Back to the Essential: A Literature-Based Review on Agile Mindset

Necmettin Ozkan
Architecht Information Systems
İstanbul, Turkey
necmettin.ozkan@architecht.com

Karen Eilers
Institute for Transformation
Hamburg, Germany
karen.eilers@in-transformation.com

Mehmet Şahin Gök
Gebze Technical University
Kocaeli, Turkey
sahingok@gtu.edu.tr

Abstract— **Starting from software development, Agile approaches are spreading across a broad range of industries and functions, with many great challenges. Mindset, as one of the crucial human factors of individuals in Agile, influences people's decision-making and affects every aspect of behavior and action. However, many organizations and teams face big challenges in achieving an Agile Mindset of their individuals. In addition to an often-unclear understanding of the Agile Mindset, various aspects of it such as success factors and indications are largely unknown, which makes it extremely difficult to establish an Agile Mindset. Motivated by this, our study aims to conduct a literature review by answering comprehensive research questions related to the Agile Mindset regarding publication demographics, importance, definitions, characteristics, elements, critical success factors, indicators, activities for development of Agile Mindset, and future directions of research.**

Keywords—Agility, Agile Mindset, systematic literature review, SLR, project management, Scrum.

I. INTRODUCTION

While Agile approaches have their native grounding in software development, today they are spreading across a broad range of industries and functions as well as research fields [1]. At the same time, organizations are facing great challenges in transitioning to Agile [1-5] and some of the transitioning attempts fail [1, 6], simply because of the actor's mindset involved in the process [1]. It is a reminder that regardless of tools, methods, or frameworks, the adoption of Agile comes down to the people who make up the organizations [2].

People have a special position in Agile transformations, compared to technology and process. Developers develop applications and systems mostly for people, and always with people. They design and shape technology and processes and are always one of the significant factors directly affecting their organizations and the success of projects [1, 5, 7]. They may cause serious problems. Weinberg [8] briefly states their key role: "No matter how it looks at first, it's always a people problem".

Even though social aspects are at least as important as technical skills [8] and the significance of people is obvious, human factors continue to be ignored by many organizations [1, 10, 11] and it presents a serious problem to them [12]. This issue is also reflected in the literature on Agile, which focuses on engineering perspectives, practices, and processes [13, 14, 15]. On the technical side, Agile teams are more often doing Agile rather than leading to being agile [14]. Issues related to people are usually missing from Agile adoption journeys [2].

Mindset, as one of the crucial human factors, influences people's behavior [16], decision-making [17], forms their way of thinking, beliefs, and attitudes [18], and thus, shapes the way organizations act [17]. It reflects a set of beliefs, assumptions, perceptions, norms, attitudes, and notions held by people [17, 19]. Individuals transfer their (agile) mindset to organizations, processes, and tools they create [20], which makes it a key factor to consider. Considering its significance, various research disciplines, ranging from psychology to information systems, are focused on the construct of mindset and its underlining key roles and its implications [6].

The mindset aspect becomes very important for Agile approaches as well, which put people at the center. Agile Mindset settles at the core of agility [22, 23] and without a change in mindset, targets cannot be met [24]. Agility can be viewed at different levels including individuals, teams, processes, tools, strategy, or culture. However, Agile Mindset has a special position compared to any specific methodology, process, system, platform, or organizational structure [25, 26]. Durbin and Niederman [27] state, "Following agile approaches requires the spirit of agile as well as the mechanics of following its 'rules'". When considering these two parts, the way to agility should start with establishing a proper and right Agile Mindset, the spirit of agility, instead of directly applying any Agile method [14, 28], because methods and practices can only lead to a shift in a degree of agility and they alone do not guarantee being agile [9, 14, 29]. Moreover, "without the right mindset, the methods are often adapted in an incorrect way and lose their purpose" [9]. To face this successfully, agile individuals require an Agile Mindset, beyond the given set of procedures, techniques, and rituals [30].

On account of this, organizations should go far beyond "doing Agile" and seek ways to "be agile" [14]. For Agile initiatives in information systems and beyond, it is required to live the core values, and principles of agility [9, 14], which may come with an Agile Mindset of individuals [9]. However, many organizations and teams fail to build an environment, which enables Agile Mindset development of the individuals [16, 31]. Even though organizations want to enable Agile Mindset development, Agile team members face several challenges in doing so, such as a continuous paradox of 'doing Agile' (trying to 'perfect' the adoption of their chosen packaged/ customized practices coming with Agile methods) versus 'being Agile' (continuously endeavoring to enhance their work, to handle uncertainty and for improvement) [3].

Hence, it is crucial to investigate the construct of Agile Mindset that has such importance in information systems and beyond and is furthermore concerned with high application

challenges. However, until today, the research regarding this topic is still in its infancy. Motivated by this need, our study aims to conduct a literature review by addressing several issues related to Agile Mindset and to find answers to comprehensive research questions. In terms of the disciplines of the included studies, it was preferred to go beyond the software development that makes use of this construct intensely and gather information from every field in order to have a generalized representation of the construct and to nurture it with more inputs from a wide area.

The remainder of this paper is organized as follows. In Section 2, we describe the overview of the research design with research questions and the paper selection process. Section 3 delivers the results of the literature review along with discussions of our findings. In Section 4, we deliver conclusions and limitations of the study.

II. RESEARCH DESIGN

This research process has been undertaken as a Systematic Literature Review (SLR) based on the guidelines proposed by Kitchenham et al. [32]. The following section describes the implementation of this SLR.

The research process starts with defining research goals and questions. After defining search queries and searching in the Scopus and Web of Science (WoS) digital libraries, we gathered 1850 potentially relevant publications. For scanning the retrieved studies, we developed and applied inclusion/exclusion criteria and obtained a final pool of 19 sources. In addition, the references in the identified 19 studies were examined (backward snowballing) and one other related study was added. Finally, 21 studies in Table IV were identified. After extracting the data from the sources, the results of the SLR were analyzed and the findings were discussed. The remainder of the section concerns the research questions, publication selection process, and data extraction and synthesis.

A. Research Questions

This study aims to review studies that focus on Agile Mindset. Thus, we set the main goals related to our research 1) identify the studies which focus totally or partly on Agile Mindset and 2) analyze and synthesize the studies' relevant results. We raise and investigate the research questions (RQs) under two main groups: (1) Publication demographic-related RQs to identify developments regarding interest and relevance in research. And (2) contribution-related RQs. In the latter we summarize relevant insights regarding the Agile Mindset. We thereby started by investigating the relevance of the Agile Mindset for different outcomes (e.g. productivity or motivation) (RQ2.1). To build a common ground, we further searched for definitions and conceptualizations of the Agile Mindset (RQ2.2). To go even deeper, we reviewed for insights, what characteristics describe the nature of the Agile Mindset (e.g. stability, latency) (RQ.2.3) and provided elements, that build the Agile Mindset as a construct (e.g. openness, collaborative exchange) (RQ2.4). The following two research questions address insights, which are necessary for organizations to build effective surroundings for Agile Mindset development. We thereby searched for critical success factors (RQ2.5) and concrete activities to achieve Agile Mindset (RQ2.6). The Agile Mindset should be reflected in special behavior, which indicate its presence. Those behavioral indicators are summarized in RQ2.7.

Finally, we conclude with future directions for research (RQ2.8). Finally, the RQs were identified as:

(1) Publication demographic-related RQs (RQ1) including country of authors, publication year, publication venue, authors' affiliation type, domain of study, and paper citation data.

(2) Contribution-related RQs (RQ2):

RQ2.1 What is the importance of Agile Mindset?

RQ2.2 What are the definitions of Agile Mindset?

RQ2.3 What are the characteristics of Agile Mindset?

RQ2.4 What are the elements of Agile Mindset?

RQ2.5 What are the critical success factors for Agile Mindset?

RQ2.6 What are the activities for developing Agile Mindset?

RQ2.7 What are the indicators of Agile Mindset?

RQ2.8 What are the future directions for Agile Mindset research?

B. Publication Selection Process

The search process was a manual search of peer-reviewed studies in the well-known digital libraries, Scopus and Web of Science (WoS), without any filter in the year range to gather a full overview. Based on the scope of this study, the search string was developed by following the SLR protocol in Table I [32]. We did not add a "population" related keyword in the string referring to the application area, which could be any discipline for our study, to access the largest possible set of the data. Regarding the search place, and taking our inclusion criteria IC2 (Table II) into account, we searched in meta-data and titles instead of the full text. Finally, the search strings were finally formed as in Table I.

TABLE I. SEARCH STRINGS AND LIBRARIES

Library	Place	Search strings	Number of Initial Results
Scopus	TITLE-ABS-KEY	TITLE-ABS-KEY ("be* of agil*" OR "be* agil*" OR "agile mindset" OR "agile mind set" OR "agile mind-set" OR "agile mind" OR "agile mental" OR "agile mentality" OR "mental agility" OR "agility mindset" OR "agility mind set" OR "agility mind-set" OR "agility mind" OR "agility mental" OR "agility mentality") OR TITLE (("be " OR being OR becom* OR bec ame) OR (mind* OR mental*) AND agil*) AND (LIMIT-TO (DOCTYPE , "cp") OR LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "ch")) AND (LIMIT-TO (LANGUAGE , "English"))	1641
WoS	All Fields	("be " OR being OR becom* OR bec ame) AND agil* (Title) OR	1067

		(mind* OR mental*) AND agil* (Title) OR ("be* of agil*" OR "be* agil*" OR "agile mindset" OR "agile mind set" OR "agile mind-set" OR "agile mind" OR "agile mental" OR "agile mentality" OR "mental agility" OR "agility mindset" OR "agility mind set" OR "agility mind-set" OR "agility mind" OR "agility mental" OR "agility mentality") (All Fields) and English (Languages) and Article or Proceeding Paper or Book Chapters (Document Types)	
Total in Dictint			1850
Selected in Dictinct Only From Scopus			4
Selected in Dictinct Only From WoS			1
Selected in Dictinct From Scopus and WoS			15
Snowballing			1
Total Selected			21

Based on the scope and context of our study, for the selection of papers, the following propositions of inclusion criteria (IC) and exclusion criteria (EC) in Table II were specified and applied to the papers. Every Agile practice, value, and principle is supposed to be theoretically and practically related to Agile Mindset. Considering this, the content was excluded if it was not explicitly related to Agile Mindset in the paper. For example, although it is known that one of the main elements in the journey to being agile is the mindset, if Agile Mindset was not mentioned explicitly by the study, then the contents of the study were not included.

During the application of inclusion/exclusion criteria, the papers were examined through their titles and, where necessary, abstracts in order to identify whether they were within our scope. If the abstracts were not sufficient to decide to include or exclude the papers, then, a scanning through the full texts of the papers was done to identify relevant ones. The studies for which inclusion and exclusion decisions could not be clearly made by the first author, a separate joint evaluation step with the second and third authors was conducted to reach consensus about the decisions.

The search process was conducted in June 2023. The initial list included duplicate records. A total number of 1850 of distinct peer-reviewed studies were returned after removing the duplicate ones. Three identified studies were the extended versions of their previous ones. In this case, only the extended versions were included. All papers were accessible by the authors when their full text was needed. We applied the exclusion criterion for papers not available in English by filtering, via the libraries' relevant feature allowing the elimination of non-English studies, and we also applied it via a manual investigation. Consequently, 21 papers were identified as shown in Table IV.

C. Data Extraction and Synthesis

The first researcher ran the data extraction and synthesis process that served to answer the research questions by applying detailed and thorough examinations of the relevant studies. The second author directed and consulted on the paper and the third author coordinated the research process.

A data collection form was designed, to record the relevant information from the identified studies. The collected information ranged from general information about each study such as author, title, year, venue, author affiliation, and author country, as well as specific information to answer the research questions. The relevant content items were captured and taken "as-is" from the studies and copied to the Excel file manually. In addition to this, the parts of the studies including the relevant data were highlighted in the original papers for any future reference. Thus, it was the authors' aim to have as little bias as possible, to comment on the original data and develop their research answers gradually. Once the data extraction was complete, they were synchronized and grouped into the relevant RQs manually. Thus, an interpretation for data analysis was limited since the actual extraction of data was conducted. Even so, for cases that were open to subjective evaluation in the interpretations of the extracted data, the first and second authors jointly evaluated the data until a consensus was reached for a common understanding.

TABLE II. INCLUSION CRITERIA AND EXCLUSION CRITERIA

ID	Criterion
IC1	Papers fully or partially focus on Agile Mindset
IC2	Papers in any field including software development, business management, human resource management, etc.
IC3	Conference, workshop, journal, or book-chapter papers
IC4	Papers in english language
EC1	Papers not involving the Agile Mindset as a research construct
EC2	Papers published in non-peer-reviewed sources such as thesis, web pages, workshop proposals, tutorials, panels, proceeding information, and books.
EC3	Papers not accessible by the authors
EC4	Duplicate studies
EC5	Extended papers
EC6	Articles not in English

D. Quality assessment

The entire process relied on a search procedure that called for explicit criteria to validate the quality of the selected candidate papers by ensuring each paper was of adequate standard [32]. Accordingly, a custom quality-assessment-criteria-list and item descriptions were established as shown in Table III.

Each paper was then assessed against this given set of questions by the first author. A manual inspection was done through the full-text investigation carried out to identify each selected paper's quality assessment score.

We set a score weight based on two values: Satisfactory (1) and Not Satisfactory (0). Accordingly, the evaluations of the papers have been made based on the two predefined values to set their scores yielding a score maximum of three. It was decided that the studies with a score below one point would be eliminated. After applying the determined quality criteria, the quality scores of each study were satisfied; No studies existed lower than the threshold score and no elimination regarding the quality assessment was done. This was most likely due to the venue of publications being well-qualified and generally well-known.

TABLE III. CRITERIA FOR QUALITY ASSESSMENT

Criteria- Statement	Descriptions

QA1- Are the contributions of methods clear?	The clarity and robustness of the method applied in the study are satisfactory
QA2- Are outcomes as results clear?	Outcomes are clearly delivered and relevant to the method applied
QA3- Is the discussion on results clear?	Discussion of the results is satisfactory and based on the results objectively. Validity threats are delivered.

III. RESULTS AND DISCUSSION

We present the results and findings of this SLR study concerning the identified RQs. Table IV lists the identified studies along with their demographic information (Regarding RQ1).

According to the results, 52% (11/21) of the studies are conference papers (C) and 48% (10/21) are journal articles (J). In terms of venues for the selected 21 papers, there are 21 different venues. The conferences are in general well-known in their respective fields. The names of the journals are Sustainability, Human Resource Development International, International Business Review, International Journal of Information Systems and Project Management, International Journal of Managing Projects in Business, Journal of Advances in Management Research, Journal of Software: Evolution and Process, Research-Technology Management, Industrial and Organizational Psychology, and Technological Forecasting and Social Change. Considering the quality of journals and conferences, it can be deduced that qualified venues and researchers are interested in this subject.

The fact that there are more conference publications than journal articles may indicate that the field is developing. Publishing conference papers is in general easier than publishing journal papers, especially in developing topics. One more reason to have such a ratio for conference papers is related to the preference to communicate the research at a conference to get feedback on first insights, rather than in journals on such a developing topic. The journal publication process can be longer than the conference publication process in general. In addition, to find a place for Agile-related papers, there may have been a tendency for conferences that can be considered more flexible in scope compared to journals. Moreover, the fact that there are some conferences dedicated to Agile topics but there is a lack of (active) dedicated journals, may be another interpretation of this tendency.

TABLE IV: IDENTIFIED STUDIES

ID	Reference Number	Country	Year	Conference (C)/Journal (J)	Industry/ Academia/ Collaborative	Discipline	Citation Count	Citation Count Per Year
P1	[5]	Slovenia	2022	J	Academia	Human Resources	2	2
P2	[26]	Germany	2022	C	Collaborative	Project Management	0	0
P3	[33]	India	2022	J	Academia	Human Resources	0	0
P4	[16]	India	2022	J	Academia	Information Technology	2	2
P5	[27]	USA	2021	J	Academia	Information Technology	5	2.5
P6	[34]	Turkey, UK	2022	C	Collaborative	Information Technology	0	0
P7	[35]	Sweden	2021	J	Academia	General	12	6
P8	[9]	Germany	2022	J	Academia	Information Technology	2	2
P9	[20]	Turkey	2020	C	Collaborative	General	3	1
P10	[3]	Germany, New Zealand	2020	C	Academia	General	9	3
P11	[23]	Italy	2022	C	Academia	Teaching & Education	0	0
P12	[36]	Poland	2020	C	Collaborative	General	9	3
P13	[37]	Sweden	2016	C	Academia	Information Technology	4	0.7
P14	[22]	Netherlands	2014	C	Academia	Information Technology	43	5.4
P15	[38]	Germany	2021	C	Academia	General	5	2.5
P16	[17]	Israel	2022	J	Academia	Business	0	0
P17	[39]	New Zealand	2013	C	Academia	General	48	5.3
P18	[1]	Switzerland	2022	J	Academia	Information Technology	18	18
P19	[6]	Germany	2020	C	Academia	Information Technology	21	7
P20	[46]	Denmark	2019	J	Industry	Enterprise Agility	78	19.5
P21	[21]	Germany	2020	J	Academia	Human Resources	26	8.7

In terms of the authors' affiliation types, 76% (16/21) of the papers are from academia, 19% (4/21) are from industry and academia collaboration, and 5% (1/21) are from industry. There is only one paper that has one sole author from the

industry. It is obvious that the Agile Mindset issues attract the attention of the academic community more, a community that is more independent on Agile matters. This fact contradicts the common belief that Agile is mainly a practice-driven domain [40] and coincides with the view that Agile is commonly regarded as an object to sell [60]. This special case regarding the Agile Mindset poses an exception may be due to the fact that selling it cannot be feasible. A more non-profit-oriented and neutral part of the community may want to normalize and liberalize the Agile movement with the Agile Mindset publications.

The disciplines of the studies include information technology with seven papers at the top, General (with no specific domain stated) with six papers, Human Resource Management and Leadership with three papers, Project Management, Management, Enterprise Agility and Teaching and Education with one paper each. This distribution shows, again, Agile is popular in the Information Technology discipline, meanwhile, it has started to spread to other management areas as well.

Among the authors, Schoop M., Ozkan N., and Mordi A. have two papers in the list while other authors contribute with one paper. Only two papers have an international collaboration among their authors, including Turkey and the UK, and Germany and New Zealand as collaborating countries. The distribution of authors' countries is Germany (6), New Zealand (2), Sweden (2), Turkey (2), India (2), Netherlands (1), Israel (1), Italy (1), USA (1), UK (1), Switzerland (1), Slovenia (1), Poland (1), and Denmark (1). The reasons that separate Germany from other countries in this regard require further research. Like other Agile-related issues, European countries and Germany's positions stand out. Our study's outputs coincide with the bibliometrics study on Agile Software Development [15]. According to the study [15], the top two countries in terms of the number of Agile publications are the United States (257) and Germany (166). Thus, this remarkable position of Germany needs further investigation.

Figure 1 shows the number of papers per year. The acceleration in the paper numbers in recent years can be seen in the figure. The first published paper in the scope of our study [P17] is more about the effective and sustained usage of Agile methods rather than Agile Mindset, although it provides inputs for our study. The first paper focusing mainly on Agile Mindset, [P14], was published in 2014, 13 years later the Agile Manifesto was announced and 20 years later Scrum emerged.
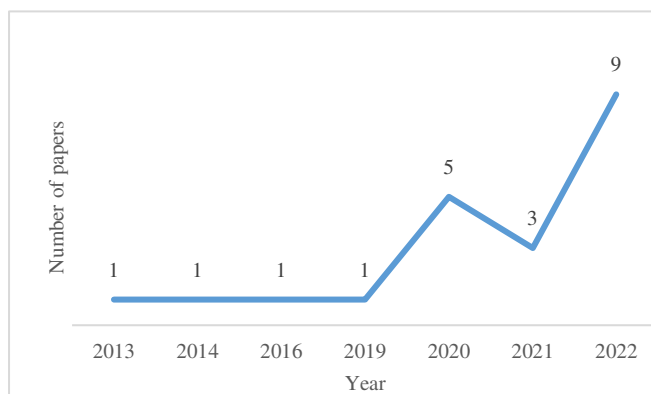

Fig. 1: Number of papers per year

With 287 total citations as shown in Table IV, the average citation count per publication is 13.6, the median of citation counts is 5, the h-index is 9, the i10-index is 7, and the i100-index is zero. There are studies that have received a high number of citations, as well as low numbers or none. The number of papers with at least one citation is 16 (76%). For the remaining 5 papers with zero citations yet, the average lifespan is almost one year (assuming all publications are published in the middle of the publication year). There is no paper published in 2021 or previous years with no citation. The studies that have never been cited seem to have a short lifespan.

Among the most influential papers include both journal and conference papers. With the highest citation count per year, [P20] and [P18] stand out. [P20] delivers the Agile transformation at LEGO Group. Eilers et al. [P18] focuses on Agile Mindset, discusses the construct and definitions of Agile Mindset and develop an instrument to measure it. Then, it investigates how Agile Mindset influences an organization's strategic agility and thus benefits its performance. This paper seems, to the authors, as one of the most comprehensive studies in the field focusing on Agile Mindset.

The remainder of this section was dedicated to RQ2 to address several dimensions including importance, definitions, characteristics, elements, critical success factors and indicators of Agile Mindset, ways to develop it, and future directions of research.

What is the importance of Agile Mindset? (RQ2.1)

The biggest issue when transitioning to an Agile organization is acquiring Agile Mindset by team members [27, 43, 44]. Many studies mention the key role of Agile Mindset and the necessity of internalizing it in order to succeed in various cases including the transition to agility [6, 14, 22, 41], effective and sustained usage of Agile approaches [34, 39], achievement of enterprise agility [6], effective teamwork [30], scaling Agile [6, 38], Agile team's productivity, responding to crises [16], onboarding for new-comers [42], helping team members in reducing negative behaviors [26], and having a proper culture, competitive advantage and project success [5, 26]. A team that does not adopt the Agile Mindset is likely to have less task responsibility, be disengaged, demotivated, and avoid challenges [16].

These studies show that Agile Mindset is important in many aspects. What is interesting is that, as far as we know, the number of papers focusing on deep understanding of Agile Mindset is highly limited.

What are the definitions of Agile Mindset? (RQ2.2)

We have found a very limited number of studies providing a definition of Agile Mindset. One study [6] states "Agile Mindset is a mindset based on the values and principles of the agile manifesto. It is underpinned by specific personal attributes on the individual level and an enabling environment on the organizational level... with the goal of achieving a state of being agile instead of merely doing agile." Another study states [30] "Agile team requires…a particular attitude, way of thinking and behavior of both the individuals and the entire team, a so-called 'Agile Mindset". Sathe and Panse [16] define Agile Mindset as "a way of thinking, that emphasizes collaboration among team members, and being adaptable to changing environments, to be a high-performing team." Study [21] produced an Agile Mindset definition derived from other studies: "the understanding of the workforce that agile

behaviors are necessary for the organization to survive in a changing marketplace…a positive attitude toward learning and self-development, as well as a positive attitude toward change". Finally, [1, p.8] developed a definition of Agile Mindset: "An individual with a strongly developed AM [Agile Mindset] evaluates learning, exchanges with others, their own work organization, and value creation in terms of the customer in a highly positive way".

Regarding the main features of Agile Mindset, the most commonly used source is the Agile Manifesto [37], exemplified in the study of [6]. However, organizations should go beyond the ideas summarized in the manifesto [9], since the manifesto does not include a reference to mindset even though its values and principles contain a certain overlap with the Agile Mindset concepts [6, 34, 45]. Moreover, [34] proposes going beyond the manifesto and not solely relying on it for the Agile Mindset.

The definition by [30] resembles the general dictionary definition of a mindset: a mental and established set of attitudes, a cognitive understanding and interpretation of the environment, and a person's way of thinking and opinions [17, 47, 48]. To prove this, we just replaced the "Agile Mindset" definition with effectiveness or quality mindset. The definition still works for both (and possibly for many more). Another issue with previous Agile Mindset definitions is that people use different terms other than mindset to describe similar or identical construct, such as Agile culture [6].

Eilers et al. [1] provide in their work a sharp definition of an individual's Agile Mindset, which integrates previous definition approaches and synthesized them with new data. Consequently, in our study, we reached a similar Agile Mindset definition as compiled by [1]. While the definition of the term agility itself has no consistent, complete, precise, and agreed definition yet [49], it seems that it will take time to clarify the definitions of Agile Mindset from different perspectives and different levels. The current situation regarding the definitions of Agile Mindset implies a need for more studies on this topic and reinforces the findings of others; it remains unclear what Agile Mindset is on different levels and perspectives [1, 6, 9].

What are the Characteristics of Agile Mindset? (RQ2.3):

Agile Mindset is an abstract, vague, and latent (invisible) construct, thus, difficult to measure, even to observe, and demonstrate [P5, P6, P11, P15, P16], which makes the transformation and training of it the most difficult part [P6, P11]. Thus, it is hard to prove and show when the transformation and training of it is successful. This may cause both "sellers" and "buyers" of Agile to want to take less risk by acquiring "well-known" and "proven" products, such as Agile frameworks and tools, even though such aspects are on the "less valuable side" of the Agile Manifesto. Thus, Agile has penetrated the various sectors with relatively easy adoption of the "proven" products [50]. This abstract characteristic of Agile Mindset also brings a duality; its weakness comes with its strength [P15]. While it is vague and has a lack of prescriptive properties [P6, P15], it also presents a freedom and a "safe place" kept away from "Agile trading" for organizations.

Agile Mindset is a soft, dynamic, and intangible asset, resource, and capability and a kind of trigger that can influence various tangible assets of organizations [P11, P16, P18]. It is a prerequisite and starting point for a successful

Agile transformation [P16]. It is inherently a psychological, socio-cultural, and human-related matter [P14, P15, P19]. Like other human-related assets, it presents complex interactions of social, cultural, and psychological perspectives of individuals with other people. This makes it challenging to understand, substitute, and emulate [P16]. The nature of it also creates challenges for organizations in terms of finding and developing their Agile Mindset as an individual endeavor [P8, P16].

The previous studies include a wide range of different behaviors, attitudes, and traits as elements of Agile Mindset. It seems that some of them appear to be specific forms of behavior (e.g. self-organization, self-managing, continually adapting, changing behavior, face-to-face conversations, mutual listening, not covering ups failures, continuous delivery, and so on). Such items that are more about the actual behavior can be results of Agile Mindset but are not elements of it. Agile Mindset in the mind of people is an intangible, invisible asset that influences various visible aspects [P11]. It is and should be a variation of "a way of thinking about things" [48] or "a person's way of thinking and their opinions" [47], not a way of doing in the apparent physical way.

What are the Elements of Agile Mindset? (RQ2.4):

We have found five main sources of studies identifying elements of Agile Mindset. One of these, [6] condensed 192 Agile Mindset elements into 27. Manen and van Vliet [22] identify factors that affect the expansion of Agile development in large organizations positively or negatively by using interviews. Those factors were then grouped into two categories: "Agile Mindset" and "Contextual Dependencies". Miler and Gaida [36] in their extended paper, focus on the elements of Agile Mindset and their importance to the effectiveness of Agile teams by reviewing the current literature and conducting interviews with experts, which results in 70 elements initially and 26 elements after applying their threshold criteria. Additionally, [16] mention two items covered by the current studies above; collaboration and focus on delivery. Finally, [1] identified four dimensions of Agile Mindset called a positive attitude towards learning spirit, collaborative exchange, customer co-creation, and empowered self-guidance and measured it on a scale of 20 items. Study [26] provides a list of Agile Mindset competencies for project leaders by conducting a semi-systematic literature review using a content analysis of current publications on the leadership role of project managers in Agile projects. Then, the identified competencies were rated by 40 respondents using a questionnaire.

We have found two more studies using the data from these primary studies. Ozkan and Gok [20] combine Agile Mindset elements from three primary studies [6, 22, 36], converged, categorized and examined their relationships. Secondly, [23] propose a training method to help trainers by focusing on the critical Agile Mindset elements based on the work of [6] that are grouped into ten topics.

After aligning Agile Mindset definitions, we need to identify and further extract Agile Mindset elements. "We need to know more about how these elements develop Agile Mindset and how they are connected with Agile Mindset" [1] and each other.

What are the Critical Success Factors for Agile Mindset? (RQ2.5):

The critical success factors for developing Agile Mindset are given in Table V and can be found in different levels in the environments of the individuals. According to the table, proper leadership and management mindset approaches are required to develop employees' Agile Mindset [P3, P16]. Agile talents should be supported to be proactive and resilient to cope with changing environments by having explorative activities such as creative ideas, risk-taking, and independent thinking [P3]. However, Agile Mindset should deal with both explorative and exploitative activities and attitudes of people [P3]. Agile teams are not completely free in their fields; they need monitoring and redirection from the management and strategy layers. This reminds us that agility is a matter of "how" that should serve a whole (what) and purposes, rather than being positioned or used in a way as to make room for unconscious acting. This inference is close to the expression that agility is a balancing act [51] in itself and with its environment.

Communication matters and continuous feedback systems are also crucial. Personal attitudes are the main driver for Agile Mindset, then, [P8] regards personal prerequisites of team members as a success factor and are a prerequisite for creating Agile Mindset. At the team level, Agile teams should have a common ground, understanding, norms, consensus, and team spirit as opposed to an "individualistic" mindset [P17]. Agile Mindset has a spirit supporting a continuous change in behavior, learning, and growth [P17].

TABLE V: CRITICAL SUCCESS FACTORS OF AGILE MINDSET

Critical Success Factors	Paper ID
A suitable leadership approach	P3
Building in-house agile talents by leaders	P3
Leadership behavior promoting employees' explorative activities	P3
Leaders facilitating employees to openly express their creative ideas, developing new competencies, and aiding in routine tasks	P3
A leadership approach where leaders provide clarity on employees' roles and responsibilities, communicate information timely and regularly, continuously provide feedback, set defined team goals, monitor their goal attainment, and promote entrepreneurial activities and innovative work behavior.	P3
Establishing a continued and consistent focus on value creation	P5
Personal prerequisites and attitudes of team members	P8
Having an open mind towards others and an Agile way of working	P8
Willingness to change	P8
Having a right management mindset	P16
Flexibility	P16
Becoming failure tolerant	P16
Having norms and consensus across different definitions	P17
Team spirit where team members display a strong sense of identification and commitment with the team as opposed to an "individualistic" mindset.	P17
A continuous change in behavior based on possibility thinking, learning, and growth	P17

What are the Activities for Developing Agile Mindset (RQ2.6):

Table VI shows the suggested actions from the identified studies about how to develop Agile Mindset. These items in total, partially, or in any form do not claim to be comprehensive, complete, or provide a method or framework to develop Agile Mindset, rather, list items from various sources.

According to the table, all stakeholders who want or will experience change, should know the reasons and value of change and should be involved in the transformation processes with a base of trust [P5, P7, P8, P16]. Although the change direction is recommended from the top-down by [P5], the change should be bi-directional and the two directions (from the top-down, from bottom-to-top) should be aligned. Managers should invest in training, building, and measuring their people/team/organization's Agile Mindset [P16]. Managers and Agile coaches should be role models for showing the Agile values [P8].

Organizations should take a holistic view of Agile implementations [P7] ranging from people aspects [P8] to tools [P5], from the individual level to the organizational level [P8]. As long as the trainings trigger behavioral transformation [P5, P16], they cannot go beyond being a weak start [P5]. In training, Serious Games can be used [P11] not only for teaching but also for learning for each individual. Highlighting the main features of Agile Mindset and in what way it differs from the mindset of a more traditional one is key to its internalization [P13]. A single teaching experience will not help. Teams should understand the vision and reasons behind the practices [P8]. After introducing and implementing the single Agile practice, some adjustments will be required according to need [P8]. During the transformation, combining existing elements into the current way of working can be used to facilitate a smooth and evolutionary process [P8].

Practices put aside, even Agile Mindset is not sufficient for being agile [P16]. As mentioned, the transformation of a mindset is challenging and takes considerable time. Therefore, it is crucial to be patient and give time to all entities involved in the transformation to mature [P7]. In this process, it is important to consider the context and unique nature of changing environments, let them fail, and try a new approach [P8]. The whole transformation process of the Agile Mindset should be meticulously followed by internal/external experts [P16, P19], and plans and progress should be monitored and measured [P13, P16]. Organizations should be aware of misconceptions and obstacles and remove them as soon as possible [P8].

TABLE VI: WAYS TO DEVELOP AGILE MINDSET

Ways to Develop Agile Mindset	Paper ID
The shift from top to bottom	P5
Integrate new tool use with Agile Mindset	P5
Establishing a continued and consistent focus on value creation throughout the development process consistent with Agile Mindset.	P5
Training sessions should be reinforced over time in a persistent manner until the mindset and practices become habitual	P5
Take a holistic view of Agile implementation	P7
Give time to mature	P7
Build trust	P7

Consider: (1) personal prerequisites and attitudes, (2) what the team has to provide for the collaboration with the coach, (3) problems on the team level, (4) the team's needs, and (5) what the team needs to learn.	P8
Consider the aspects related to the agile coach: (1) observing and understanding (the team), (2) activities of the coach, (3) making agile tangible, (4) perception of agile by the coach, and (5) experiences of the coach.	P8
Take care of (1) the collaboration between coach and management and (2) misconceptions and obstacles.	P8
Understand vision and reasons behind introducing an Agile way of working, get a brief theoretical training, including an explanation of why the respective practice is helpful and should be implemented, and start implementing single Agile practices, and adjust them.	P8
Integrate existing elements in the way of working to ease the transformation	P8
Observe teams to get an understanding of teams' dynamics, their current situation, and their way of working	P8
An Agile coach has to be a role model for showing Agile values	P8
Integrate teams into whole processes and listen to their ideas, concerns, and needs.	P8
Allow development teams to fail and to try something that may or may not work	P8
Serious Games can be used in training for Agile Mindset	P11
Find a basis on which to identify the main features of Agile Mindset and in what way it differs from traditional mindset	P13
Develop and plan a way of shifting Agile Mindset of a current team	P13
Measure the progress	P13
Build in advance resources that can be used at short notice	P16
Managers should invest in training, building, and measuring their organization's Agile Mindset	P16
Start by collaborating with expert institutions to train their managers to acquire an Agile Mindset	P16
Agile Mindset is not enough; organization must 'walk the talk'	P16
Place Agile Mindset Trainer roles	P19

Everything is influenced by people's mindset, even human-made artifacts such as tools, processes, and organizational structures. For instance, tools inherit a mindset from the person who produced them. Even such dummy entities should be aligned with the targeted Agile Mindset, which the organization desires for the individuals. We see such a need in the study of [P5] that proposes an integration of new tool use with an Agile Mindset and Agile resources management method which was suggested by [P16]. Agile practices should also be conduct with a proper mindset. 'Doing Agile' can be a step on the way towards fully embracing the Agile Mindset" [25, 52], but, starting blindly or only with Agile practices is not satisfactory; they alone do not guarantee being agile [9, 14, 29] and "without the right mindset, the methods are often adapted in a wrong way and lose their purpose" [9].

The findings indicate that Agile Mindset transformation, is a challenging, grueling, and long journey that requires patience and effort. It must focus on all dimensions of change, and in itself must be conducted in an agile way.

What are the Indicators of Agile Mindset? (RQ2.7):

When it comes to the indicators which reflect Agile Mindset in behaviors of people, we identified that those people collaborate with others [P4, P14] and use real-time planning [P1]. They behave with ownership, make decisions autonomously, and build connections between issues [P4]. They respond to changes [P4], focus on delivery [P4] and search for continuous improvements and new,

unconventional, and better ways for organizations' management structures, methods, and systems [P14, P16], even when it is challenging [P16]. One of the fields that prove the existence of a strong Agile Mindset can be seen in flexible, quick, fluid, and successful resource management [P16]. Agile Mindset is indicated to be related to superior performance and higher innovativeness [P16]. While trustful interactions are a prerequisite and facilitating factor for the Agile Mindset, its presence is also an indicator of the Agile Mindset's existence [P14].

What are the Future Directions for Agile Mindset Researches? (RQ2.8):

Table VIII lists possible future work items extracted from the identified studies. While there are many studies investigating how the technical side of Agile can be agile, we see that reflections of them on the Agile Mindset need to be studied in the future. For instance, [P16] asserts that no study has examined how a mindset can be agile [at least until their work was conducted in the year 2022] or how it can be measured [P18].

While physical actions are observable, we need to find ways to observe and ensure that individuals are immersed in Agile Mindset [P5] and to remove the impediments which hinder achieving the Agile Mindset [P18]. Some personalities have more potential in terms of supporting Agile Mindset than others. Then, it would be interesting to combine research on Agile Mindset with research on personality, social aspects [P8], and experiences and maturity of practitioners [P19] to examine what type of organizations and people are able to utilize Agile Mindset more [P15]. Each unique individual, team, and organization should find an optimum level for their Agile Mindset by considering its tradeoffs and side effects. For instance, it can be interesting to research whether having an excessive Agile Mindset harms performance [P16], quality, or other aspects. We need to locate the responsibilities of Human Resource Management, Talent Development, other departments, and leaders in installing target-oriented initiatives and providing ways in which actors can develop their Agile Mindset [P18]. There is a need for valuable insights into Agile leaders' mindset and their effects on organizations [P18].

Agile Mindset should be integrated into a comprehensive network with other constructs [P18]. A satisfactory number of studies is missing in the literature to measure Agile Mindset [P18]. We also need more studies on how the state of having an Agile Mindset can be achieved at different levels starting from the individual level to the organizational level [P18, P19], by distinguishing differences between the perceived Agile Mindset at different organizational levels [P19].

Among the Agile Mindset elements, which of them are the most important and how and to what extent each element supports real agility and Agile Mindset can be sought [P8, P9] by categorizing them [P19]. Another research area can be what determines Agile Mindset and what organizational outcomes Agile Mindset and actors with Agile Mindset influence [P18, P19]. One of the interesting dimensions of the construct can be about time. Specifically, how the characteristic of the construct changes over time can be a matter of interest [P19].

TABLE VIII: FUTURE WORK ITEMS

Future Work Items	Paper ID
Are there ways to ensure that individuals are immersed in the Agile Mindset?	P5
Combining research on Agile mindset with research on personality and social aspects, for instance investigating what type of organizations and people are able to utilize Agile Mindset	P8, P15
What Agile elements are the most important and how and to what extent each element supports real agility and Agile Mindset?	P8, P9
Can an excessive Agile Mindset harm performance?	P16
Can Human Resource Management and Talent Development Departments install target-oriented initiatives and provide a framework in which actors can develop their Agile Mindset themselves?	P18
Investigating influences on Agile Mindset	P18
Investigating effects of managers' Agile Mindset on employees	P18
How actors with an Agile Mindset interact [with a specific subject]	P18
How managers with Agile Mindset empower their employees to develop their Agile Mindset	P18
Exploring nomological network of Agile Mindset, specific behaviors, and practices or social Agile practices	P18
How Agile Mindset improves other outcomes such as value to organizations	P18
Investigating impediments that hinder employees and teams to achieve Agile Mindset and transfer it into action	P18
Studying Agile Mindset on individual and organizational levels	P18, P19
Studying whether characteristics can be categorized and change over time	P19
Investigating whether there are differences in perception of mindset related to Agile experiences and maturity of practitioners	P19
Investigating whether there are differences between organizational levels in perceiving the Agile Mindset	P19

We point out that the Agile community and practitioners are aware that internalizing the Agile values and principles is key to being agile. However, it is remarkable that there has been very limited interest in Agile Mindset and the social aspects of agility [1], which is especially relevant for information systems as well organization studies. Even though Agile development is more about people and human factors from the onset [53], and people and human factors are an underlying foundation of agility as defined in the Agile Manifesto [54], the increased interest in Agile in the academic field is more on concrete entities such as practice, method, and frameworks. For instance, while there are plenty of cases investigating how practices can be agile, [17] asserts that no study has examined how a mindset can be agile [at least until their work was conducted in 2022] and studies are limited on how it can be measured [1]. In another instance, while our search with the keyword ("agile mindset" OR "agile mind set" OR "agile mind-set") brought 75 initial results in Scopus, the search in the same database within the same condition with the "Scrum" keyword brings 4,047 results (54 times of the former one). These, among others, indicate that Agile-related works focus on the practical, concrete, "easy-to-perceive" side of it.

On the "harder-to-implement side", Agile Mindset requires shifting to a whole new way of thinking, which manifests a challenge to unlearn old and traditional practices and to move towards new ones [55]. One of the other reasons for inhabiting the harder side to implement can be because Agile Mindset is a relatively hard-to-internalize-aspect of

Agile in organizations [34, 35], and changing the mindset of employees and management seems to be more difficult than the mere implementation of Agile practices that is rather simple [9].

Gelmis et al. [34] state that because "these aspects are abstract, the transformation of a mindset is the most difficult part of the work and hard to prove and show; then, consultants do not prefer such a transformation [since the transition process can take several years and requires major resources] [35]. Rather, they prefer to transform only the concrete substances of the organizations. [50], [14], and [56] put forward that the industrialization effects driven by the Agile marketing and selling Agile™ products and "Fake Agile" to organizations have caused the overshadowing of Agile Mindset and prevented organizations to properly understand real and market-independent agility. Thus, Agile Mindset stays behind the "sold" practices because the market may want to sell "agility" for their economic interest [50]. This trading mostly ends with an illusion of "doing agile", which takes years to realize and overcome. It can also be seen with the first paper focusing mainly on Agile Mindset published in 2014, 13 years later the Agile Manifesto was announced and 20 years later Scrum emerged. We see a similar reflection of this case in agile trainings; the abstract nature of Agile Mindset leads to a limited study on explicit training for it [23]. Briefly stated, while there is an intense focus on the methods, the number of studies on the mindset part is very low [6, 20, 23], due to some reasons such as economic interests [57] and the abstract nature of it [23]. Consequently, many organizations fail to enable an Agile Mindset of the individuals [31].

However, an increasing number of researchers have started to focus on the internal aspects and human side of agility [1]. It seems that Agile Mindset aspects will be on the agenda of the organizations now and in the future [34]. This increasing interest of researchers in recent years can also be seen in our study results.

Even more, [34] foresees that the focus on the people side and having a proper Agile Mindset will be more important and the predefined practices will have relatively less place in the future. Similarly, [58] argues that after a while, Agile practices will be largely equalized for organizations, and organizations that make a difference will come to the fore with the people dimension. While the majority of organizations today prefer to focus on Agile frameworks, in the future, there can be some new frameworks tailored to each organization depending on organizational cultures and needs [34], which requires the intellectual capabilities of people's minds to make practices evolve more organically.

It is seen in our work that most of the excluded studies are satisfied by only mentioning the term Agile Mindset as a "fixed concept" without actual descriptions, details, explanations, or definitions. This case has also been witnessed by the study of [6] and [20]. Most of these publications investigate Agile Mindset either as a precondition or a relation to organizational culture [9]. When mentioned by some studies, Agile Mindset has been confined to being understood as only one category amongst many [59] or only a prerequisite for implementing Agile.

Regarding the RQ2, there are very limited resources especially involving definitions of Agile Mindset, its elements, methods to develop it, indicators, and the measurement of it. Inappropriate definitions lead to a variety

of invalid measures [1]. Because of the missing consensus in existing Agile Mindset conceptualizations, an aligned comprehensive understanding of it must be conducted and conceptualizations from different perspectives and levels [1, 9]. Measuring instruments for this different conceptualization and progress on different levels are missing [1].

How can we decide the optimum level needed for Agile Mindset? What other capabilities should Agile Mindset be supported with? How can those who have a low Agile Mindset and those who have a high Agile Mindset work together? Or, do we need to have a common mindset understanding as stated by [35]? What are the effects of the tenets of Agile Mindset on agility? What are the relationships between a person's personality and Agile Mindset, which is currently absent from the academic literature?

With these and many more unanswered questions, it seems that there is a long way to go on this topic and that further studies should involve behavioral research, cognitive science, learning (rather than teaching), and other disciplines, to accelerate this relatively new concept.

IV. CONCLUSIONS AND LIMITATIONS

Although the importance of Agile Mindset is known by many studies and people, the construct interestingly seems to be underrated in the literature. Most of the studies involving the Agile Mindset term as a fixed term. For this reason, it seems necessary to further unbox the construct. To do so, it seems necessary to create projects to reflect the situation regarding Agile Mindset in practice. Although Agile Mindset is a new construct to study, it is recommended in the first stage to consider the studies that deal with the construct of mindset in general terms and to benefit from studies from multiple related disciplines.

Our study aims to deal with the important Agile Mindset construct comprehensively, using sources from many disciplines while doing this. We aim to open a door to this construct, which is worth researching in terms of practice and theory. In the future, we will study on the development and measurement of the Agile Mindset for individuals in organizations.

The procedures used in our study have limitations in several ways. Limitations of search terms and search engines can lead to an incomplete set of primary sources. It is possible that we may have missed some relevant studies as we did not include all possible libraries. In particular, we have missed the studies published in non-peer-reviewed resources. To minimize risks that may result from search engines process, we included two comprehensive academic databases and used a comprehensive search string developed through several iterative improvement processes. We recorded each paper that we found with its source in an Excel sheet. Therefore, we believe that an adequate and inclusive basis was established for this study.

Defining search terms in the source selection approach resulted in obtaining only the sources written in English and the peer-reviewed ones. However, the main issue regards whether the selected works represent all types of literature in the area of study. We ensure that the relevant studies collected in the study pool contained sufficient information to represent the entire related literature.

A single researcher extracted the data from the included studies. Also, the values of the quality assessment criteria are subjective but based on field experience. Moreover, the primary studies' results are context dependent and have thereby limited generalizability. However, when these processes were unclear a consensus session was applied with the second author. Additionally, the relevant data was taken as an actual extraction of terms from the identified studies and copied to the Excel file. To ensure the reliability of our study, the entire pool of the sources was analyzed carefully and the data were reviewed, extracted, and synthesized in iterations according to the research protocol and guideline applied.

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