Impact of Agile Software Development Team Leaders' Mindset on Dynamic Capabilities for Achieving Organizational Agility

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Abstract

Agile Software Development (ASD) methodologies are often viewed as restraining IT innovation and causing technical debt. Recently, agile mindset leaders have been introduced as a remedy to solve this clash, describing them as those who secure dynamic capabilities. In other words, ASD alone, without an open, agile mindset, can serve as a blocker rather than a supporter of innovativeness in IT. To confirm this thesis, this study compares the impact of agile and non-agile mindset team leaders on developing dynamic capabilities in the IT sector to verify how critical an agile mindset is in IT. The Structural Equation Modeling (SEM) model was developed based on a sample composed of 474 IT employees to investigate it. Results showed that the sensing capability in the non-agile leader model is ineffective. Therefore, the innovations are hindered. The leaders with an agile mindset foster greater organizational agility and reduce the need to confront resistance to innovation. Therefore, agile mindset team leaders, in contrast to non-agile mindset team leaders, are those who can secure organizational agility in IT. So, securing ASD team leaders with an agile mindset is critical to win organizational agility in IT.

Keywords: agility, team leader, agile mindset leader, dynamic capabilities, agile software development, ASD, organizational agility

1. Introduction

Agile Software Development (ASD) methodologies have gained increasing popularity over the past decades. On the one hand, they are seen as tools that support the software industry in adapting to constantly changing requirements [6], [30] and to foster business innovativeness [3],[16]. On the other hand, some authors view them as rigid tools hindering IT innovation and contributing to technical debt [4,5], [35], [45]. Therefore, the impact of ASD on innovativeness and organizational agility is a matter of controversy.

IT organizations must adapt to changes in the external environment [17], [36], [43], [63]. The ASD Team needs to react swiftly not only to customer needs but also to the changes in technology and market trends. This type of agility is defined as Organizational Agility (OA) [24] and requires 'higher-level learning skills' defined as dynamic capabilities [62]. Dynamic capabilities involve actively monitoring the external environment for potential opportunities like new technology (SENSING capability), being able to capitalize on them (SEIZING capability), and adjusting internal processes and routines to adapt accordingly (RECONFIGURING capability). They are all necessary to enhance change adoption and foster innovativeness [1], [9], [12], [54]. Strong dynamic capabilities cannot be developed without leaders. Recently, agile mindset leaders have been introduced as critical for agility development in organizations [37,38]. Therefore, this study investigates how the Agile Leader mindset impacts dynamic capabilities to increase

OA and foster innovativeness, leading to an increase in overall performance [61].

Recent studies suggested that organizational agility is more closely tied to employees' mindset than technological and methodological management approaches [14], [37], [46]. The authors argue that in a rapidly changing world, adaptability skills are crucial to organizational growth and survival. Therefore, organizational agility, which enables businesses to respond quickly and efficiently, thereby enhancing performance in volatile times, is critical to cultivate nowadays in any type of organization, especially in IT. An agile organization is considered an efficient, comprehensive adaptive system that encompasses the coordination of people, processes, technology, culture, and resources, which critically depends on its agile mindset leaders and agile mindset employees, technology adoption, and application of agile management methods [37]. In such a context, this research aims to build upon this line of studies and provide new insights into the importance of an agile mindset and its relationship to dynamic capabilities. In other words, it aims to bring a deeper understanding of where the non-agile mindset is especially lacking or detrimental to organizational agility. Such research is profoundly meaningful when conducted in the IT sector context, where agile software development methods are widely implemented, often giving the collective illusion that implementing agile software development methodology automatically guarantees organizational agility.

To sum up, this study aims to compare the impact of agile and non-agile team leaders on dynamic capabilities in organizations that have implemented ASD methods, to expose the differences between the effects observed in dynamic capabilities input to organizational agility exposed by teams led by agile and non-agile mindset leaders. The expected value of such a comparison is to deliver clear evidence if the agile mindset of a team's leader makes a difference. In other words, this study shows that agile software methodologies alone, without agile mindset leaders' input, may not serve the organizational agility of teams as well as when agile mindset leaders are involved. Dynamic capabilities serve here as an organizational agility proxy.

2. Conceptual Framework

2.1. Organizational Agility (OA) from operational perspective

Agile software development requires continuous collaboration with the customer in order to respond quickly to changes on the customer side [6], [20], [25], [30], [42], [60]. This type of agility does not necessarily require the agile team to change their development process or work routines. However, the ASD team must not only respond swiftly to customer needs but also adapt to changes in technology and IT market trends, while avoiding technical debt [47,48]. Behaving this way ensures a focus on company growth through innovation. Innovations will likely result in changes to an agile team's work routines. To capture this kind of agility, the construct Organizational Agility (OA) was utilized [24], [62].

A.T. Walter highlighted various perspectives, leading to an inconsistent and ambiguous understanding of Organizational Agility among different authors [61]. This paper considers OA from an operational performance perspective. OA is defined as the ability of processes to achieve speed, accuracy, and cost economy in the exploitation of opportunities for innovation and competitive action [51]. Organizations today need to develop adaptability secured by dynamic capabilities to survive and grow.

Organizational agility requires the ASD Teams to change their development process and/or work routines, which is described by the concept of dynamic capabilities [62]. In this context, we apply the OA construct to the ASD Team to evaluate all IT-sourced changes while excluding those sourced from the business. This way, we primarily target IT innovations, like new technologies, new ideas, and any kind of improvements. However, organizational agility in the context of ASD teams also includes IT cost optimization, such as the ASD Team's decision to replace expensive proprietary technology with an open-source solution.

2.2. Dynamic capabilities

An organization's survival relies on its ability to evolve and adapt to a changing world;

COVID-19, climate change, technical breakthroughs, and generative AI are recent examples of disruptions that compel the world to evolve by developing dynamic capabilities [9], [12], [54]. 'Dynamic capabilities' are defined as change routines that operate at a higher level of learning skills, aiming to improve typical work processes [62]. They define the organization's ability to integrate, develop, and reconfigure internal and external skills to adapt to a rapidly changing external environment and gain or retain competitive advantage [29], [40], [56]. So, sensing, reconfiguring, and seizing dynamic capability skills can be seen as predictors for operational agility.

Sensing

The 'sensing' capability involves scanning the external environment, interpreting information, and identifying the opportunities [57,58], the creation of new ideas and knowledge, and empirical learning [34], entrepreneurial resources, innovation strategy, and anticipation process [26], internal assets along with research and development, anticipation and pre-venture examination, and sustainability of recipients [8], as well as experimental exploration, consideration of the functional core, and paradoxical framing [59]. So that the team can either utilize organizational resources or conduct their market observation to detect new trends and identify innovation opportunities. In the ASD context, sensing skills are expected to identify new IT technologies and cost-saving opportunities or threats. They provide input for the decision-making process concerning the implementation of new technologies, replacement of tools, and modification of processes to enhance software quality, improve development efficiency, and optimize IT costs as well.

Seizing

The 'seizing' capability refers to an organization's ability to capture the value from opportunities [56]. It depends on communication with stakeholders and combining business and technological models [8], [34]. Again, an agile mindset team leader can be critical to achieving it. It must be stressed that implementing innovation is worthless unless the innovation yields value and gives the company a competitive advantage, so this is a critical capability to make the innovation matter from a competitive advantage perspective. In the context of the ASD, the competitive advantage may relate to either IT (software development efficiency, IT cost savings) or business (benefit on the customer side).

Reconfiguring

Once an opportunity is identified and positively evaluated, it needs to be implemented. The capability of 'reconfiguring' defines an organization's ability to coordinate its asset base, transform resources and processes into valuable new combinations, and develop new capabilities through learning [28],[56]. Decentralization of power [8], cross-vergence organization, flexible connecting structures, and cost-cutting [59] are supposed to foster this capability. Thus, agile self-organizing teams should be able to quickly adapt to the new way of working. Reconfiguring capabilities requires collaboration and coordination between the business and technology worlds [26]. In the ASD Team context, reconfiguring skill defines the team's ability to adapt to a new technology, change the development process, work routines, tools, etc. Potentially, an agile mindset team leader can be critical to achieving it.

2.3. Agile mindset

Mindset determines how humans interpret the surrounding world. It defines how they understand emotions, beliefs, assumptions, attitudes, motives, and intentions, and how we react to situations based on the interpretation [18], [31]. Several attempts have been made to define the agile mindset [13], [14], [46]. The most recent definition of the agile mindset encompasses four attitudes within a work context: (i) continually seeking new insights to adapt to changes; (ii) openly sharing and discussing methods and results with others; (iii) independently deciding how to proceed; and (iv) maintaining a goal-oriented focus on the customer [13]. Sathe and Panse [52], inspired by Hastie and Engineer [23], added "delivery focus" as a critical factor reflecting an agile mindset.

Individuals with an agile mindset, in contrast to those with a non-agile mindset, do not

experience a negative impact on their psychological well-being due to change. They can effectively generate and implement new ideas that enhance team members' ability to thrive and contribute to dynamic working conditions [32], [44]. Ambituuni et al. [2] noted that some individuals naturally possess an agile mindset, while others do not and are unlikely ever to develop one. The latter group constitutes the majority within society.

2.4. Agile mindset leaders

The agile mindset capabilities of leaders, such as their ability to adapt, be flexible, learn actively, serve as role models, and maintain a future-oriented perspective, are essential for organizational survival during times of crisis [55]. According to Kerguenne [33], agile leadership enables organizations to deal with wicked problems, making it more profound than traditional servant leadership [7].

Moreover, Maroukian and Gulliver [41] concluded that highly adaptive agile leadership influencing organizational agility is conceptually different from all existing value-based leadership approaches. Recently, agile mindset leaders have been introduced as critical for agility development in organizations [37,38]. However, the essence of agile mindset leadership contribution to agile organizations' development still needs to be explored [15], [49,50], [53]. This study contributes to this need.

2.5. Research questions

RQ: Which type of leaders, agile or non-agile mindset, are more efficient in supporting dynamic capabilities to foster Organizational Agility in IT? Do we observe any difference?

This study aims to verify this assumption empirically. The theoretical model (Figure 1) visualizes the studied dependency between three dynamic capabilities: sensing, reconfiguring, seizing, and organizational agility for two different cases: agile mindset leader (AML) versus non-agile mindset leader (n-AML). The research question is addressed in two steps:

- Step 1: Run the same SEM model explaining how dynamic capabilities impact organizational agility, for two subsamples, one based on team members who see their leaders as agile (Fig.1a) and the other composed of team members who see their leaders as having a non-agile mindset (Fig.1b).
    - H1: Sensing capability positively impacts OA (AML vs n-AML)
    - H2: Seizing capability positively impacts OA (AML vs n-AML)
    - H3: Reconfiguring capability positively impacts OA (AML vs n-AML)
- Step 2: Compare the results of both models to see which leaders are more efficient in supporting dynamic capabilities to foster Organizational Agility.

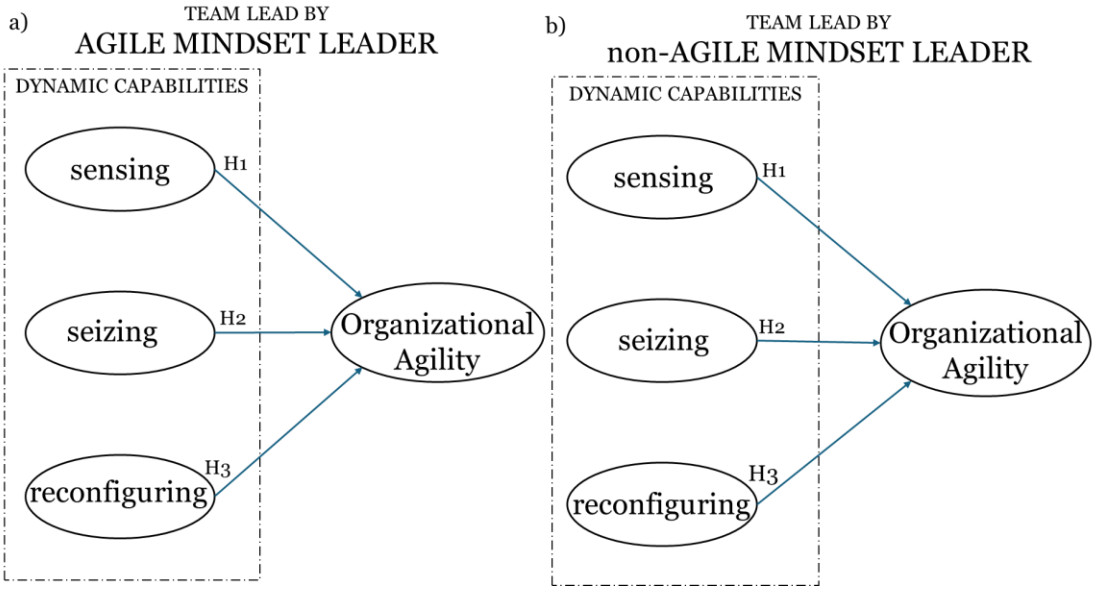

Fig. 1. Agile and non-Agile Mindset Leaders' Impact on Agility Comparison. Empirical model.

Based on the literature given above, dynamic capabilities such as sensing, reconfiguring, and seizing are expected to form the basis for organizational agility. However, Organizational Agility involves changes in development practices and work routines, which may negatively affect the well-being of leaders with a non-agile mindset while positively impacting the well-being of leaders with an agile mindset who naturally see changes as opportunities. Therefore, agile mindset leaders are expected to foster higher organizational agility by enhancing dynamic capabilities.

3. Methodology

3.1. Survey sampling method and data collection

The Structural Equation Modeling (SEM) method was applied to validate both models. The two samples employed came from data collection carried out in January 2025 and targeted IT sector employees working in ASD teams using the Computer-Assisted Web Interview (CAWI) method of questionnaire distribution. The questionnaire tool was created using the measurement scales presented in Table 1. The convenience snowball sampling method was applied to ensure that respondents who were genuinely engaged and interested in the 'leaders and agility' issues participated in the survey. The invitation was among those who, according to the best knowledge of other professionals (co-workers), are interested in the topic of 'organizational agility.' The final sample consists of higher-level IT specialists (48%) and IT managers (52%) from micro (15%), small (28%), medium (31%), and big (26%) enterprises.

Table 1. Measurement scales, their sources, and reliability (total sample, n=475).

Scale source	Loadings measures (scale statements)	Cronbach α
Dynamic capability: sensing [39]	• We are looking for new opportunities in the operating environment • We are searching for new practices • We are conceptualizing new ways of doing business [39]	0.960
Dynamic capability: seizing [39]	• We observe market trends • We react to changes in our operating environment • We continuously build complementary know-how • We try to influence the direction of our business sector actively [39]	0.973
Dynamic capability: reconfiguring [39]	• Acquired know-how is integrated into the organization • Existing resources are used in new contexts • Existing know-how is used in new areas [39]	0.961
Organizational agility (Author's scale based on Carvalho [10,11])	We are focused on: • flexibility of our processes • efficacy of our processes • effectiveness of our processes • operational excellence initiatives taking	0.981
Agile mindset leader **non-Agile mindset leader** [37]	An agile mindset leader (AML) is a "hybrid mindset" who excels at ambidexterity. AML embodies both outside-the-box and inside-the-box thinking, blending seemingly opposite attitudes and approaches like stability with agility, experimentation with exploitation, and flexibility with control at the same time. This allows AML to adapt to different management styles, make the right just-in-time decisions, and efficiently manage tensions and paradoxes in constantly changing environments. He combines efficiency and expertise with social skills. His expertise-driven intuition is developed through continuous learning, unlearning, and relearning.[37] Do you consider your team leader to be a leader with an agile mindset? YES/NO	dichotomous output YES/NO

All the constructs were measured using a 7-point Likert scale, where 1 means 'totally disagree'; 7 means 'perfectly agree'; 4 is seen as neutral (neither agree nor disagree). Table 1 presents applied scales, their sources, and the reliability of measures obtained based on Cronbach's alpha. Cronbach's alpha is a method used to assess the reliability of a measurement instrument by comparing the shared variance (or covariance) among its items to the overall variance; Cronbach's α of 0.9 and above suggests strongly reliable scales[57]. Moreover, Table 2 exposes the factor loadings matrix and shows that the measurement scales do not overlap. The matrix indicates that each loading measure exclusively measures one construct (bolded values). Since the construct measures are correct, we can proceed with further analysis.

Other tests that expose the quality of the presented measures are AVE and CR. CR (Composite Reliability) measures the ratio of explained variance over total variance. It can be applied to standardized and non-standardized coefficients. AVE (Average Variance Extracted) is applied to standardized coefficients only. Acceptable values for CR and AVE are typically above 0.70 and 0.50, respectively [22]. Details of effects obtained for the CR and AVE tests are presented in Tables 3a and 3b below.

Table 2. Factor loadings model matrix (Promax, Kappa 4, total sample, n=475).

	Reconfiguring	Seizing	Organizational Agility	Sensing
Seizing Q1		**.785**		.207
Seizing Q2		**.718**	.118	.201
Seizing Q3		**.760**		.183
Seizing Q4	.210	**.920**		-.252
Sensing Q1	.281		.104	**.602**
Sensing Q2	.243			**.646**
Sensing Q3	.289		.151	**.529**
Reconfiguring Q1	**.615**		.167	.186
Reconfiguring Q2	**.836**	.108		
Reconfiguring Q3	**.882**			
Organizational agility Q1			**.854**	
Organizational agility Q2	.139		**.818**	
Organizational agility Q3	.112		**.826**	
Organizational agility Q4		.136	**.756**	

3.2. Analytical procedure

The total sample (n=475) was split up into two subsamples representing team members led by an agile mindset leader (AML, n=271) and a non-agile mindset leader (nAML, n=204). Next, basic statistics were gathered for each subsample, and sample quality was assessed. After that, SEM models were calculated, hypotheses verified, and the final effects compared.

3.3. Basic statistics and sample quality

Sample quality was assessed using the Common Method Bias (CMB) and Kaiser–Meyer–Olkin (KMO) test for three samples. The results are as follows: TOTAL sample: KMO=0.965, total variance extracted: 93%, CMB=40%; AML sample: KMO=0.934, total variance extracted: 91%, CMB=56%; n-AML sample: KMO=0.917, total variance extracted: 85%, CMB=47%. The KMO values above 0.8 indicate a very high sampling quality. Harman's one-factor test indicates that CMB is present if the unrotated solution (with all measured items included) produces one factor that accounts for more than 50% of the variance [19]. CMB, only in the case of the ALM sample, is above 50%, which is a limitation of this study. It might be caused by the fact that dynamic capabilities impact agility tremendously [21], [27]. That seems to be confirmed by the high correlations between constructs presented in Table 3a and Table 3b.

Table 3a. Basic statistics, AVE root square, and correlations between constructs: AML model (a)

	Mean	SD	AVE	CR	Cronbach	**sensing**	**seizing**	**reconfig.**	**agility**
sensing	5.46	1.8086	0.94	0.97	.971	**0.972**			
seizing	5.49	1.8423	0.97	0.99	.985	0.908	**0.986**		
reconfiguring	5.46	1.7756	0.92	0.96	.961	0.944	0.907	**0.962**	
agility	5.53	1.8453	0.97	0.99	.982	0.943	0.925	0.942	**0.983**

Table 3b. Basic statistics, AVE root square, and correlations between constructs: n-AML model (b)

	Mean	SD	AVE	CR	Cronbach	**sensing**	**seizing**	**reconfig.**	**agility**
sensing	4.905	1.9795	0.87	0.93	.930	**0.934**			
seizing	4.965	1.9115	0.93	0.96	.964	0.912	**0.966**		
reconfiguring	4.815	1.8595	0.91	0.95	.950	0.937	0.864	**0.953**	
agility	5.05	1.8385	0.92	0.96	.960	0.907	0.858	0.934	**0.961**

The basic statistics presented above show that team members led by AML leaders (Table 3a) report higher mean values of dynamic capabilities and organizational agility than those led by non-AML leaders (Table 3b). This suggests that the structural models' effects will also expose the significant difference in impact observed for dynamic capabilities on organizational agility for teams led by agile and non-agile leaders.

Furthermore, analyzing all tests of measures' qualities, AVE, and CR, all achieved excellent levels [22]. Moreover, the root square of AVE (bolded in Tables 3a and 3b) exceeded the correlations between constructs, indicating a good model fit [22].

In summary, all the elaborated statistics enable us to proceed with further comparison of the entire set of structural effects obtained for teams led by agile and non-agile leaders (Figure 2), presented in the next section.

4. Results

The presented results (Figure 2) show that teams led by agile mindset leaders expose all dynamic capabilities and have a higher organizational agility than teams led by non-agile leaders. In other words, results clearly show that ASD methods alone, without agile mindset leaders, do not serve the organizational agility of teams as well as when agile mindset leaders are involved. Teams led by non-agile leaders did not exhibit sensing capability at all (H1 β=0.42***/ns AML/n-AML), and their input to organizational agility was primarily based on reconfiguring (H3 β=0.41***/0.80***) and only marginally on seizing (H2 β=0.15**/0.22*). Team members led by AML leaders expose all the dynamic capabilities profoundly.

Analysis of models' quality by tests: RMSEA, GFI, CFI, $\chi^{2,}$ and TLI (Table 4) indicates that AML model (a) quality is better than n-AML model (b), but both models are well fitted. However, in the case of the n-AML model, H1 is statistically insignificant, and H2's statistical significance is low ($p < 0.05$). Moreover, the R^2 is significantly higher in the case of the AML model (a). It clearly indicates that dynamic capabilities explain organizational agility much better for leaders with an agile mindset than without.

The R^2=0.88 (n-AML) suggests the existence of other factors (not included in the model) that may support organizational agility of teams led by non-agile leaders, which the studied model omitted. The input of the omitted factors is marginal in the model of agile mindset leader teams since AML R^2=0.94. Additionally, the basic statistics (Table 31, Table 3b) show that the difference in overall agility between AML and n-AML samples is not as severe as would be if not for the unidentified mechanism. This mechanism is not described in the literature related to the dynamic capabilities or team learning. Furthermore, in the case of n-AML, the high impact of reconfiguring capability on organizational agility is 0.8 (Figure 2), which, along with a moderate mean agility of 5.05 (Table 3b), indicates the team is somehow adopting without learning, which is interesting. This mechanism requires further investigation.

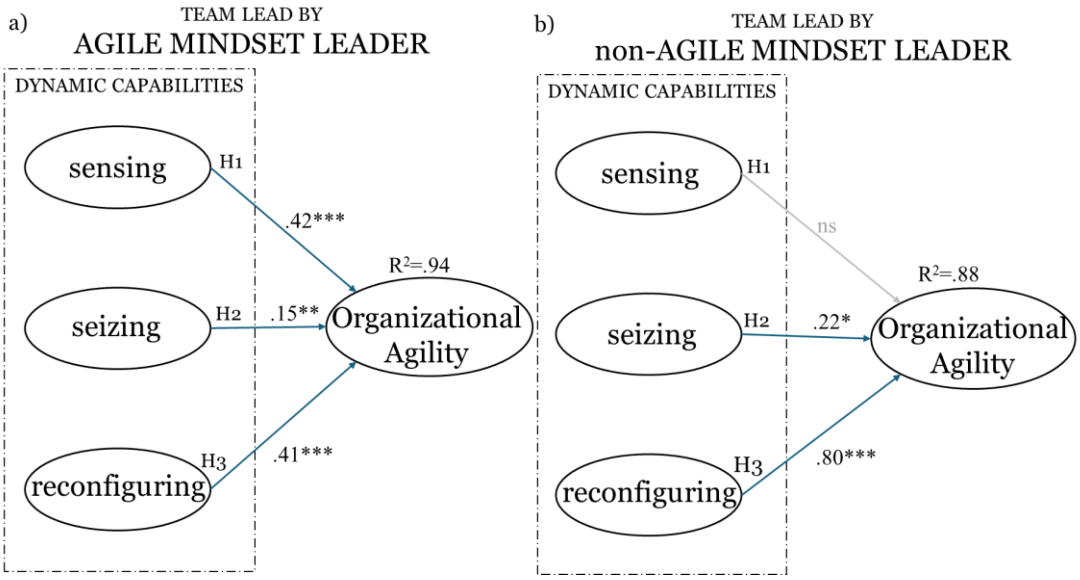

Fig. 2. Agile and Non-Agile Mindset Leaders' Impact on Agility Comparison.

Table 4. Hypotheses Verification

	AML model (a)		**n-AML model (b)**	
H1	.42***	hypothesis sustained	ns	hypothesis rejected
H2	.15**	hypothesis sustained	.22*	hypothesis sustained
H3	.41***	hypothesis sustained	.80***	hypothesis sustained
Model quality	χ^2 = 55(25); RMSEA=.068; Cmin/*df*=2.23; GFI=.958; FI=.995; TLI=.990		χ^2 = 59(25); RMSEA=.082; Cmin/*df*=2.37; GFI=.951; CFI=.989; TLI=.981	
Sample size	n=271		n=204	

Note: *p < .05; **p < .01; ***p < .001; ns—not significant result

5. Discussion, practical implications

The results indicate that the sensing capability in the non-agile mindset leader model is ineffective. This is understandable, as non-agile leaders, by nature stressed by changes, are not focused on searching for opportunities that lead to changes. Sensing capability is crucial for the entire learning process about business reality and the wise adoption of its potential changes. There is no innovation if the team is not learning about the current reality drivers of change and does not consider adjustments to them.

Regarding the ASD innovativeness, the literature contains contradictory statements related to it. On the one hand, many authors view ASD as supporting adoption and fostering innovativeness [3], [6], [16], [30]. On the other hand, many authors see ASD methodologies as restraining IT innovation and causing technical debt [4,5], [35], [45]. These claims are based on qualitative studies that identified issues with innovation-related processes. The results of this study indicate that ASD team learning (sensing capability) and, consequently, innovativeness strongly depend on the agility of the leader's mindset. On the one hand, the AML subsample results show that ASD can be very innovative, which justifies the statement that agile fosters innovativeness [3], [6], [16], [30]. On the other hand, the n-AML subsample result shows that ASD does not protect innovativeness against a non-agile mindset leader. The n-AML subsample size is substantial, so those are not isolated cases. Therefore, the most accurate conclusion is that agility is conducive to innovation but does not guarantee or protect innovativeness.

Additionally, in Figure 2, we can see that the seizing capability is significantly weaker compared to the other capabilities. This capability is related to harvesting the benefits of an innovation and gaining a competitive advantage by combining business and

technological models [8], [34]. The competitive advantage may not be directly related to the agile team. The interface between the agile team and the business may play a focal role, which needs further investigation.

From a practical standpoint, leaders with an agile mindset foster greater organizational agility and reduce the need to confront resistance to innovation. Consequently, securing ASD team leaders with an agile mindset is critical to win organizational agility in IT.

6. Limitations

The key limitation of this research is that the studied model does not include other factors enforcing changes related to technical innovativeness.

Moreover, seizing capability was not deeply investigated regarding the mechanism related to harvesting a competitive advantage out of innovation, where the beneficiary may be other than the Agile Team. This study omitted it totally, but this issue seems to be critical and requires further investigation.

Finally, the sample data were collected in only one country using convenience snowball sampling, which probably caused the slight bias observed in the AML sample. A replication study in other countries and expansion of the tested model investigating additional organization-related factors, in addition to confirming the findings, would help better understand the mechanisms standing behind agile and non-agile mindset leader teams' impacts on dynamic capabilities, organizational agility, and innovativeness.

7. Conclusions

The paper brings new insight into the importance of an agile mindset of the leader and its relation to dynamic capabilities development. Put another way, it explains where the non-agile mindset is especially lacking or detrimental to organizational agility. The results show that the sensing capability in the non-agile leader model is ineffective. Therefore, innovations are hindered. In contrast, leaders with an agile mindset promote greater organizational agility and diminish the need to confront resistance to innovation. As a result, this approach appears to be the best choice for organizations.

The results indicate that in the case of non-agile leaders, even though sensing capability is ineffective, organizations are using other, unknown mechanisms to trigger innovations. This mechanism is less effective but saves organizations from being completely non-innovative. It needs to be further investigated.

The results related to seizing dynamic capability indicate that deeper studies on how the Agile Team interfaces with internal and external customers are needed to understand how a competitive advantage derived from innovation is transferred to customers in order to improve this process and foster higher organizational agility.

The study shows that dynamic capabilities, as collective higher-level learning skills, are closely related to leaders' agile mindset.

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