Cloud computing adoption decision-making process:

A sensemaking analysis

Abstract

Design/methodology/approach
We adopt an interpretive epistemology to understand the process of cloud adoption decision making. Following an empirical investigation drawing on interviews with senior managers who led the cloud adoption decision making in organizations from across Europe. We outline a framework that shows how cloud adoptions follow multiple cycles in three broad phases.
Purpose
We study how cloud adoption decision making unfolds in organizations and present the dynamic process leading to a decision to adopt or reject cloud computing. We thus complement earlier literature on factors that influence cloud adoption.
Findings
Our findings demonstrate that cloud adoption decision making is a recursive process of learning about cloud through three broad phases; building perception about cloud possibilities, contextualizing cloud possibilities in terms of current computing resources and exposing the cloud proposition to others involved in making the decision. Building on these findings, we construct a framework of this process which can inform practitioners in making decisions on cloud adoption.
Originality/value
This work contributes to our understanding of how cloud adoption decisions unfold and provides a framework for cloud adoption decisions that has theoretical and practical value. The study further demonstrates the role of the decision-leader, typically the CIO, in this process and identifies how other internal and external stakeholders are involved. It sheds light on the relevance of the phases of the cloud adoption decision-making process to different cloud adoption factors identified in the extant literature.

Keywords*: cloud computing, cloud adoption, cloud adoption decision-making process, sensemaking, cloud adoption phases.*

1. Introduction

Cloud computing (cloud) radically changes the way organizations adopt and use information technology (IT), with IT provision now relying on remote distributed on-demand resources. In 2022, the global public cloud services market was, according to Gartner (2022), expected to grow by around 20.4% to around $495bn. Following one of the most cited definitions of cloud computing, we define cloud as the technology which enables "ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction" (Mell & Grance, 2011, p.2). Cloud enables service-based technology provisioning (Etro, 2009; Vouk, 2008), allowing organizations to move from asset ownership to the acquisition of computing as-a-service (Van der Molen, 2009; Vouk, 2008). The on-demand, minimum management effort, limited provider interaction and shift of asset ownership characteristics of cloud have shaped a perception of cloud adoption as a binary and one-off technology adoption decision. This is implied in the extensive and growing body of literature that addresses the factors influencing cloud adoption decisions in the past decade (e.g., Low & Chen, 2011, Oliveira et al., 2014, Wu et al., 2022, etc.) and has led to significant insights on *what* influences cloud adoption. While these findings are important, this literature overlooks the dynamic aspect of *how* these decisions unfold and potential nuances to what a decision on cloud adoption may entail at a particular point in time (Wulf, Westner & Strahringer. 2021; Schneider & Sunyaer, 2016).

This gap impacts cloud adoption researchers as well as practitioners. Firstly, it limits the interpretation of research results on cloud adoption factors by drawing on the 'big picture' of how cloud adoption decisions are taken. Shedding light on the cloud adoption decision making process will assist researchers in further explaining their findings on adoption factors, showing the phases of decision-making process decision makers undergo and the interplay between the stakeholders involved. Secondly, practitioners are seeking guidance on how to select a cloud service or a cloud vendor while ensuring the alignment of their business and technical strategies. Currently, practitioners rely on vendor frameworks to guide their organization's cloud adoption decisions (e.g., framework for cloud-agnostic guidance for cloud decisions - Microsoft (2022)). While academic research on this topic remains limited, access to unbiased cloud adoption frameworks is not possible. Thus, providing research insights on cloud adoption decisions could assist practitioners in structuring and implementing every step of their cloud adoption decisions (e.g., when to involve end-users, top management, colleagues from other organizations etc.).

We consider cloud computing adoption decision making (henceforth CADM) as a *process* that decision makers undergo until the point in time when a decision is reached. That is, to decide about the adoption or rejection of a cloud technology, decision makers follow a process through which they learn and extract information about the technology and attempt to make sense of its consequences (Swanson, 2002). As we show in our literature review, in the case of cloud adoption, attention to this process is currently lacking. We address this research gap by answering the following research question: ***How does cloud adoption decision making unfold in organizations?***

We theorize that cloud adoption decisions are the result of a process which unfolds; involving the continuous redrafting of the cloud understanding in the context of the organization over time. Our choice of the term *unfolds* reflects the contingent happening over time of decision making that is neither wholly mechanistic nor wholly emergent – and so resonates existing interpretive process approaches (e.g. Hultin 2019). Our empirical study shows that the CADM is organized around three phases, namely, *building perception about cloud, contextualizing cloud* and *exposing the cloud proposition* which encapsulate

sensemaking cycles aiming at deepening the understanding between desired business outcomes and capacity of cloud services.

The paper is structured as follows: in the next section we review the cloud literature, presenting the extant knowledge on cloud adoption and discussing in detail the research gap presented in this introduction. Within this review we identify sensemaking as a relevant theoretical lens for understanding CADM. Section 3 explains our methodological approach; we describe our empirical data (drawn from interviews with key personnel engaged in CADM in diverse organizational settings across Europe), justify their relevance for this study and explain our approach to data analysis. In Section 4, we present our findings and show how CADM unfolds through three phases. Section 5 discusses the implications of this study. Section 6 summarizes the contribution of the paper to the cloud literature and proposes directions for further research.

2. A Sensemaking perspective on cloud computing adoption decisions

2.1. Research on cloud adoption decisions

Adoption is the most popular and prominent context for the study of cloud within the information systems and business academic literature (Asatiani, 2015; Yang & Tate, 2012). This literature mainly formulates and tests hypothesis on factors that influence cloud adoption using widely-cited IS adoption theories such as the Technology Acceptance Model (TAM) (Davis, 1989), or the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh *et al*., 2003), the Technology-Organization-Environment (TOE) framework (Tornatzky & Fleischer, 1990) and Diffusion of Innovation theory (DOI) (Rogers, 1995) or their extensions, such as the Human-Organization-Technology model (HOT-fit model) (Yusof *et al*., 2007) and other theories.

Such research is important as it identifies factors in cloud adoption and provides insights on their significance. For example, the literature identifies relative advantage (Ju-Chuan & Shu-Mei, 2021; Low & Chen, 2011; Oliveira *et al*., 2014), cost savings (Alshamaila *et al*., 2013; Ju-Chuan & Shu-Mei, 2021), desire for remote access (Polyviou *et al*., 2016) and security concerns (Gupta *et al*., 2013; Huang *et al*., 2021; Morgan & Conboy, 2013; Nagahawatta & Warren, 2020; Oliveira et al., 2014) as significant factors for the decision to adopt cloud. External influences also have an impact on cloud adoption: existing literature identifies competitive pressure (Hsu *et al*., 2014; Low & Chen, 2011; Oliveira et al., 2014) and social pressure (Asatiani, 2015; Benlian, 2009) as important. Further, the majority of studies on cloud adoption factors (Asatiani, 2015) show that top management support has a notable impact, indicating that management executives are, to some extent, involved in adoption decisions (Alshamaila et al., 2013; Low & Chen, 2011; Oliveira et al., 2014). Similarly, human competences, such as CIO innovativeness (Lian, Yen, & Wang, 2014), and the decision makers' beliefs about the term 'cloud' itself (Morgan & Conboy, 2013; Polyviou *et al*., 2014) are noted as relevant. Organizational culture is also influential since the 'willingness of the organization to transform' and the changes in norms and culture of the organization that arise (e.g., radical changes in the role of the IT department) (Morgan & Conboy, 2013; Venters & Whitley, 2012) are relevant to cloud adoption. Additionally, previous research identifies organizational size as a factor that influences cloud adoption and invites scholars to investigate cloud adoption with respect to organizational size (Alshamaila et al., 2013; Asatiani, 2015; Low & Chen, 2011; Oliveira *et al*., 2014).

While the majority of cloud adoption literature focuses on the identification of cloud adoption factors (cf. Appendix 1), a number take an alternative perspective on cloud computing adoption. For example, Venters & Whitley (2012) analyze cloud services in the view of desires and realities for organizations, highlighting that organizations are seeking at least equivalence

with cloud's predecessors. In the light of examining cloud to its predecessors, Schneider et al. (2016) compare and contrast cloud computing decisions with IT sourcing decisions and note that cloud computing holds several specificities, and its decision making is more complex, involving also client firm capabilities and size, institutional influences and uncertainty. Several authors criticize the cloud literature for lack of empirical and theoretical depth (Asatiani, 2015; Schneider & Sunyaev, 2016; Yang & Tate, 2012). We attribute this critique to the predominant focus of this literature on cloud adoption factors. Such adoption factors research has a clearly defined scope and contribution, revealing 'what' influences cloud adoption, as discussed in the previous paragraph. As illustrated also in Appendix 1, the majority of this body of literature employs widely cited IS adoption theories (e.g., DOI theory, TOE framework) which contribute to the identification of cloud adoption factors. Typically, such research employs quantitative research methods and therefore is deductive in nature, focusing on hypothesis confirmation (Al-Natour & Benbasat, 2009; Chinedu *et al*., 2014). Quantitative research is appropriate for studying the impact of certain factors, such as availability levels, cost or savings per year, in order to test their influence on cloud adoption and evaluate the usefulness of cloud. However, cloud adoption decisions are complex and research on adoption factors can address this complexity only partially. This gap has been highlighted first through the review of the cloud adoption factors literature included in Schneider and Sunyaev (2016) and then by a more recent follow up review by Wulf, Westner and Strahringer (2021) who confirm that literature on the decision to adopt cloud remains scarce.

We help address this gap and complement the research on cloud adoption by researching 'how' cloud adoption decisions are made. Focusing on the 'how' rather than the 'what', enables us to grasp how the potentially complex, ongoing adoption unfolds as well as to identify the stakeholders involved in, or influencing, different phases of this process. Employing qualitative research, we are also able to provide a richer understanding on how certain cloud adoption factors, such as attitudes towards technology or management support, come into play in the decision-making process (cf. Asatiani, 2015). We employ sensemaking theory as a theoretical lens within our qualitative research of CADM. The next section introduces and justifies the choice of this theoretical lens, and illustrates how the sensemaking features may apply to CADM.

2.2. Sensemaking within the cloud adoption decision-making process

Weick (2001) argues that sensemaking occurs temporally as individuals face problems within unfamiliar situations for which their understanding or knowledge is inadequate (Zhang *et al.*, 2008). In this paper, sensemaking helps us understand the process by which organization members attempt to bridge the gap of information shortage about cloud, through interpretive acts such as looking back, and imagining the future in order to reach an adoption/rejection decision (Kaplan & Orlikowski, 2012). Sensemaking is an activity or process which includes retrieving information and using mechanisms to place information in interpretive frameworks, so as to build cognitive maps about it (Ring & Rands, 1989). Information comprehension and meaning ascription is thus possible to build arguments for or against the new phenomenon (Thomas *et al*., 1993). The generation of such interpretive arguments is supported by a series of justifications, requisite evidence, logic and criticism and they are constructed so as to reach mutual understanding between the members of the organization and take action (Maitlis, 2005; Toulmin, 2003; Weick, 1995). Although sensemaking differs from taking a final decision as the sensemaking process aims to result in mental models which then facilitate the finalization of a decision (Bagdasarov et al. (2016); Drazin et al. (1999); Hogarth & Makridakis (1981)), existing literature highlights that sensemaking also involves a future-oriented outlook as the sensemaker may envision a future state or condition (Maitlis & Christianson, 2014). We thus

adopt sensemaking as a relevant theory to explore how cloud adoption decisions are made. Sensemaking theory elicits greater understanding of interpretive insights into the phenomenon of CADM. Through an interpretive epistemology, our aim is to subjectively distill experiences from the research fieldwork using sensemaking as a theoretical lens guiding this interpretive act (Orlikowski & Baroudi, 1991). Thus, we consider sensemaking as an appropriate lens that provides a relevant process-based approach to understanding technology.

Sensemaking can be viewed as the reciprocal interaction and interplay of information seeking, interpretation and action (Thomas et al., 1993). This interplay influences the evaluation of the phenomenon, suggesting that the interpretation of the cloud changes, evolves and takes shape over time. Such evolution and change can be considered as a cycle (Kaplan & Orlikowski, 2012; Louis, 1980; Weick, 1995). The sensemaking literature also emphasizes the recursive nature of sensemaking (Weick *et al*., 2005) as a process of ongoing redrafting of an emerging phenomenon in order to make it increasingly comprehensive (i.e., by interpolating additional observed data) and more resilient to criticism. This effort meaning ascription redrafting of the understanding involves properties such as ongoing updating, socially situated, identity, retrospection, extraction of cues, plausibility, context-dependency, driven by affective states stimulated by bodily experiences, power directed, and emotionally and cognitively contagious (Cristofaro, 2022).

Sensemaking theory has been widely used in organizational studies, management disciplines and information systems. Indicatively, sensemaking theory has been successfully employed to study a number of information systems topics, such as IT outsourcing relationships (Ning, 2015), technology value (Park & Kim, 2014), virtual worlds (Davidson, 2002) and user accommodation practices for IT artifacts (Zamani *et al.*, 2021). Sensemaking theory has been shown to provide a valuable lens for studying different processes in organizations, including social responsibility decisions (Basu & Palazzo, 2008), creativity processes (Drazin *et al.*, 1999), strategic change processes (Ericson, 2001), or organizational identity formulation processes (Grimes, 2010). In a similar vein, in this paper, we draw on sensemaking theory, to theorize CADM as recursive sensemaking processes of learning about cloud, enriching that knowledge, interpreting it in the context of the organization and critically reflecting on it.

Furthermore, we employ the set of features that characterize sensemaking introduced by Weick (2001) to research CADM (see Table 1). *Organizing flux* is the trigger that interrupts what has been considered as usual so far and prompts consideration of cloud adoption. After interrupting what is perceived as 'normal', further attention is drawn and so *noticing and bracketing* occur. Using mental models and knowledge, differences within the situation and differences to existing technologies are spotted and bracketed so as to simplify the understanding of cloud. This also involves an affective state by which the sensemaker is triggered to collect and interpret cues (Cristofaro, 2022; Cristofaro et al., 2021). *Labeling and categorization* involves the attachment of labels relevant to categorizing the characteristics of the new technology following a labeling strategy that assists the decision maker to understand the technology in more depth. The *retrospective* feature contributes to making sense of the new technology (i.e., cloud) through the lenses of previous mistakes and experiences. *Presumption* concerns connecting abstract knowledge to concrete events (e.g., real life examples, demos etc). *Social and systemic features* regard metal models being influenced by the real or imagined presence of others (Sandberg & Tsoukas, 2014). In the context of cloud adoption this may include the influence of professional contacts of the individual in formulating perceptions about the cloud technology. *Finally, organizing through communication* concerns the exchange and combination of the perceptions of different stakeholders whereas *action* refers to the point in the evolving sensemaking process where the situation has been realized and further action needs to be defined – the "'what do I do next'? question" (Weick 2001, p.136).

Table 1 Sensemaking features in the context of CADM (Source: Authors' own creation/work.)

Feature	Description
Organizing flux	The trigger that prompts the consideration of cloud adoption
Noticing and bracketing	Spotting basic differences of cloud to existing technologies and bracketing them so as to simplify the new phenomenon
Labeling and categorization	Categorizing the characteristics of cloud following a labeling strategy that assists the decision maker to understand them
Retrospective	Making sense of the cloud through the lenses of previous mistakes and experiences with technology and vendors
Presumption	Deploying cognition and experimentation (e.g., piloting, previewing demos) so as to interpret cloud into more concrete and specific terms
Social and systemic	Using opinions of others and 'general beliefs' about cloud in order to formulate a perception about it
Organizing through communication	Exchanging and combing of the perceptions about cloud, of different stakeholders in the organization
Action	Defining 'what do I do next?' in CADM

The following section describes the methodological approach employed to qualitatively and interpretively investigate CADM employing the sensemaking lens.

3. Research Approach

We conducted an interpretive qualitative field study based on interviews with senior managers (typically CIOs or equivalent), knowledgeable with and involved in their organizations' CADM. A total of 29 heterogenous organizations in Europe have been included in our study. These were organizations which have recently reached cloud adoption or rejection decisions. Thirty (30) semi-structured interviews, lasting one hour on average (see Table 2 for details) were completed; all were recorded and transcribed.

Participant Selection

Respondents were key informants, typically the individuals leading the cloud adoption process in the respective organization (CIOs or similar role – see Table 2). In accordance with Parrish (2020), we consider that these individuals are the key owners of the canonical story of cloud adoption in their organization and thus they can provide all relevant insights of the narrative shared across the team involved in this process. To select our respondents, we followed purposive sampling (Kuzel, 1992). We sought interviewees who could assist in discovering unanticipated but systematic patterns relevant to our research question (Seawright and Gerring, 2008). Our sampling approach included certain criteria for recruiting participants: employee of organization which has recently adopted/rejected cloud, leader of IT decisions in the organization, leader of a recent CADM process in the organization. We also ensured that respondents came from heterogeneous organizations covering a range of industry sectors, organization sizes (both SMEs with less than 250 employees and large organizations) and European countries (Austria, Belgium, Cyprus, France, Germany, Greece, Italy, Poland and the U.K.). The selection process incorporated four stages. Firstly, we identified a list of candidate CIOs/IT senior managers drawing on participants of events relevant to cloud (e.g., CloudExpo Europe), cloud vendors and our network of industry partners and alumni. Secondly, we filtered our participants, considering the criteria listed above. Thirdly, we contacted each of the candidate participants and requested their participation in the interview process. During the interview process we explicitly asked respondents to confirm that they have led a cloud

adoption process in their organization and requested them to suggest additional organizational members in case they could not recall certain details on specific aspects of the process. In one of the organizations, the CIO also suggested reaching out to a member of their team to provide further information in this respect (see Table 2). Fourth, a few additional interviewees were added following the snowball sampling approach (interviewees recommending others) which led us to additional insights until reaching saturation in the findings.

Data Collection

A common interview agenda was used (see Appendix 2) to gain an in-depth understanding of the CADM followed in each organization and to enable comparisons across all interviews (Cassell & Gillian, 1994). However, our interviews were semi-structured, to allow probing to ensure better understanding of the organizational context and processes. Following introductory questions about the organization, the role of respondent and the use of cloud services, we asked respondents to describe and justify the CADM followed. While our interviews only occurred at a specific point in time (usually following a recent adoption or rejection decision), our primary intention was to elicit detailed descriptions of the processes the interviewee had participated in and to invite interviewees to reflect on their experience[1] and provide a narrative of the sequencing of events (Poole *et al*., 2000) (rather than detailed temporal accounts).

In view of our interpretive stance, we accepted and accommodated the perspective of the interviewees (remaining conscious of potential bias in their statements). Following the Klein & Myers (1999) principles of contextualization and interaction between researcher and subject, we invited interviewees to reimagine the CADM they followed and critically reflect on it. This reflective aspect meant that some interview questions were inspired by the sensemaking theoretical lens. For example, asking respondents "How did your experience with previous systems influence your decision to adopt cloud?" related to the retrospective feature; questions on external influences (e.g., attendance of conference or influence of vendors) related to the social and systemic feature; questions on the debates and arguments used by internal stakeholders on whether to adopt cloud related to the organization through communication feature, and so on. However, we deliberately refrained from building a research agenda explicitly and exclusively on sensemaking, aiming to receive candid responses of the CADM, as perceived by each respondent. This approach further accommodated dialogical reasoning, abstraction and generalization (Klein & Myers,1999). Our primary focus, as reflected in our research agenda, has been to study the process of the CADM. Therefore, most of the questions were open and invited interviewees to report on their initial reaction to cloud and compare that with how this perception evolved over time. Further probing was used where necessary to allow respondents to elaborate and offer additional details on their interpretation of the processes followed in their organization (e.g., how and why did other stakeholders participate in CADM), in order to address the research gap defined in the previous section. Our retrospective historical understanding of cloud adoption is interpretive, built from interviews with key stakeholders in which we asked the interviewees to reconstruct a previously experienced process, accommodating in this way multiple interpretations, hermeneutics and suspicion (Klein & Myers,1999).

Interviews are appropriate methods for process research (Gersick, 1994) and through them our aim was to explore the overall pattern of sensemaking in CADM. We adopted a highly

[1] Reconstructing processes and events from interviews is widely used (e.g., the Police interview), and, because "what people present in the interviews is but the results of their perception, their interpretation of the world" they are "of extreme value to the researcher because one may assume that it is the same perception that informs their action" (Czarniawska, 2004).

interpretive process research approach (Van de Ven & Poole, 2005) based on multiple case studies which as "retrospective studies, offer the opportunity to identify patterns indicative of dynamic processes" (Leonard-Barton, 1990, p.248). We acknowledge limitations in this approach (e.g., interviewees may overemphasize, have forgotten or misunderstood). However, CADM is not the type of strategic innovation, where the interviewee would have a stake in rewriting history, that according to Van De Ven (Van De Ven, 1992) would require longitudinal study. Acknowledging that all research approaches come with some limitations (Crotty, 1998) and that further longitudinal research would be useful, our approach entails comparison and synthesis across 29 different organizations of many longitudinal process aspects of CADM and thus is most suitable for revealing a more normalized and generalized pattern of sensemaking activity than a single process study (Langley *et al*., 2013) might.

In addition to the interviews, we attended a number of industry events on cloud, in order to follow recent trends, be informed about how business benefits are presented by vendors to potential customers and observe networking behavior among vendors and clients. This material has enriched our understanding of the research context and served as a mechanism for data triangulation; indeed we were able to associate the responses of interviewees concerning the influence of external stakeholders to our observations of how networking unfolded in industry events.

Table 2 Profile of interviewees (Source: Authors' own creation/work.)

Inter-viewee	Job Title	Description of the organization	Size	Type of service
[i1]	Director	Fashion Apparel Producer and Retailer	SME	SaaS
[i2]	Manager (in charge of IT)	Regulatory NGO	SME	IaaS
[i3]	Director	Restaurants Chain	SME	SaaS
[i4]	CIO	Group of Hospitals	Large	SaaS
[i5]	CIO	Pharmaceutical	Large	SaaS
[i6]	Deputy CIO	Hospital	Large	IaaS
[i7]	Director	Data Analytics Services	SME	SaaS
[i8]	Director	Training and Psychological Support Centre	SME	SaaS
[i9]	Division Manager	Hotel Chain	SME	SaaS, PaaS
[i10]	CIO	Insurance Company	Large	SaaS, IaaS
[i11]	CIO	Financial Services	SME	IaaS
[i12]	Director	Training Centre	SME	SaaS
[i13]	Co-Founder	Pharmacy Chain	SME	SaaS
[i14]	CIO	Engineering Simulation Software Company	Large	SaaS
[i15]	IT team leader	Investment Tax Specialists	SME	IaaS
[i16]	Infrastructure and support team leader	Financial Services	SME	SaaS
[i17]	Director	Online Educational Services	SME	SaaS

[i18]	Director	Food Chain	SME	SaaS
[i19]	Co-Founder	Law Firm	SME	SaaS
[i20]	CIO EMEA	Pharmaceutical	Large	SaaS
[i21]	CIO Greece	Pharmaceutical (Same Organization as [i20])	Large	SaaS
[i22]	Head of Systems	Asset Management Consultancy	SME	IaaS
[i23]	Director	Customer Rights Consultancy	SME	-
[i24]	Director	Logistics	SME	SaaS
[i25]	Director	Electrical Engineering and Automation Consultancy	SME	SaaS
[i26]	Systems Administrator	Regional Police Department	Large	SaaS
[i27]	IT Specialist	Municipality	SME	SaaS
[i28]	CIO	Bank	Large	SaaS
[i29]	Head of Network and Computer Systems Administration	University	Large	SaaS, IaaS
[i30]	Director of Digital and Resources	Local Government	Large	SaaS, PaaS

Data Analysis Approach

We analyzed our empirical corpus inspired by problematizations and seeking the unexpected rather than following strict coding practices (e.g., (Monteiro et al. (2022))) using a flexible approach to interpretive analysis and moving between ideas and transcripts seeking to convey authenticity, plausibility and criticality (Golden-Biddle and Locke 1993) within our analysis. This approach was framed by the analysis rounds as follows. Initially, notes and transcripts were annotated and organized for understanding. In the first round of analysis (R1), the interview transcripts were reviewed so that noticeable *sensemaking features* (introduced in Section 2.3) were identified throughout the text and discussed among the authors to reach common understanding and challenge divergent views. Features identified were re-addressed and re-explored through an iterative process across the author team that involved reading and questioning their validity, in line with interpretive research practices (Walsham, 2006). In the second round of analysis (R2), we looked for groups of quotes that sketched the occurrence of *cycles of sensemaking* within each interview (i.e., sensemaking prior to some *action* such as a decision to seek further information or to move forward by engaging more stakeholders, and so on). In the third round of analysis (R3), we identified extracts within the interviews that represented sensemaking cycles and noted the sequence in which they occurred and their result, i.e., the action that followed. We then discussed the findings among the author team to pursue further interpretation and eliminate overlaps. In this third round of analysis (R3), we identified temporal extracts within the interview transcripts (particularly where specific aims were evident – such as gaining approval). The analysis results were then reviewed, compared and contrasted across different interview transcripts, leading to the identification of three distinct phases of a CADM that appeared consistent across interviews. Each phase could include multiple sensemaking cycles. We note that after the coding of approximately 25 interviews, we observed that no new themes were emerging, but rather that the same patterns were recurring

and that the content of these was essentially the same, suggesting that we had achieved saturation in our analysis (Saunders et al., 2017).

The following section presents our findings, starting with the overall picture of the three phases of the CADM and moving on to show how the decision-making process unfolds in the context of each of the three phases. We include indicative quotes for each round of analysis following the approach of Navmar et al. (2021). Throughout this analysis, we refer to the relevant sensemaking features of Table 1 (using font in italics) and to specific interviews (using square brackets – cf. Table 2).

4. Analysis

Following the analysis process described previously, we observed that sensemaking features (Table 1) come into play throughout the CADM in a series of cloud decision cycles. Each cloud decision cycle ends with the *action feature*, whereupon the organization may be ready to adopt or reject cloud, or may decide to initiate a new cloud decision cycle. We observed that the most dominant sensemaking features are different as these cycles progress. The dominant features occurring in one or more cloud decision cycles, led us to identify and label three *phases* of the overall process: *building perception about cloud, contextualizing cloud* and *exposing the cloud proposition.* The three phases and their order emerged from within our synthesis of interview data.

A trigger initiates the first phase of sensemaking, ***building perception about cloud****,* in which the organization attempts to understand cloud. *Noticing and bracketing* and *categorization and labeling* are dominant sensemaking features in this phase. In the second phase, ***contextualizing cloud***, the organization considers the relevance and implications of alternatives to their specific context, following one or more sensemaking cycles. Here *retrospective, social and systemic,* and *presumption features* are dominant. In the last phase, ***exposing the cloud proposition,*** the sensemaking process is concluded, leading to a decision on whether to adopt cloud or not with *organizing through communication being* dominant. That is, the sensemaking ends with conclusions being shared and made sense of at the top organizational level so that a definitive decision on adoption might be reached. Such a final decision may be reached on occasion at the end of an earlier phase, under certain conditions (e.g., smaller organizational size).

The repeated sensemaking cycles within these phases reveal a constant redrafting of the perception of cloud - typically led by one person we term the *Decision Leader* (henceforth *leader*). Usually a Chief Information Officer (CIO) or a senior executive in the case of several SMEs, the leader orchestrates the sensemaking, and involves others throughout the three phases until, with other senior executives –the decision maker(s)– they reach the final decision: *"if something seems interesting, the director of IT retrieves further information and tries to see if it is applicable to our business model and give us [the board members] feedback"* [i14].

We next synthesize our interview data further to describe these three phases in detail, outlining what occurs within them, who is involved and how an organization moves from one phase to the next.

Phase 1: Building perception about cloud

Organizational needs (e.g., to enhance IT effectiveness) or external triggers (*organizing flux)* initially motivate leaders to begin their sensemaking journey by ***building perception about cloud***. In this phase, the leaders focused on exploring desired business outcomes and then identifying possible options and studying their potential to serve these business outcomes. *Organizing flux, noticing and bracketing, and labeling and categorization* were the most dominant sensemaking features. For example, in [i3] and [i4], it was deemed important for the

company to have remote access to the organization for employees to respond to the needs of their role. Along the same lines, [i15] stressed "*the capability to operate anytime and from anyplace*" as one of the main reasons to consider adopting cloud. In other cases (e.g., [i30], [i1]), the process was triggered by a negative experience with existing IT systems. While looking for solutions, leaders were able to gain a wider understanding of what was available in the market to serve their needs and what cloud services could offer *(noticing and bracketing, labeling and categorization)*. For example, in [i5] leaders needed a more functional and less expensive solution which could better serve their future strategy. While making sense of the market and potential on-premise solutions, they realized that cloud-based options were much more advantageous. Similarly, sensemaking of [i1] at this stage involved understanding their needs and exploring the options available in the market, leading to an improved understanding of the possible solution benefits (including cloud) and the sensemaking of the expected business outcomes. In particular, the need was for a solution "*that would be easier, faster and cheaper".* This led them to a "*market research on the providers that offer business intelligence software in Greece. We found five [...] We considered four providers, from which only two had a cloud solution."* In other words, sensemaking of [i1] at this stage involved understanding their needs with reference to the options available in the market, leading to an improved understanding of the possible solution benefits (including cloud) and the sensemaking of the expected business outcomes. As a result of these initial sensemaking cycles, desired business outcomes as well as an interpretation of what cloud services could offer were specified by the leader.

In summary, in this first phase, following a certain trigger, such as a business need or trend or external prompt, leaders appreciate how cloud solutions may offer beneficial business outcomes (see **Table 3**).

Table 3 Indicative quotes & themes relevant to Phase 1 (Source: Authors' own creation/work.)

Phase 1	**Sensemaking Cycles**	**Features**	**Indicative quotes**
Building perception about cloud	Trigger	Organizing flux	*"the ability to control the entire organization from a single device; by using the appropriate software we can have a clear view of the needs and contact the suppliers." [i3]* *"it was initiated by doctors towards the IT people" [i4]* *"complex, fragmented and expensive architecture… It stinks, everybody hate[s] it, and we're paying for it." [i30]*
	Use the trigger as an opportunity to think about desired business outcomes ↻	Noticing and bracketing	"*The first and most important thing is cost reduction. At this time, if we have to maintain this infrastructure and the licenses involve a huge cost. The cost of IT is a 10-digit number each year. … for scalability matters, because we buy, sell companies, hire people, reduce staff members etc. We don't want to be tied to an infrastructure for something that is entirely changeable. […]We had to change it, we had to consider the future (4-5 years)". [i5]*

	Understand possible options and justify potential business outcomes		*"We wanted something that would be easier, faster and cheaper. For example, in our old solution, for each report that we wanted to retrieve from each department, we had to ask a developer to make the configuration and to implement it. We had to pay him a lot, based on the hours of work and get the solution in ten days, or in two weeks. Now [after cloud adoption], these can be done by the users."[i1]*
		Labeling and categorization	*"We wanted to see if it was worth choosing a solution which is on-premise rather than cloud-based. But, considering companies such as Salceforce.com which is a 'giant' in CRM, we decided that there was no other choice." [i5]* *"Looked for mobile and web-services which are available from the cloud vendors" [i25]* *"Made a market research on the providers that offer business intelligence software in Greece. We considered four providers, from which only two had a cloud solution" [i1]* *"[we] found maybe 3-4 products that did roughly what we wanted to do. We found it online. It was good enough just to search online" [i2]* *"Outline the proposed initial steps for developing a digital road map which [would] allow the [organization] to harness the benefits of cloud technologies". [i30]*

Phase 2: Contextualizing cloud

Once the leader felt they had a solid understanding of cloud (effectively *labeled and categorized* to allow clear understanding in the previous phase) we noticed that they moved to a new set of sensemaking cycles in which they strongly focused on what cloud might offer and what resources it would require, specifically identifying the parameters by which the cloud solution might be judged appropriate for their organization. We termed this phase the ***contextualizing cloud phase*** and noted that the *retrospective, social and systemic,* and *presumption* are the most dominant sensemaking features. *Noticing and bracketing* as well as *labeling and categorization* continue to play a role in this phase, although in a more contextualized and organized form (see **Table 4**).

The main aim of this phase is to validate and deepen the understanding of candidate cloud services. We noticed that leaders cross-checked their initial understanding of cloud by seeking the opinions of similar adopters and "reference sites" – showing evidence of *social and systemic* sensemaking features (e.g., [i2] and [i22]). Most of the leaders, however, complemented online sources with the views of stakeholders in their environment who were considered as reachable and respected by the decision makers. For example, [i13] and [i28] valued the views of stakeholders in similar roles in other organizations within their industry; [i1] and [i2] considered the advice of existing vendors and collaborators, while [i30] relied on their consultants. In [i22] the leader argued that retrieving information online about the experience of other companies was valuable as some insights might not be available in ones'

network of colleagues. Such insights reveal that during this phase, leaders are validating their sensemaking of the services by retrieving the opinions of trusted sources.

This phase additionally involves validating the sensemaking process by getting proof of concept for the candidate cloud services (*presumption*). Cloud enables much easier piloting and testing at lower cost and allows testing much earlier in the adoption process (Willcocks et al., 2014). The leaders of the process were thus able to rapidly test candidate services so as to gain a hands-on perception of how the cloud service is contextualized within the organization (a form *of organizing through communication*). In cases where piloting was possible, leaders themselves gained hands-on experience through trying the service for a certain amount of time. For example, [i30] prototyped different email marketing systems. Some even considered piloting as very important and thus made special arrangements with vendors to pilot the service (e.g., [i2]). In cases where the nature of the service or regulation prevented leaders from piloting the service within the organization, they often developed workarounds for validating their perception by using demos or visiting similar organizations already using the service (e.g., [i4]). Such workarounds allowed leaders to gain a better understanding about how the candidate cloud service was being used in similar contexts. Although cloud is argued to minimize upfront investment risk, our findings highlighted that leaders still seek to validate their understanding about candidate cloud services by investing in testing the services and gaining proof of concept.

Past experiences also shaped the validation approach for the leaders (*social and systemic* and *retrospective*). In [i22], past positive experience with a vendor led the decision maker to choose them. Many existing software companies were rushing to transition their software to cloud services as the market moved in that direction. In other cases (e.g., [i1]), the existing vendor attempted to convince the leader to remain with their on-premise software as they were preparing to release their own cloud-based products soon. This required the leader to evaluate a future potential solution against currently available cloud services and led to a decision to either postpone the decision or adopt a competitor's solution. The leader in [i25] reflected on previous experiences with a vendor and the reasons leading to rejecting the candidate service offered by that vendor, whereas in other cases vendors also attempted to offer alternative solutions in order to maintain the customer (e.g., [i5]).

Thus, the *contextualizing the cloud proposition* phase allows leaders to cross-check their understanding by eliciting information from trusted sources, gaining proof of concept and connecting their knowledge with previous experiences. As the perception about candidate cloud services and the choice of a particular vendor becomes more specific through this phase, the leaders build a stronger and more confident judgment about the suggestion they will be making to their organization's management. We noted that leaders within smaller SME organizations that lacked an IT department made a definitive adoption decision themselves towards the end of this phase, concluding the decision about cloud adoption (*action* leading to an accept or reject cloud decision).

Table 4 Indicative quotes & themes relevant to Phase 2 (Source: Authors' own creation/work.)

Phase 2	Sensemaking Cycles	Features	Indicative quotes
Contextualizing cloud	Identify trusted sources ↻ Enhance understanding	Social and Systemic	"*Some advice I got online was good. A number of internet sources you can't find through personal contacts. It is very useful to be able to verify some of the things, e.g., 'does it really work like this?', 'it seems too good to be true. Is that right?', 'we tried that, it was good, but there were few*

	of potential business outcomes		*problems with it, so we would advise you not to do that'"[i22]* "*We deal a lot with CIOs [in] banks, so we have access to their IT [expertise] anyway. I have contacts with people in various departments in companies like that, large investment banks where I can spend time talking to people, find out [what] they plan to do and how they feel about it" [i28]*
	Define desired functionality ↻ Extract information on actual functionality and compare	Presumption	"*That's a crucial thing to do with any kind of new service; to start with a small test, so for example with [the vendor] we set up one of our services and we did a test migration to their data center" [i2]* "*We went outside Greece. I visited a hospital in Barcelona (St Pauli) and we also consulted a solution from the USA*". [i4]
	Reflect on previous experiences ↻ Formulate desired future experiences	Retrospective	*"We were happy with the way we worked together, so this [adopting their cloud service] is a sort of upgrading our sort of core infrastructure. And I am quite happy continuing to work with them. If you are happy with an existing relationship, why change it.*"[i22] "*They [the vendor] are planning to move their products to the cloud at some point. So they were trying to convince us, not to do the transition to the cloud, not to make this change. And proposed to us to adopt the next version of their product which would also be cloud based. So, in this way, they tried to change our decision and to influence us negatively.*" [i1] "*[The vendor] was very difficult to communicate [with], every day we were talking to a different person, [we] had to explain everything from scratch. It had bad service and support. Working with a smaller company would be better*".[i25] "*When you are rejecting a product or a collaborator, you have to justify why. So, the existing vendor gave us another suggestion*". [i5]

Phase 3: Exposing the cloud proposition

Once the leader has formulated a solid perception about cloud and contextualized this perception to the organization and the marketplace providing the service in Phase 2, they begin to move towards the final phase before taking a decision (with the exception of some SMEs that reach a decision at the end of Phase 2, as explained earlier). In this phase, which we call ***exposing the cloud proposition,*** the leader distills and packages their understanding for more senior, but less technical, top management executives. The latter are the decision makers who, either individually, or collectively with the leader, made the cloud adoption decision.

In more concrete terms, leaders often organized a meeting to communicate relevant information on cloud adoption to the decision makers (*organizing through communication,* reliant upon *social and systemic* perceptions and *labeling and categorizations* from earlier in the process). In such meetings, leaders exposed their views, proposed cloud services and provided reports (e.g., traditional cost-benefit analysis) and/or presentations to decision makers (for example the CEO), in order to reach a formal decision. In [i6], the decision makers received an analysis that "*clearly showed potential benefits of cloud adoption*" before deciding. In some cases (e.g., [i22]), a meeting was organized to present the candidate cloud service to senior executives and explore the proposition. In addition to presenting their proposition, the leader sometimes had to respond to questions convincingly. We note that decision makers are primarily active in this final phase of the process but rely strongly on the leader to guide the decision making.

Established relationships with vendors were also important during this phase, as vendors often assisted the leader in shaping their presentations for the decision makers. For example, in [i16], although the vendor did not participate in the meeting, they assisted the organization of the cost-benefit analysis. Other technical experts (e.g., technology or operations experts) also provided information to leaders to use in convincing decision makers while for [i30] consultants assisted with a formal "options appraisal" of different cloud services. It should be noted however that, for [i21] at least, the internal discussions about cloud adoption required less effort compared to on-premise solutions as the process "*depends on the amount of money required and the internal bureaucracy for decision making when it comes to large/costly projects*".

Where decision makers had previous experience with a vendor or the vendor's policy, this often contributed to the decision to adopt cloud. For example, in [i7], one of the decision makers had previous experience with a different cloud product offered by the same vendor, and this familiarity contributed positively during the internal discussion. Similarly, in [i30], the consultants' expertise with particular cloud platforms influenced their preferences. The perception that there were no viable alternatives to cloud assisted the leaders in overcoming concerns that were raised by the decision makers. For example, in [i9] the decision makers raised concerns in an effort to validate the leader's approach. These findings suggest that cloud adoption decision making is mediated: the sensemaking of a leader about cloud (strongly based on understanding of business needs, and their *retrospective* experience of previous technologies) is mediated through the assistance of the vendor and other internal experts. It is from this mediated perception that the actual decision is made. The decision makers are thus detached from the understanding of cloud; rather they are presented, by the leaders, with a potential future technology directly entwined with intended future organizational needs and strategy and formulated with retrospective understanding of the organization's existing technology (see **Table 5**).

Table 5 Indicative quotes & themes relevant to Phase 3 (Source: Authors' own creation/work.)

Phase 3	Sensemaking Cycles	Features	Indicative quotes
Exposing the cloud proposition	Organize cost-benefit analysis and future vision 	Organizing through communication	"*I think, they want to examine and to check my decision-making process really, they aren't experts in this kind of IT field, however, they are smart and have been around quite some time so they would be able to ask good, insightful questions around some of this stuff and potentially expose flaws of my thinking, areas that I haven't*

	Present to organization's executives and revisit flaws		*investigated that I should investigate. You know, they might not have expertise in the particular area, but they might be able to tell whether I have done a good job coming to a good decision".[i22]* "*... they did help me to set the presentation up, they did send me material. What I presented was based on what they presented to me.*" *[i16]* "*concern about the level of dependency with network operators and vendors, but beyond that they realize that cloud is the only way to operate*".[i9]

Our analysis reveals three phases of CADM, the main aims of the sensemaking cycles and dominant features in each phase These construct the potential sensemaking journey taken by a leader to decide about cloud. In the next section we reflect on the findings of our analysis to construct the CADM framework and discuss the implications for cloud adoption research and practice.

5. Discussion

Our analysis helped us address the under-explored research question of "***How does cloud adoption decision making unfold?"***. Building upon our findings, in this section we construct a CADM framework which can guide both researchers and practitioners with an interest in cloud adoption. We then discuss the framework in the context of the extant literature on cloud computing adoption and identify the role of external stakeholders in this process.

5.1 How are cloud adoption decisions made?

Drawing upon our research findings and building on our understanding of the constituents of the sensemaking cycles at each stage and the possible variations in the pathways for decision making, we are able to construct a framework for cloud adoption decision making.

Figure 1 illustrates the three phases of the CADM and the potential journey towards adoption or rejection of cloud. Each phase will have one, but may potentially have more, cloud decision cycles, as the organization seeks and processes information relevant to cloud adoption. Forward triangular arrows demonstrate the move from one phase to the next. Circular arrows drawn within a phase depict the multiple cloud decision cycles followed within that phase and indicate the objective of information retrieval and its result (e.g., identifying trusted sources enables information retrieval which leads to deeper understanding of potential business outcomes). Backward triangular arrows pointing to a previous phase show that a leader may revisit an earlier phase, to recreate or refine the organization's perception about cloud (e.g., because the decision makers feel a certain aspect of cloud has not been well understood, as occurred in [i22]) – suggesting decisions are crafted over time. A decision to either adopt or reject cloud is typically made at the end of phases 2 or 3, depending on whether the leader is a senior executive or the CIO, respectively, as discussed above. We also found evidence that the process may already be terminated at the end of phase 1, hence the exit arrow at the end of Phase 1 in Figure 1. For example, [i6] asserted "The legal issues concerning privacy of medical records and patient data remain unresolved. Therefore, it is a huge risk for us to migrate our applications to the cloud without a proper legal and regulatory framework in place," thus terminating the process early. A decision can be to adopt or reject cloud, either of which signals the end of CADM, or to continue sensemaking and decide later.

As is likely the case with any technology adoption, throughout the CADM phases the leaders' understanding is enhanced through learning about cloud services which allow them to move closer to a final recommendation or decision. CADM is thus a learning and deciding process in which learning focuses on cloud computing adoption with a distinct focus on specific cloud related factors (e.g., remote access), and where it is usually relatively simple to prototype and evaluate the services (due to easy access and lack of installation complexity).

The framework highlights several decision cycles which take place during the phases of CADM. *In the first phase*, the triggers initiating CADM in the organization are first reviewed by the leader to understand whether they would lead to desired business outcomes. Following this review, the leader identifies and makes sense of candidate solutions and their capabilities (i.e., justification of business outcomes). Here the specific features of the cloud (e.g., "easier, faster, cheaper" and "remote access") are cataloged and compared with on-premises and existing solutions, supporting the equivalence in computing suggested by Venters & Whitley (2012). The focus is on building comparisons (in documents and spreadsheets) against specific business needs and organizational requirements. These documents usually focus on cost, speed of deployment and ease of deployment alongside specific needs and operational requirements. Accessibility (i.e., remote access outside the firewall) is a key feature. Researchers seeking to understand adoption factors would thus benefit from examining such spreadsheets and documents as their schema reflects adoption factors importance. Vendors of cloud service may also benefit by providing simple tables of comparison to assist with this phase in the decision process.

After identifying candidate services with a potential to provide the desired business outcomes, *in the second phase*, leaders seek to retrieve information about the cloud service by extracting information from trusted sources, piloting the service, and reflecting on previous experience. Spreadsheets become more tangible with a focus on the offer and resource requirements, for example, to deepen their understanding of potential business outcomes from candidate services. Along the same lines, other cycles may involve defining desired functionality from the service and testing, whereby leaders may attempt to make sense of the service's actual functionality to determine if it meets the desired functionality and needs. Leaders may also reflect on experiences of the *past* in order to formulate future desired experiences from the service (for example an interviewee who remembered losing business capabilities when a physical server broke was keen to have cloud computing running the infrastructure) – supporting the concept of equivalence from the cloud computing literature (Venters and Whitley 2012). Testing and piloting occurs in this phase as options are considered and demos experienced. The phase is experiential and exploratory – with leaders testing solutions or visiting reference sites to learn and experience solutions. The remote access to cloud services facilitates such experiential learning as services can be easily tried remotely without installation on company data-centers. Such experiential learning is however framed by, and compared against, the experiences with existing on-premises solutions. Options and specific offers for cloud services are considered in detail during this phase. Vendors should emphasize and support such experiential learning and prototyping in their pre-sales practices.

In the last phase, leaders may consolidate the knowledge collected in order to conduct an overall cost-benefit analysis and envision the future with the chosen solution. This is a crafting process in which spreadsheets often give way to powerpoints created and framed based on earlier learning and the expectations and needs of senior decision makers. Consultants could assist in option-appraisals. PowerPoints are less technical and more focused on business needs than earlier analysis documents. Opinions become stronger and key lessons are drawn from pilots and prototypes. Further research that examines the capacity for testing during adoption decision making would be welcome as our research hints at a significant impact of this on cloud

adoption. Research into the methodologies for cloud computing options-appraisal and business justification would also be welcome.

Depending on the organization's size, this knowledge may be exposed to the organization's high-level executives to test flaws of the approach or to gain approval.

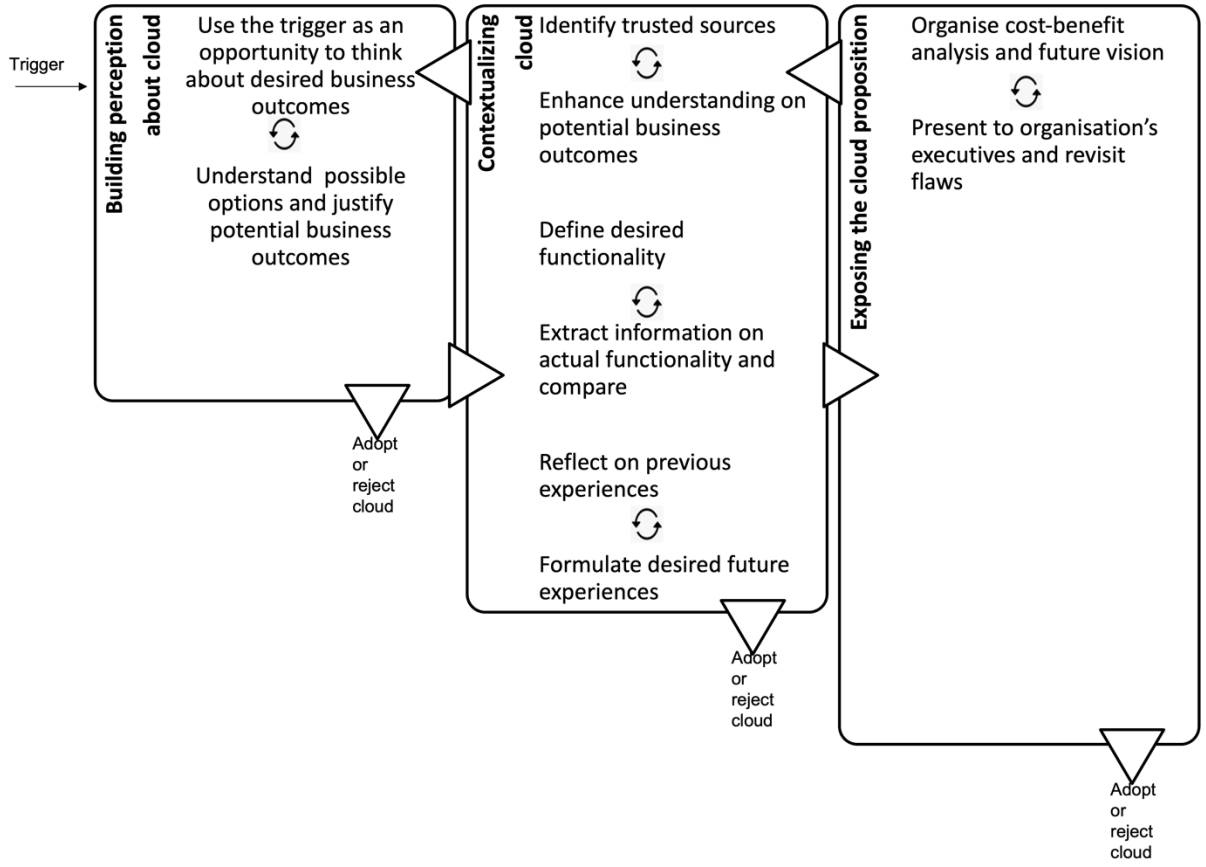

Figure 1 CADM Framework. (Source: Authors' own creation/work.)

5.2 Extending research on cloud adoption factors

In addition to the insights on the process of decision making, the CADM framework allows us to enrich and extend research on cloud adoption factors. In particular, the study of the different phases provides insights about how and when certain adoption factors come into play within the unfolding process. Thus, our research extends current understanding of relative advantage, CIO innovativeness, top-management support and organizational size as explained in the following paragraphs.

Our evidence suggests that CADM is led by one person, the leader, who is usually the CIO or equivalent role. The leader is in charge of consolidating knowledge arising in CADM and assessing the appropriateness of candidate cloud services. This finding is in line with existing research that identifies cloud's relative advantage as one of the key factors driving the decision to adopt (e.g., Alshamaila *et al.*, 2013; Ju-Chuan & Shu-Mei, 2021; Polyviou *et al.*, 2016; Nagahawatta & Warren, 2020). Our findings demonstrate that cloud's relative advantage is considered across all three phases of the CADM. Additionally, we provide evidence that in the first phase the emphasis is primarily on the relative advantages among cloud services, whereas in the second phase emphasis is primarily on relative advantage with reference to business requirements and existing IT systems.

The literature also identifies human competences as relevant to cloud adoption (e.g., CIO innovativeness (Lian et al., 2014) or decision makers' beliefs about the term 'cloud' itself (Morgan & Conboy, 2013; Polyviou *et al.*, 2014)). Our findings indicate that such competences are particularly relevant during the first phase of CADM, as an initial motivation (i.e., the trigger) for the leader to consider cloud options. Our findings also show that although CIO innovativeness is indeed influential for cloud adoption, innovativeness need not only characterize CIOs, but, rather, the leading decision maker more broadly, especially in the case of small organizations without an IT department.

Final decisions are reached following the involvement of the organization's executives in CADM. *Exposing the cloud proposition* is a collective phase that entails the leader consolidating information and sketching future visions and presenting their cloud proposition to high-level executives of the organization. Existing literature highlights top-management support as an important factor for cloud adoption (e.g., Alshamaila et al., 2013; Asatiani, 2015). As demonstrated by our framework, during the *Exposing the cloud proposition* phase the candidate cloud solution is presented to organization's high-level executives and hence top-management support is a significant factor during this stage. In small organizations without an IT department, senior executives may be those leading CADM - in such cases their involvement and the evidence of top management support is persistent for the whole process.

These insights also provide evidence of the relevance of organizational size, thus addressing Schneider and Sunyaev's (2016) call for research on different organizational sizes in relation to cloud adoption. Our research highlights that CADM differs for smaller companies lacking IT departments as cloud adoption decision making is likely led directly by the management of the organization rather than the CIO or similar role. In this situation the top-management will have participated in the journey through CADM, whereas in larger organizations the first two phases would be completed before presenting (usually at a single meeting) the opportunities and costs of a cloud solution to gain top management endorsement and support. Schneider and Sunyaev (2016) suggest that it might be the on-demand self-service nature of cloud services that leads to differences in the decision-making process followed by SMEs. Our framework contributes to this statement by relating the simpler cloud decision making of smaller companies to the absence of an IT department and the additional role associated with the organization's high-level executives. While our sample is not sufficient for generalizations in a statistical sense, our findings offer a useful problematization for developing more inclusive and, we would argue, relevant questionnaire instruments in future quantitative

research studying cloud computing adoption in respect to organizational size. Furthermore, our findings indicate the importance of differentiating between CADM leader and decision maker within such questionnaires. In practice, these findings are of interest to the IT industry in marketing cloud adoption to SMEs.

5.3 Stakeholder involvement in CADM

Our research on CADM led us to identify additional stakeholders who may be involved as well as the stages in which they are invited to participate. Existing literature already notes that external influences have an impact on the decision to adopt. Relevant adoption factors include competitive pressures (Hsu et al., 2014; Oliveira et al., 2014) and social pressures (e.g., Asatiani, 2015). The CADM framework illustrates how these factors become most relevant in the *contextualizing cloud* phase. We show how the leader may approach trusted sources to assist the information retrieval during the *contextualizing cloud* phase. These may be colleagues in other organizations, or forums that host demonstrations of evidence on the potential business outcomes of the candidate cloud services where trusted peers can also be consulted. This suggests the value of further research examining the role of events, reference sites and prototyping /proof-on-concept creation on cloud adoption.

Vendors or consultants may also be invited to assist the CADM, especially if the vendor has offered other IT services to the organization in the past (e.g., cloud's predecessors). While cloud computing definition may imply that organizations are expected to purchase cloud services off-the-shelf without any direct interaction with the provider (Schneider & Sunyaev, 2016; Mell & Grance, 2011), our framework demonstrates that decision makers remain keen to meet cloud providers in person and that this is most likely to occur during the *contextualizing cloud* phase. It is during this phase that decision makers identify candidate vendors and review their characteristics (e.g., if the vendor is responsive, friendly, or trustworthy (e.g., [i1])). This happens at an early stage in the CADM process as an opportunity to elicit a vendor's approach and intentions and may evolve as a growing relationship, with the vendors being present or supportive in later phases of the process and when final adoption decisions are reached. Further research on interaction between cloud vendors and customers would be welcome.

5.4. Theoretical Implications

This paper's contribution is primarily empirical, detailing the process by which companies adopt cloud computing (Ågerfalk 2014). We conceptualize cloud adoption decision making as an unfolding iterative sensemaking process and show how the sensemaking theoretical lens has assisted us to dismantle CADM into three distinct phases which we have empirically elaborated.

Our development of CADM demonstrates how sensemaking theory can be employed by the Information Systems discipline to study technology adoption decisions. The majority of IS scholars studying technology adoption have traditionally employed widely cited IS adoption theories (Oliveira & Martins, 2011) including the DOI theory and the TOE framework. While these lenses have proved extremely useful in understanding the adoption of various technologies in the past, they largely focus on the identification of technology adoption factors. Sensemaking could serve as an alternative lens, to assist researchers in exploring more complex IT sourcing and technology decisions. Through this study, we illustrate how sensemaking theory can be used in studying technology adoption, emphasizing the decision-making process. Our focus on cloud computing serves as an exemplar for researchers aiming to use sensemaking as a lens for studying the adoption decision-making process of other similar technologies in the future.

The identification of CADM as an unfolding phase-based process, could help future cloud researchers look beyond the factors shaping the decision and more towards the phases and practices of those stakeholders involved. These practices occur within sensemaking cycles performed at the pre-decision stage and lead to the adopt or reject decisions. We show that CADM involves learning as sensemaking occurs – suggesting the benefit of further research examining how decision makers learn and structure their learning – learning which is experiential (evidenced through the importance of pilots) (Argyris & Schon 1996) and social (evidenced through the intense collaboration with vendors and other stakeholders) (Wenger 2000) as well as analytical (evidenced though comparisons and spreadsheets). Further research connecting organisational learning theories with adoption studies would thus be welcome. Indeed, our research hints at the potential for research examining the practices of adoption (Nicolini 2013) to elaborate on the processes of adoption within organisations and the sensemaking of those involved. Along the same lines, the CADM framework shows that different sensemaking features and mechanisms being employed at different phases of the sensemaking journey. This warrants future research to go beyond the case of cloud computing and to reflect on our overall understanding of sensemaking with regards to phases and the relevance of different sensemaking features in each phase.

The findings of this study on phases, the stakeholders and activities included in CADM can also be linked to IT governance literature. The results demonstrate that the cloud adoption decision is shaped not only by the final decision marker, but rather by several stakeholders who contribute to making sense of cloud in the context of the organisation across the process. Their involvement across different phases of CADM provides lessons for IT authority (Sambamurthy & Zmud, 1999) and thus possibly indicates that specific IT governance patterns are followed in CADM (Xue, Liang, & Boulton, 2008). For example, although different internal and external stakeholders may be involved the first two phases of CADM, these phases are managed by the leader – indicating a link with the IT monarchy governance model (Weill, 2004). In the third phase, the top-management is invited to provide or deny authorization for cloud adoption. At this stage, they may proceed with the decision to adopt, either at their level –reflecting the existence of a business monarchy governance model– or in collaboration with the leader – reflecting an IT duopoly model (Weill, 2004). Overall, our analysis of sensemaking features at play, activities, and stakeholders involved in each of these phases, and their discussion with respect to the cloud literature (cf. Section 5.1, 5.2, 5.3), led us to contribute to the debate on the perception of cloud by organizations.

5.5 Practical Implications

This study has several important practical implications. We envision that the CADM framework can serve as a tool to assist IT professionals and organization executives in creating and implementing their cloud adoption strategy. In particular, the sensemaking cycles identified may assist practitioners appreciate how to begin and navigate through cloud adoption decision making in their organization. Our research illustrates that cloud adoption decision making is not a linear process, but rather a complex unfolding process which involves multiple stages and sensemaking cycles. These show that the leader may need several iterations to deepen their understanding of the candidate services and critically reflect on their potential value for the organization. In Table 6, we outline several different steps which can be followed by practitioners undergoing CADM alongside with the key skills required for the completion of each stage.

Table 6 Guidance for IT practitioners and relevant skills (Source: Authors' own creation/work.)

Steps	Key Skills
• How to get started with CADM? o Specify the desired business outcomes o Identify and make sense of the available solutions o Consider the capabilities of potential solutions Vs desired business outcomes and shortlist candidate services or reject the cloud option	innovativeness, understanding of business needs, analytical skills, problem solving
• How to proceed in CADM? o Consider candidate cloud services in the context of the organization o Seek experiences of other organizations o Pilot candidate cloud services (if possible) or see for use cases in other organizations to gain proof-of-concept o Reflect on established collaborations with vendors and for/against continuation o Revisit desired business outcomes and evaluate what candidate cloud can offered based on earlier steps to shortlist further candidate services further o Decide to propose the adoption of a specific cloud service or reject cloud	communication skills, networking, analytical skills
• How to finalize CADM? o Summarize suggested cloud service and justify choice (vendors and other stakeholders may provide support at this stage) o Present suggestion to the organization's high-level executives o Prepare and respond to further questions by the executives o Top management to provide approval (or not) to adopt the suggested cloud service / request to retrieve more information	communication, presentation, debating

6. Limitations and Future Research

Our study illustrates the role of the decision leader, typically the CIO, in the CADM process and identified other internal and external stakeholders engaged. It also sheds light on the relevance of the phases of the CADM process for different cloud adoption factors identified by the extant literature. Our findings point to three key conclusions regarding cloud adoption decisions; First, decisions are crafted through ongoing interaction with the vendors, consultants, and peers. Second, decisions rely extensively upon experiential factors such as prototypes and tests (facilitated by clouds remote access), visits and consultants rather than just codified data. Third, decisions are often made or validated by those not directly engaged in the learning, so that sensemaking is mediated for the decision maker.

While our research covered a range of industries and company sizes, our focus was not specifically upon the conditions under which the cloud adoption process occurred; we might have been missing significant qualifiers. In this study, we focused on the sensemaking of the leaders of CADM and thus our findings reflect the perceptions of senior level executives (or equivalent) rather than novice IT experts. While perceptions of novice and expert participants may be different (Kahneman & Klein, 2009), future researchers may explore how less experienced IT experts make sense of cloud adoption in organizations. We also note that our empirical material was drawn from organizations based in Europe; other geographical regions

with different cultural or regulatory frameworks may reveal different issues in CADM. Our study is beneficial in showing the process of CADM across many different enterprises. In researching process interpretively, we thus relied upon carefully interviewing knowledgeable respondents to retrospectively inform us of their interpretation of CADM. Further research would valuably complement this study by adopting more explicitly longitudinal process analysis approaches (Langley et al., 2013) to reveal greater details of the relationship between vendors, leaders and decision makers within the CADM. Finally, as the paper focuses on adoption decision making, it begs a question on how organizational sensemaking unfolds in the post-adoption phase. In the case of cloud in particular, it would be interesting to study the stages following up on cloud adoption decisions, that is, the implementation of a cloud solution.

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APPENDIX 1(Source: Authors' own creation/work.)

Reference	Main Research Objective	Theory	Key findings
Ju-Chuan & Shu-Mei, 2021	Investigate the determinants in the context of cloud computing services to digital innovation and the relationships among them	Activity Theory	Relative advantage, financial cost, ease of use, security and privacy, supplier computing support
Low *et al.*, 2011	Investigate the impact of cloud adoption factors on the intention to adopt cloud	TOE framework	Relative advantage, top management support, firm size evaluated, competitive pressure
Oliveira *et al.*, 2014	Investigate the impact of cloud adoption factors on the intention to adopt cloud	TOE framework, DOI theory	Relative advantage, complexity, technological readiness, top management support, firm size, security concerns, competitive pressure
Polyviou *et al*., 2016	Cloud adoption factors when considering cloud adoption in a specific business area	DOI, Organizational Capability	Remote access, cost reduction, personnel innovativeness
Gupta *et al*., 2013	Identify risks and benefits for cloud adoption for micro-sized companies and SMEs	-	Ease of use, convenience, cost reduction, security concerns, privacy
Huang *et al*., 2021	Identify Critical Success Factors (CSFs) in cloud ERP	-	Security, project management, communication
Morgan & Conboy, 2013	Identify cloud adoption factors	TOE framework, DOI theory	relative advantage, triability, compatibility, complexity, desire to improve collaboration, increased traceability and auditability, fitting to the organizational norms and culture, security and legal issues, innovativeness and perceptions of the decision makers towards the term 'cloud'
Nagahawatta & Warren, 2020	Identify the security and privacy-related factors that influence the use of cloud computing by SMEs	TOE framework, HOT-fit model, Institutional theory	skilled personnel, technology readiness and trust, security concerns, privacy concerns
Hsu *et al*., 2014	Analyze cloud computing adoption factors	TOE framework	perceived benefits, perceived business concerns, IT capabilities, competitive pressure
Low & Chen, 2011	Investigate cloud adoption factors in firms belonging to the high-tech industry	TOE framework	relative advantage, top management support, firm size, competitive pressure, and trading partner pressure

Asatiani, 2015	Identify determinants playing a key role in organizations' decision to adopt cloud	TOE framework	Cost advantage, relative advantage, accessibility, compatibility & technological readiness, management support, size, Social influence & peer pressure
Benlian 2009	Research opportunities and risks associated with cloud computing	Theory of Planned Behavior (TPB), Theory of Reasoned Action (TRA), Resourced-based view framework (RBV)	social influences, attitude towards SaaS, uncertainty associated with adoption, strategic value, company size is not relevant
Alshamaila *et al.,* 2013	Identify cloud adoption factors especially for SMEs	DOI theory, TOE framework	relative advantage, cost savings uncertainty, geo-restriction, compatibility, trialability, size, top management support, prior experience, innovativeness, industry, market scope, supplier efforts, external computing support
Lian, Yen, & Wang, 2014	Export critical factors that affect the decision to adopt cloud in hospitals	HOT-fit model, DOI theory	data security, perceived technical competence, cost, top management support, complexity, CIO innovativeness. Technology is the most important dimension, then human, organizational, and environmental
Polyviou *et al*., 2014	Identify cloud adoption factors in the public sector	DOI theory, TOE framework	Relative advantage, compatibility, interoperability, security, legal issues
Venters *et al*, 2012	Framework of technological and services desires of cloud computing	-	Security equivalence, availability equivalence, latency equivalence, variety, abstraction, scalability service dimension of cloud desires: efficiency, creativity, simplicity, role of the IT department
Schneider *et al.*, 2016	Determinant factors for IT sourcing decisions Vs cloud computing decisions	-	some factors are inconclusive for cloud computing and IT outsourcing. Cloud computing holds several specificities, and its decision making can be also influenced by: client firm capabilities and size, institutional influences, uncertainty

APPENDIX 2 (Source: Authors' own creation/work.)

Interview Agenda

1. Please provide a brief description of your organization (size, core sector)
2. What is your role in the organization?
3. Do you have a dedicated IT department in your organization? (If not, how are the IT services being managed?)
4. What is cloud from the viewpoint of your organization?
5. What types of cloud services do you use? For how long have you been using the service?
6. What is the subscription model based on which these services purchased? (e.g., monthly, per user etc.)
7. How did you first find out about cloud?
8. What was your initial reaction to cloud? Was it positive or negative?
9. What means did you use to retrieve further information about cloud?
10. To what extent did these affect your perception about cloud? (positive/negative/hesitant)
11. What was the process you followed so as to formulate your views about cloud?
12. Did these views change over time? If yes how and why?

If *not* answered by the questions above:

a) Did you visit any conferences/events discussing cloud computing? To what extent did this experience influence your knowledge and perception towards cloud?

b) Did you use the Internet to retrieve further information about cloud computing? To what extent did this experience influence your knowledge and perception towards cloud?

c) Did you visit any websites that discuss/compare/rank cloud services? To what extent did this experience influence your knowledge and perception towards cloud?

d) Did you look for success stories of similar organizations? How did you retrieve them? How informative were they? To what extent did this experience influence your knowledge and perception towards cloud?

e) Did you ask external collaborators or consultants that are somehow related to the organization about their views on cloud computing? To what extent did this influence your knowledge and perception towards cloud?

f) How did candidate vendors influence your perception towards cloud? To what extent did this experience influence your knowledge and perception towards cloud?

g) How did you cross-check the information derived through these mechanisms (e.g., conferences, vendors, external collaborators, internet etc.)? What did you find out?

13. What was the decision making process followed within the organization in order to decide to move to the cloud?
14. At which stage did you hold internal meetings?
15. Who was involved in this process? How were these stakeholders involved in the process? Whose opinion carries more weight and why?
16. Why did they become involved?(Why so many people/ Why so few people)

If *not* answered by the questions above the above:

a) Were these stakeholders initially aware of the term cloud?

b) If not, what information did you use to explain cloud to them?

c) If yes,

i. How do you think they found out about cloud?
ii. What mechanisms do you think they used to retrieve information?
iii. To what extent do you believe they were influenced by these mechanisms?

17. Were all the stakeholders for or against cloud from the beginning?
18. How did their perceptions change over time? What arguments did they use for discussing for or against the adoption of cloud services?

If *not* answered by the questions above the above:

a) Did anyone mention examples from other organizations? If yes, how did this change the perceptions?

19. Did candidate vendor(s) participate in any of these meetings?
20. Did you meet vendors before deciding? If yes, what was discussed at that stage?
21. What was the process followed to select the service?

If *not* answered by the questions above the above:

a) Did you request quotations by candidate cloud vendors before choosing the particular service?
b) Did you try candidate services before choosing the particular service? Please elaborate.

22. How did your previous experience with IT systems influence you decision to adopt cloud and to select the specific cloud services?
23. How easy has it been to integrate? /Are you keeping the systems?
24. How did your experience with previous systems influence your decision to adopt cloud?
25. How did it influence the choice of the cloud provider?
26. How did you ensure that your needs would be met by the use of cloud / of the particular service?
27. Which benefits (or product characteristics) influenced the organization's decision to adopt cloud services?
28. How did you ensure that the expected benefits would be met?
29. Were there any considerations for using cloud services raised?
30. How did you ensure that any problems arising during the migration to the cloud or after the migration would be resolved?
31. Which do you think were the major sources of uncertainty as you were taking the decision to adopt cloud? How did you deal with these sources of uncertainty?
32. Was the discussion to move to the cloud influenced by an existing or forthcoming policy? (e.g., policy at national level, policy of the organization etc.)
33. In your view how does your adoption of cloud compare to similar organizations in your sector?
34. Would you say there is an overall trend in the industry to adopt cloud solution?
35. Who do you think sets this kind of trends in your industry? Would you say you are one of the first to adopt new technologies?