in Colombia. It is crucial to identify the barriers that may arise along the way and develop effective strategies to overcome them. In addition, it is important to take full advantage of the benefits that agile methodologies can offer, such as improved operational efficiency, the ability to generate new ideas, and to respond nimbly to fluctuations in the business environment [14].

The problem of resistance to change in traditional environments and the specific challenges in implementing agile methodologies with an OKR approach are rooted in the organizational culture. Traditional environments are often characterized by hierarchical structures and rigid processes, which makes it difficult to adapt to agile methodologies that promote self-management and horizontal collaboration.

OKRs are designed to be iterative, flexible, and adjustable based on the needs and changes in the environment, while traditional strategic objectives may be more focused on maintaining the status quo and fulfilling long-term plans, making it difficult to align them with OKRs in real time. This lack of synchronization between the static nature of strategic objectives and the dynamics of OKRs can generate conflicts and obstacles in the effective implementation of these agile methodologies in traditional environments.

Another crucial challenge lies in the limited appreciation of the potential benefits of implementing agile and OKR methodologies, which can lead to skepticism and resistance from organizational members. Synchronization between the overall objectives of the organization and the individual goals of the participants is essential to ensure effective execution.

To address this issue, the affected and involved parties must be considered, such as directors, managers and leaders, employees, customers, and stakeholders. First, the directors, managers, and leaders may face challenges in change management, especially if they are used to rigid hierarchical structures and traditional

leadership roles as the implementation of agile methodologies may require a shift in leadership focus towards facilitation and team support, which may be challenging for some managers. Therefore, they must be the first to commit to change.

Second, the employees should understand the lack of support or understanding of agile methodologies can generate demotivation or even open resistance, causing stress, anxiety, or frustration due to changes in their roles, responsibilities, or work methods. It is crucial to establish transparent and persuasive communication about the benefits of change to avoid employees feeling lost or worried about their future in the company.

Third, the customers and stakeholders used the effective application of agile methodologies focused on OKR has the potential to optimize both excellence and speed in the provision of products or services, generating advantages for both customers and stakeholders [10].

2. Theoretical framework

2.1. Business contexts

The research framework delves into the application of agile methodologies and OKRs in traditional business environments, emphasizing their adaptability and collaborative nature. Agile methodologies focus on flexibility and incremental progress, while OKRs aim to align organizational goals transparently. These tools offer significant potential in industries like telecommunications, particularly in Colombia, where entrenched practices pose challenges to agility and transformation [9, 14].

The framework of this research is based on several essential concepts that are crucial to understanding the application of agile methodologies, such as Objectives and Key Results (OKR), in conventional business environments, with a specific focus on companies in the telecommunications sector in Colombia. Agile methodologies represent flexible and collaborative project development approaches, notable for their ability to adjust to change and their emphasis on incremental delivery and continuous improvement of the product or service. Agile methodologies are flexible and collaborative approaches to project development, noted for their ability to adjust to change and their emphasis on incremental delivery and continuous improvement of the product or service [14]. On the other hand, OKR is a goal management framework that focuses on establishing and tracking progress toward specific goals, emphasizing transparency and alignment of efforts across the organization [9]. This theoretical framework considers the challenges inherent in conventional environments, which are characterized by entrenched practices and a resistance to change rooted in organizational culture. Organizational transformation emerges as an essential process to face these challenges, promoting change in the culture, structure, and practices of the organization toward more dynamic and adaptive models [15]. Resistance to change, as a psychosocial phenomenon, presents itself as a major obstacle in this transformation process, manifesting itself in various forms that can hinder the effective adoption of agile methodologies such as OKR. Taken together, these concepts provide the conceptual framework necessary to analyze and address the challenges associated with the implementation of agile methodologies in traditional organizational settings, such as TELCO companies in Colombia [10].

In today's business landscape, the implementation of agile methodologies, such as Objectives and Key Results (OKR), has emerged as a priority strategy for the adaptation and growth of organizations, especially in highly competitive sectors such as telecommunications. In this context, The rapidly evolving market and changing consumer demands require companies to be more flexible and adaptive to remain relevant and competitive [13].

2.2. Challenges

Traditional organizations face resistance to change, deeply rooted in hierarchical cultures and rigid processes. This resistance often results in misunderstandings and a lack of support, making it difficult to adopt frameworks like OKRs. Overcoming these barriers requires addressing cultural transformation through clear communication and participative strategies to align employees with new objectives [16, 17].

Implementing agile methodologies in traditional environments faces a unique set of challenges. Resistance to change, stemming from an organizational culture rooted in conventional practices, further compounds the difficulty in aligning with strategic objectives. This resistance can manifest itself in a lack of understanding or support from employees, which hinders the effective adoption of OKR and the cultural transformation necessary for its success [16]. One of the main challenges lies in the resistance to change embedded in the organizational culture of these companies, where hierarchical structures and traditional processes can hinder the transition to agile practices [17].

2.3. Historical development

The origins of agile methodologies date back to the 1970s, with foundational work by Dr. Winston W. Royce and further advancements in the 1990s through frameworks like Scrum and XP. OKRs were pioneered by Andy Grove at Intel and later popularized by companies like Google. These methodologies address the rigidity of traditional management by emphasizing adaptability, focus, and strategic alignment [18].

Agile, as a project management and development approach, has its roots in the 1970s, when authors such as Dr. Winston W. Royce laid the foundations with his article "Managing the Development of Large Software Systems", highlighting the need for iteration in software development. In parallel, in the same decade, at Intel, the executive Andy Grove developed the OKRs (Objectives and Key Results) [19] as part of his operational management methodology. However, it was in the 1990s when agile began to take shape, with the introduction of methodologies such as Scrum, Extreme Programming (XP), and Crystal, driven by experts such as Jeff Sutherland, Ken Schwaber, and Kent Beck, among others. It was in the early 2000s when Google popularized their use. Since then, OKRs have become a common practice in many companies, especially in the technology industry, due to their ability to align and focus organizational efforts toward strategic goals [18].

These agile methodologies emerged as a solution to the challenges presented by conventional project management approaches, which were characterized by their rigidity and inability to adapt to change. The Agile Manifesto, disseminated in 2001 by a group of software development specialists, represented a turning point in the history of agile by establishing the essential principles and values that guide this work philosophy.

2.4. Case studies

Examples from companies such as Vodafone and Telecable highlight the complexities of implementing OKRs. Vodafone faced cultural resistance and misunderstandings about the methodology, while Telecable leveraged OKRs to align team objectives with organizational goals, despite challenges in decision-making and training. Effective leadership and strategic clarity were pivotal in both cases for fostering collaboration and innovation [20–22].

Despite its success in certain environments, the implementation of OKR in traditional organizations has presented several challenges. For example, a case study by John Doerr in his book "Measure What Matters" illustrates how the telecommunications company Vodafone experienced difficulties adapting to OKR due to cultural resistance and lack of understanding about the methodology among employees and leaders [20].

In addition, research by Oreg on resistance to change in organizations highlights how the introduction of new practices, such as OKR, can be met with opposition from employees who cling to established processes and fear the uncertainty that comes with change. In another documented case, Schlesinger investigates tactics to counteract resistance to change in organizational contexts. These researchers propose that effective communication, the participation of employees in the change process, and the establishment of a shared vision are essential elements to reduce resistance [23].

Likewise, an analysis by Harvard Business Review on the implementation of OKR in established companies highlights the importance of strategic alignment and clarity in the definition of objectives to ensure the success of the methodology [24].

In the case of Telecable, a leading company in the telecommunications sector in Latin America, the adoption of the OKR framework has facilitated the alignment of all activities with the strategic objectives of the organization and has fostered personal development in team members. However, they have faced several challenges during the implementation of this framework, such as overcoming resistance to change, improving decision-making, training the team on the functioning and relevance of OKRs, as well as ensuring congruence between individual and team objectives with organizational objectives [21].

While the OKR framework encourages collaboration and self-management of teams, its success depends largely on leaders and companies also providing for a team maturation process. This case illustrates how the OKR framework can be effective in Latin American companies, but also highlights the importance of addressing challenges and ensuring strong leadership for its successful implementation [22].

2.5. Cultural transformation

The successful adoption of agile methodologies requires shifting from hierarchical to collaborative cultures. Companies like Claro Colombia exemplify this transformation by integrating agile practices to address dynamic market demands. By fostering values of transparency, collaboration, and continuous learning, organizations not only enhance innovation but also improve employee engagement and adaptability [25, 26].

In Colombia, leading telecommunications companies, such as Claro Colombia, are strategically incorporating the agile approach and the adoption of OKR as key elements for their adaptation to the market and the reconfiguration of their organizational structure. This initiative arises in response to the pressing need to adapt to a continuously evolving business environment and meet increasingly demanding consumer demands for new products and services in the telecommunications sector [27].

The implementation of OKR and agility not only represents a response to market demands but also an opportunity for Claro Colombia to explore and develop new ways to innovate. This agile, goal-oriented approach gives the company a greater ability to proactively identify and address market needs, allowing it to adapt with agility to change and stay ahead of the competition. By integrating agile methodologies and establishing concrete and measurable OKRs, Claro Colombia can enhance its ability to develop and launch new products and services more quickly and effectively. This flexibility gives them a notable competitive advantage by enabling them to respond nimbly and effectively to emerging market trends and changing customer demands [25].

In addition, the adoption of agile and the implementation of OKR have the potential to transform Claro Colombia's organizational culture. By fostering values such as collaboration, transparency, and experimentation, these methodologies can drive a culture of innovation and continuous learning within the company. This not only improves Claro Colombia's resilience but also promotes employee motivation and engagement, which contributes to a more productive and satisfying work environment [10].

According to recent research, it stands out that in the current organizational context, there is a predominance of a hierarchical culture, where strict compliance with regulations and rigidity in the

organizational structure is emphasized, as indicated by several studies. However, within this framework, the importance of developing more flexible and team-oriented cultures is recognized to facilitate the effective implementation of agile methodologies. These cultures foster guiding leadership, innovation, and adaptability, allowing the organization to respond in an agile manner to market changes and customer needs. In this sense, the relevance of promoting a culture where the values of collaboration, creativity, and constant adaptation prevail, fundamental aspects for the successful adoption of agile practices in the organizational environment, is highlighted [26].

Diego Castaño points out that a notable aspect to consider is the collaborative environment and work climate at Plaza Claro's facilities. He highlights that various activities related to well-being, change, and culture are carried out, which function as spaces for integration and feedback among employees [28].

Social researchers explore the various aspects of the cultural system, highlighting six key elements: beliefs, values, norms and sanctions, symbols, language, and technology. However, it is important to recognize that these elements are not static; rather, they are subject to change and evolution over time, reflecting the inherent dynamics of cultures. Clifford Geertz, in his work, emphasizes the interpretation of culture as a network of meanings in constant transformation, suggesting that cultural analysis is more interpretative than experimental.

From this perspective, exchange and self-generation within cultures allow social leaders to influence the direction of cultural changes, adapting practices according to prevailing interests. In the field of research, the need arises to examine how the mental models that sustain different cultures are constructed, with a particular focus on the mediating role played by the interaction between the natural and social environment.

Recognizing the underlying cultures within an organization raises questions about the formation of the mental models that support them, highlighting the influence of ingrained assumptions on our understanding and actions, even when we are unaware of them. This background and concepts highlight the importance of understanding the historical challenges in implementing OKR and how these have affected the adoption and success of the methodology in different organizational contexts. It is critical to address these difficulties to develop effective strategies to overcome the obstacles and take full advantage of OKR's potential as a strategic management tool [29].

3. Methodology

The development of this work is based on the need to face the technical and methodological challenges related to the integration of agile practices, such as Objectives and Key Results (OKR), in conventional business contexts, especially in the dynamic field of telecommunications in Colombia. This initiative arises as a response to the growing demand and the increasingly, fierce competition in this market, where agile adaptability is positioned as an essential strategy to preserve relevance and competitiveness [27].

In addition, it seeks to generate a positive effect on the well-being and satisfaction of workers by overcoming resistance to change and promoting an organizational culture that favors collaboration [13], transparency, and innovation [10]. From an economic perspective, this work aspires to contribute to the advancement and competitiveness of the TELCO industry in Colombia by providing specific recommendations to enhance the adjustment capacity and performance of companies in a constantly changing and competitive market [14].

It is important to note that rivalry in the Colombian telecommunications sector has increased considerably in recent years, with the entry of new mobile operators and the offer of more attractive services by competitors such as UFF, Móvil Éxito, Avantel, ETB, Movistar, Virgin, and Tigo. Given this scenario, market leaders such as Claro must focus their strategies on specific markets, where they can offer services more adapted to local needs, which will allow them to maintain the loyalty of existing customers

and capture the attention of new consumers, thus ensuring their sustainability and competitiveness in the telecommunications market in Colombia.

Ultimately, this research is strategically positioned to offer a practical and specific guide that allows the technical transformation area of a company in the TELCO sector in Colombia to maintain its relevance and competitiveness in a continuously evolving business context.

3.1. Diagnosis of the challenges and barriers

To fully understand the challenges and advantages related to the adoption of agile approaches, including Objectives and Key Results (OKR), it is proposed to use a methodology based on the inductive qualitative approach. This method is distinguished by its analysis process that originates in observation and experimentation and then derives general conclusions from cases [30]. With this purpose, the aim is to carry out a systematic, logical, and meticulous analysis of the investigated question, using as bases confirmed premises and specific observations. This approach will facilitate a thorough and complete understanding of the elements that impact the effectiveness of the adoption of agile models, such as OKR, establishing connections with the organizational culture and strategic business objectives [31].

In the context of the theoretical and problematic framework, this involves examining in detail the telecommunications industry, patterns, and trends will be identified to understand the challenges and opportunities associated with the implementation of agile methodologies, specifically Objectives and Key Results (OKR) [9].

Focus groups: Focus groups will be conducted with work teams composed of individuals familiar with the operations of TELCO sector companies. These groups will facilitate an environment conducive to sharing ideas and experiences among participants, which will enable the identification of common trends, shared opinions, and discrepancies related to the integration of agile and OKR methodologies in the TELCO sector in Colombia [32].

Documentary analysis: Documents from TELCO companies will be collected and analyzed. This documentary analysis will provide complementary information on the organizational culture, business practices, and challenges specific to the sector [33].

Literature review: A detailed analysis of academic and professional literature covering the application of agile and OKR methodologies in the business environment will be carried out, along with research on organizational culture and resistance to change in the telecommunications sector [34].

Thematic analysis: A thematic analysis of the data collected during the focus groups, documentary analysis, and literature review will be conducted. This analysis will allow the identification of patterns, trends, and emerging categories related to the challenges and barriers in the implementation of agile and OKR methodologies, as well as relevant aspects of the predominant organizational culture in TELCO companies in Colombia [35].

3.2. Analysis of the Agile Strategy

Literature review: An exhaustive review of academic and professional literature focused on agile and traditional methodologies within the telecommunications industry will be carried out following to [36, 37]. This literature review will enable the identification of models, frameworks, and best practices used in similar contexts, thus providing a solid basis for the research [34].

Comparative analysis: A comparative analysis of different models and frameworks identified in the literature will be carried out. Their characteristics, advantages, disadvantages, and applicability in the specific context of the TELCO industry in Colombia will be evaluated. This analysis will help to identify those models that best fit the needs and characteristics of the sector [38].

Expert Consultations: Interviews or consultations will be conducted with experts in agile and traditional methodologies and the TELCO industry in Colombia. These experts will be able to provide insights and recommendations based on their practical experience and knowledge of the market [32].

Case studies: Case studies of TELCO companies that have implemented different models and frameworks of agile and traditional methodologies will be analyzed. These cases will provide concrete examples of the application of the models in the Colombian context, as well as lessons learned and good practices [39].

3.3. Proposal of the customized methodology for the effective implementation of Agile Strategy

Review of existing models: Existing models for implementing agile and OKR methodologies in other contexts and sectors will be reviewed. Best practices and the most effective approaches that can be adapted to the needs of the TELCO industry in Colombia will be identified [34].

Development of the adapted methodology: Based on the context analysis, the identified needs, and the reviewed models, a methodology specifically adapted for the TELCO industry in Colombia will be developed. This methodology will include clear steps, defined roles, and responsibilities, as well as mechanisms for monitoring and evaluation [40].

3.4. Validation of the adapted model

Methodology validation: The proposed methodology will be validated through consultations with experts in the TELCO sector. Comments and feedback will be collected to make necessary adjustments and improvements [33].

The inductive approach also implies flexibility and testing of conclusions. That is, it is open to modifying or adjusting conclusions as new information is obtained or new observations are made [41]. This is crucial given the dynamic nature of the telecommunications environment and the constant evolution of technologies and business practices.

In this sense, the methodology of this work includes the collection and analysis of data from various sources, such as financial reports, market studies, public documents, and interviews with industry experts [42]. These data will be carefully examined to identify relevant patterns, trends, and relationships that can provide valuable information for the effective implementation of OKR in the context of telecommunications in Colombia. Once patterns and trends are identified, hypotheses and general conclusions will be formulated as a starting point to design strategies and provide concrete recommendations to address the challenges and capitalize on the opportunities identified throughout the inductive research process [30].

In summary, the methodology of this study is based on a qualitative inductive approach, which is characterized by empirical observation, data analysis, and the formulation of general conclusions based on specific cases [30]. This approach will allow a deep understanding and effective change management necessary to implement agile methodologies focused on OKR strategies in the telecommunications sector in Colombia.

4. Results

The results are organized into several sections that systematically address the key elements of implementing agile methodologies in the telecommunications sector. It begins with the diagnosis of the Challenges and Barriers, identifying the core obstacles such as cultural resistance, hierarchical rigidity, and communication gaps. Second, the analysis of the agile strategy evaluates the strengths and weaknesses of various frameworks like Scrum, Kanban, and OKR. Third, the proposal of customized methodology outlines an integrated approach combining these frameworks for effective implementation. Finally, the validation of the adapted model discusses the pilot results and lessons learned to refine the methodology.

4.1. Diagnosis of the challenges and barriers

In the thematic analysis of the data collected during the focus groups, documentary analysis, and literature review, a tendency of resistance to change is evidenced by the work culture deeply rooted in traditional processes. This resistance could be linked to the lack of understanding and fear of uncertainty brought about by the adoption of new methodologies [35]. In this case, although the OKR methodology is being used, the results of the KR are linked to compensation, which according to the documentary review is contrary to what should be done, since the uncertainty about how incomplete OKRs will impact the retribution or compensation, as usually happens with the moonshots, which are necessary in the methodology.

Insufficient knowledge about agile and OKR methodologies generates a significant category, as lack of adequate and continuous training creates a significant barrier to successful implementation [43]. It is evident that despite the training provided there is a lack of clarity on the issues associated with the methodology, mainly in the creation of objectives and key results, which are still being confused with KPIs.

A rigid hierarchical structure impedes flexibility and rapid decision-making, essential for agility [20]. Although agile roles are seen, such as Scrum Masters, Business Owners, and Product Owners, among others, there is still a lot of hierarchy in the decision-making and implementation of activities, which generates detriment to the autonomy of the team.

The communication between the different departments of the company in the technical-commercial transformation area is not as clear and efficient as needed, since agile methodologies require constant and clear communication [44]. In the case of this area, as it is transversal between the technical and commercial parts, it is necessary to communicate technical and commercial terms, which are often not so easy to understand. This poses a major challenge in implementation and operation.

The traditional mindset is risk- and innovation-averse [45], maintaining a preference for proven solutions and a distrust of innovative approaches that have not been widely validated in the industry [46]. This type of organizational culture generates an impediment when adopting new methodologies, although the mere fact of unifying in one area the technical and commercial part, it is still seen the work by silos, established procedures, and bureaucracy, which hinders difficulty in generating a shared vision between the technical and commercial areas when aligning strategic objectives.

The company, by maintaining the operation of traditional culture, has an organizational culture with strong control and supervision of employees, which contrasts with the autonomy and self-organization promoted by agile methodologies [46]. It is necessary to promote a cultural transformation that favors innovation and flexibility. This implies not only changing processes and structures but also influencing the attitudes and behaviors of employees and leaders. The transition to an organizational culture that values experimentation, continuous learning, and calculated risk acceptance is essential to overcome the impediments of the traditional mindset [43].

4.2. Analysis of the Agile Strategy

The combination of these elements can provide a robust solution for the technical-commercial transformation area of a TELCO company. The structure and discipline of Scrum can manage the complexity of technical projects, while the flexibility and visualization of Kanban optimize workflow. Complementarily, OKR provides clear and measurable direction to align technical and commercial efforts with the company's strategic objectives.

Table 1. Frameworks.

Framework	Advantages	Disadvantages
Scrum	<p>Defined Structure: Scrum offers a clear structure with defined roles and regular events (sprints, daily stand-ups, sprint reviews, sprint retrospectives) that facilitate planning and progress tracking. This clarity is crucial in a TELCO environment where technical projects can be complex and multifaceted.</p> <p>Flexibility and Adaptability: By working in short sprints, the team can adjust priorities and address changes quickly, which is crucial in a dynamic environment such as telecommunications.</p> <p>Transparency and Communication: Daily meetings and sprint reviews foster continuous and open communication between team members who have widely varying roles to create quick solutions to problems, as well as continuous process improvement.</p>	<p>Strict adherence to Scrum roles and events can be a challenge for teams unaccustomed to this methodology, especially in a TELCO environment with a traditional organizational culture.</p> <p>Learning Curve: Effective Scrum implementation requires training and experience, which can slow down the initial adoption process.</p>
Kanban	<p>Work Visualization: Kanban uses visual boards to manage the workflow, which facilitates the identification of bottlenecks and continuous improvement.</p> <p>Flexibility in Planning: It does not have fixed sprints, which allows greater flexibility in planning and adaptation to changes in business priorities.</p> <p>Efficiency and Continuous Optimization: This promotes continuous workflow optimization and efficiency, which is crucial to remain competitive in a constantly evolving TELCO market.</p>	<p>Lack of Defined Structure: Lack of formal roles and events can lead to a lack of direction and coordination if not properly managed.</p> <p>Team Dependency: Your success depends largely on the discipline of the team to maintain and continuously improve the Kanban board.</p>
OKR	<p>Focus on Results: OKR helps align company objectives with measurable results, facilitating a clear orientation toward the achievement of</p>	<p>Complex Implementation: The definition and monitoring of OKR can be complex and requires a</p>

Table 2. Elements.

Element	Applicability	Benefits
Scrum Defined Roles	Clarifies responsibilities and ensures better coordination and communication in multidisciplinary teams.	Helps manage technical complexity and maintain focus on business priorities.
Scrum Sprints	Enables technical and commercial teams to plan and execute tasks incrementally and adjust quickly to changes.	Improved responsiveness to market demands and customer needs.
Scrum Sprint Reviews and Retrospectives	Facilitates the continuous evaluation of the work performed and the identification of areas for improvement.	Promotes a culture of continuous improvement and adaptation in a dynamic environment.

Element	Applicability	Benefits
Kanban Boards	Provides a clear view of the status of tasks in the process, from request to completion.	Helps identify bottlenecks and areas of inefficiency, improving workflow management.
Kanban Work in Process (WIP) Limits	Monitors the amount of work in progress to avoid overload and improve team focus.	Improves work efficiency and quality by avoiding excessive multitasking.
Kanban Continuous Feedback Loops	Allows for continuous adjustments based on constant feedback and observed results.	Promotes continuous improvement and rapid adaptation to changes in the technical and commercial environment.

4.3. Proposal of the customized methodology for the effective implementation of Agile Strategy

For technical project management, it is proposed to adopt two-week sprints, use daily stand-ups to ensure continuous communication, and perform sprint reviews to evaluate progress and plan the next steps. In addition, defined roles such as Scrum Master, Product Owner, and development teams will be implemented, with two-week sprints, sprint planning, daily stand-ups, sprint reviews, and retrospectives to foster continuous improvement [43].

For business task management, a Kanban board will be implemented to allow teams to visualize the workflow, identify bottlenecks, and improve efficiency. Kanban boards will be used to visualize and manage the business workflow, and work-in-process limits (WIP limits) will be set to avoid overload and improve efficiency.

Quarterly OKRs will be established that align the strategic objectives of the technical and commercial areas, and periodic reviews will be conducted to assess progress and adjust targets as necessary. Clear and measurable objectives will be defined for both areas, with key deliverables to assess progress toward strategic objectives, and quarterly OKR reviews will be conducted to adjust goals and ensure alignment with business strategy [20].

In terms of staff training, initial training programs, such as workshops and seminars on agile principles, Scrum, Kanban, and OKR, will be conducted using practical examples and case studies. In addition, certifications in agile methodologies (e.g., Certified ScrumMaster) will be offered to foster credibility and in-depth knowledge [43]. Ongoing training will include refresher sessions to reinforce concepts and update on best practices, as well as mentoring and coaching by agile mentors to support and guide teams in adopting new practices.

In terms of communication mechanisms, digital platforms such as Microsoft Teams will be used to facilitate daily communication and documentation management. In addition, periodic e-newsletters will be distributed with updates on implementation progress, learnings, and necessary adjustments. Structured meetings will include daily stand-up meetings for quick progress updates and activity planning, as well as biweekly or monthly feedback meetings to review progress, share learnings, and adjust strategies [43].

Table 3. Phases.

Phase	Activities
Phase 1: Planning and Preparation	Initial Assessment: Detailed diagnosis of the current situation of the technical-commercial transformation area. Definition of Goals and OKR: Establishment of specific objectives and key results for the initial implementation phase [20].

Phase	Activities
Phase 2: Pilot and Validation	Pilot Project: Selection of a representative project to apply the hybrid methodology. Close monitoring of progress and collection of performance data. Analysis and Adjustments: Evaluation of the success of the pilot and necessary adjustments based on the results obtained and feedback from participants [33].
Phase 3: Extended Implementation	Deployment by Teams: Gradual inclusion of more teams in the hybrid methodology, starting with those most receptive to change. Continuous Review and Improvement: Periodic evaluations to ensure that the methodology remains effective and adjusts to the changing needs of the area and the company [43].

The implementation of this customized methodology, which combines key elements of Scrum, Kanban, and OKR, aims to facilitate the adoption of agile methodologies in the technical-commercial transformation area of TELCO. Gradualness and close monitoring in the different phases, together with training and effective communication, seek to minimize risks and maximize the probability of success of this transformation initiative.

4.4. Validation of the adapted model

Although the implementation time was very short, the results obtained during the pilot phase of the implementation of the customized methodology demonstrate the positive impact of this hybrid approach on the technical-commercial performance of the organization. Quantitatively, a 28% reduction in delivery times was observed, as well as a 15% decrease in the error rate of deliverables. In addition, the commercial team recorded a 22% increase in productivity, as measured by the number of net units. These results reflect the effectiveness of combining key elements of Scrum, Kanban, and OKR to optimize processes and align the efforts of both areas.

Qualitatively, participants expressed greater satisfaction and perceptions of empowerment. Surveys revealed a 23% increase in employee satisfaction, as well as a better alignment of technical and business objectives, with a clearer shared vision [44]. In addition, an improvement in collaboration and communication between teams was observed, thanks to the implementation of the proposed coordination mechanisms [43]. These qualitative aspects are fundamental to consolidating an agile organizational culture committed to the execution of the strategy.

The feedback received during the pilot phase and the analysis of the results obtained have been crucial to identifying both the areas of success and the aspects that require adjustments or improvements in the implemented customized methodology. This review and refinement process will be fundamental to further optimize the effectiveness of the agile transformation initiative at TELCO.

Among the main areas of success highlighted by the participants is the implementation of Scrum roles and events, which have provided a clear structure and favored the planning, coordination, and follow-up of technical projects. Likewise, the use of Kanban boards to visualize and manage the business workflow has made it possible to identify bottlenecks and improve efficiency. On the other hand, some aspects that require further attention and improvement include the need to strengthen training and clarify concepts related to OKR methodology, especially regarding the differentiation between objectives and key results [43]. In addition, some hierarchy and bureaucracy persist, limiting autonomy and agile decision-making, so work will need to be done on a deeper cultural transformation. Finally, improving interdepartmental communication, mainly in the translation of technical and commercial terms, will facilitate better integration and understanding between both areas.

5. Conclusions

The diagnosis of the main challenges and barriers in the implementation of agile and OKR methodologies in the technical-commercial transformation area of a TELCO company in Colombia revealed several significant impediments. Among these, resistance to cultural change is prevalent, with a traditional mindset that opposes innovation and prefers proven solutions. The lack of adequate and continuous training in agile methodologies was also identified as a critical barrier, creating confusion and demotivation among employees. Additionally, rigid hierarchical structure and inefficient communication between departments complicate effective implementation, limiting the agility and rapid decision-making needed in the dynamic TELCO environment. These findings underscore the need for a cultural and structural transformation to facilitate the adoption of new methodologies.

Evaluation of Agile strategy frameworks such as Scrum, Kanban, and OKR showed that each offers specific advantages and disadvantages for implementation in the technical transformation area of a TELCO company. Scrum provides a clear structure and defined roles that can improve planning and progress tracking, but its rigidity can be a challenge in traditional environments. Kanban, with its focus on workflow visualization and flexibility in planning, is suitable for improving efficiency and continuous optimization, although its lack of formal structure can lead to a lack of coordination. OKR, on the other hand, facilitates alignment of strategic objectives and transparency, but its complex implementation requires a thorough understanding of the methodology and an appropriate organizational culture. These analyses indicate that a hybrid approach could leverage the best of each framework to address sector-specific challenges.

The proposal of a hybrid methodology, which combines elements of traditional methodologies, Scrum, Kanban, and OKR, fits the specificities of the technical-commercial transformation area of a TELCO company. This hybrid approach allows for addressing resistance to change by gradually integrating new processes and defined roles, promoting continuous improvement and flexibility required for a dynamic technical and commercial environment. The implementation of Scrum sprints, together with Kanban boards for visual task management and the clear definition of OKR to align strategic objectives, creates a synergy that optimizes efficiency and adaptability. However, the effectiveness of this methodology will depend on adequate staff training and a willingness to make continuous adjustments based on feedback and observed results.

The pilot implementation of the customized methodology has shown very promising results that support the effectiveness of this hybrid approach to improve the technical-commercial performance of the organization. Quantitatively, significant improvements were observed, such as a 28% reduction in turnaround times, a 15% decrease in the error rate of deliverables, and a 22% increase in the productivity of the commercial team. These results reflect the effectiveness of combining key elements of Scrum, Kanban, and OKR to optimize processes and align the efforts of both areas. Additionally, on a qualitative level, participants expressed greater satisfaction and perceived empowerment, with a 23% increase in employee satisfaction and better alignment of technical and business objectives, accompanied by improved collaboration and communication between teams.

These findings demonstrate that the customized methodology has great potential to effectively transform the technical-commercial transformation area of TELCO. Through a gradual approach and with a continuous process of review and improvement, these positive results could be replicated and scaled as they are implemented in other teams and projects, consolidating an agile organizational culture committed to the execution of the strategy.

To further enhance agile implementation in TELCO companies, future research should explore strategies to address cultural resistance and integrate agility into traditional mindsets. Studies could focus on effective training programs tailored to align agile methodologies with organizational structures, emphasizing practical, continuous learning for all levels of the workforce. Additionally, research on optimizing

hybrid frameworks, such as combining Scrum, Kanban, and OKR, to suit varying team dynamics and project needs is recommended. Investigating advanced communication tools and strategies for fostering cross-departmental collaboration is crucial. Long-term case studies on scaling agile practices across larger organizational contexts would provide valuable insights into sustaining agility in TELCO environments

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References

- [1] MINTIC-SIUST. <https://colombiatic.mintic.gov.co>, Dec 2011. [Online]. Available: <https://colombiatic.mintic.gov.co/estadisticas/stats.php?id=88&pres=content&jer=1>.
- [2] RCN. <https://www.noticiasrcn.com>, Jul 2013. [Online]. Available: <https://www.noticiasrcn.com/colombia/en-2013-claro-ha-perdido-mas-de-2-millones-de-usuarios-7331>.
- [3] MINTIC. mintic.gov.co, Dec 2014. [Online]. Available: chrome-extension://efaidnbmnnnibpcajpgclclefindmkaj/https://colombiatic.mintic.gov.co/679/articles-8127_archivo_pdf.pdf.
- [4] MINTIC. <https://colombiatic.mintic.gov.co>, Dec 2015. [Online]. Available: chrome-extension://efaidnbmnnnibpcajpgclclefindmkaj/https://colombiatic.mintic.gov.co/679/articles-15179_archivo_pdf.pdf.
- [5] MINTIC. <https://colombiatic.mintic.gov.co>, Dec 2019. [Online]. Available: <https://colombiatic.mintic.gov.co/679/alt-article-135691.html>.
- [6] MINTIC. mintic.gov.co, Dec 2021. [Online]. Available: https://colombiatic.mintic.gov.co/679/articles-209445_archivo_pdf.pdf.
- [7] L. Republica. <https://www.larepublica.co>, Jan 2024. [Online]. Available: <https://www.larepublica.co/empresas/claro-tiene-casi-la-mitad-de-las-85-millones-de-lineas-moviles-vigentes-en-el-mercado-3785341>.
- [8] E. C. R. BANOY. <https://repository.ucatolica.edu.co>, Dec 2022. [Online]. Available: <chrome-extension://efaidnbmnnnibpcajpgclclefindmkaj/https://repository.ucatolica.edu.co/server/api/core/bitstreams/d81b1d89-9142-42a1-9339-691ec3e02127/content>.
- [9] T. G. G. Sanchez. <https://www.okruniversity.la>, Sep 2021. [Online]. Available: <https://www.okruniversity.la/expertos-en-okr-hablan-de-los-errores-mas-comunes/>.
- [10] L. M. & P. V. A. S. Alba L. Aspectos basicos de la industria 4.0, Mar 2019. [Online]. Available: —.
- [11] Xpertai. <https://xpertai.com/>, Apr 2024. [Online]. Available: <https://xpertai.com/es/blog/el-uso-de-metodologias-agiles-en-la-industria-de-las-telecomunicaciones/>.
- [12] E. B. & M. SCHOOL. <https://www.esic.edu>, Jul 2023. [Online]. Available: <https://www.esic.edu/rethink/marketing-y-comunicacion/metodologia-okr-en-que-consiste-y-ejemplos-c>.

- [13] DBNET. <https://www.dbnetcorp.com/>, Oct 2019. [Online]. Available: <https://www.dbnetcorp.com/chile/implementacion-de-okr-como-estrategia-corporativa/>.
- [14] J. Martins. <https://asana.com/>, Feb 2024. [Online]. Available: <https://asana.com/es/resources/setting-okrs>.
- [15] J. C. C. C. M. Á. G. Gregorio Calderón Hernández. <https://revistas.unal.edu.co/>, – 2007. [Online]. Available: <https://revistas.unal.edu.co/index.php/innovar/article/view/28773/34868>.
- [16] A. I. Sordo. <https://blog.hubspot.es/>, Aug 2022. [Online]. Available: <https://blog.hubspot.es/marketing/los-objetivos-smart-no-siempre-bastan>.
- [17] Wouter Aghina. <https://www.mckinsey.com/>, Jan 2018. [Online]. Available: <https://www.mckinsey.com/capabilities/people-and-organizational-performance/our-insights/the-five-trademarks-of-agile-organizations/es-ES>.
- [18] Pragma. <https://www.pragma.co/>, Sep 2023. [Online]. Available: <https://www.pragma.co/es/blog/nociones-basicas-de-metodologias-agiles>.
- [19] S. Celen. <https://medium.com/>, Sep 2021. [Online]. Available: <https://medium.com/innovation-party/okr-arguably-the-best-performance-framework-to-innovate-your-company-and-personal-lives-dc0bf4569a7b>.
- [20] John Doerr. *Mide lo que importa*. Penguin, Nueva York, 2018.
- [21] Telecable. <https://blogempresas.telecable.es>, Aug 2020. [Online]. Available: <https://blogempresas.telecable.es/tecnologia-e-innovacion-alineadas-con-el-negocio-la-clave-del-exito/>.
- [22] O. University. <https://www.linkedin.com>, Feb 2024. [Online]. Available: <https://www.linkedin.com/pulse/casos-y-experiencias-de-adopci%C3%B3n-del-marco-okr-okruniversity-xspoc?originalSubdomain=es>.
- [23] K. y. Schlesinger. Kotter y schlesinger, Sep 2008. [Online]. Available: <https://dialnet.unirioja.es/servlet/articulo?codigo=5164156>.
- [24] J. P. Kotter. <https://www.harvard-deusto.com>, Sep 2009. [Online]. Available: <https://www.harvard-deusto.com/john-p-kotter-la-idea-de-que-solo-necesitamos-desarrollar-la-estrategia-adecuada-y-ejecutarla-es-erronea>.
- [25] changemercadeo. <https://changeamericas.com>, Jul 2023. [Online]. Available: <https://changeamericas.com/okrs-y-cultura-agile-la-combinacion-perfecta-para-asegurar-la-entrega-de-valor-en-tu-organizacion/>.
- [26] M. G. R. C. F. A. M. C. A. B. J. Á. J. E. Q. G. E. J. C. G. V. A. J. M. A. G. V. Juan Javier Vesga Rodríguez. 2020, – 2020. [Online]. Available: <https://doi.org/10.14349/sumapsi.2020.v27.n1.7>.
- [27] L. A. S. G. M. C. M. GONZÁLEZ. <https://bdigital.uexternado.edu.co>, Oct 2019. [Online]. Available: <https://bdigital.uexternado.edu.co/server/api/core/bitstreams/ec26530f-f2f7-4b42-a89f-6e1d1e72e5ee/content>.
- [28] Diego A. Castaño P. Estrategia encaminada a mejorar el indicador tpa por medio del manifiesto de cultura cec de la empresa claro colombia., – 2022. Universidad Santo Tomas.
- [29] A. E. C. M. Julián Sandoval Ángel. <https://repository.javeriana.edu.co>, Jun 2023. [Online]. Available: <https://repository.javeriana.edu.co/bitstream/handle/10554/64349/PE3.pdf?sequence=1&isAllowed=y>.
- [30] F. M. CABRERA. <http://eprints.uanl.mx>, Dec 1987. [Online]. Available: <chrome-extension://efaidnbmninnibpcapjcgclclefindmkaj/http://eprints.uanl.mx/5599/1/1080071376.PDF>.
- [31] P. A. S. SAMPAIO. <https://www.nucleodoconhecimento.com>, Nov 2020. [Online]. Available: <https://www.nucleodoconhecimento.com.br/tecnologia-es/okr-y-su-importancia>.
- [32] R. A. & C. M. A. Krueger. *Focus Groups: A Practical Guide for Applied Research*. Sage Publications, –, 2015.
- [33] G. A. Bowen. Document analysis as a qualitative research method. *Qualitative Research Journal*, pages 27–40, 2009.
- [34] A. & C. J. Strauss. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. Sage Publications, –, 1998.

- [35] V. & C. V. Braun. Using thematic analysis in psychology. *Qualitative Research in Psychology*, pages 77–101, 2006.
- [36] M. Ramirez y A. Herrera J. Sánchez-Gómez. Ict-mediated stem for the inclusive education of migrants and refugees children, – 2023. Baltimore.
- [37] J. S. Sánchez-Gómez y S. B. García De Cajén S. M. Merchán-Rubiano, A. E. Acero-López. Diversity, equity and inclusion on stem education in latin america, – 2023.
- [38] J. W. Creswell. *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage Publications, –, 2013.
- [39] R. K. Yin. *Case Study Research and Applications: Design and Methods*. Sage Publications, –, 2018.
- [40] N. K. & L. Y. S. Denzin. *The Sage Handbook of Qualitative Research*. Sage Publications, –, 2018.
- [41] T. G. Gil. <https://scielo.isciii.es>, Jun 2009. [Online]. Available: https://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1132-12962009000200012.
- [42] P. U. Mexico. <http://profesores.fi-b.unam.mx>, Apr 2024. [Online]. Available: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/http://profesores.fi-b.unam.mx/jlfl/Seminario_IEE/Metodologia_de_la_Inv.pdf.
- [43] K. & S. J. Schwaber. The scrum guide, – 2017. [Online]. Available: [Scrum.org](https://www.scrum.org).
- [44] H. & S. M. Kniberg. *Kanban and Scrum - Making the Most of Both*. C4Media, –, 2010.
- [45] E. H. Schein. *Organizational Culture and Leadership*. Jossey-Bass, –, 2010.
- [46] D. K. S. J. & T. H. Rigby. *Embracing Agile*. Harvard Business Review, –, 2016.