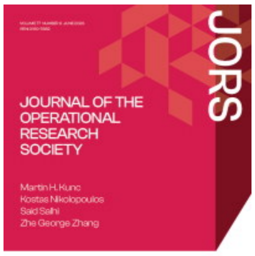

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ORIGINAL ARTICLE

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Applying agency theory in a complicated context: a Cynefin-guided framework for cloud contracting

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ABSTRACT
A cloud contract can be an effective tool for managing uncertainty in cloud computing adoption. To make informed choices when selecting the right cloud contract type, it is crucial to consider the impact of uncertainty factors. However, there is a lack of comprehensive knowledge regarding how uncertainty influences cloud contract decisions. This study aims to address this knowledge gap, combining the Cynefin framework to sense, analyse, and respond to the context with agency theory to analyse the relationship between uncertainty and decision-making in cloud contract types. This research explores four key uncertainty factors and their impact on cloud contract decisions. The quantitative research reveals that investments in information systems and the length of agency relationships positively affect outcome-based cloud contracts but negatively impact behaviour-based cloud contracts. In contrast, task programmability has the opposite effect, impacting these contract types differently. The influence of outcome measurability on cloud contracts appears to be insignificant.

PRACTITIONER SUMMARY
Our study combines the Cynefin framework and agency theory to examine how uncertainty influences the choice of cloud contracts. The findings provide practical guidance for organisations adopting cloud services. We find that investment in information systems and longer client–provider relationships have a positive impact on the use of outcome-based cloud contracts. This suggests that organisations planning to invest in information systems and build long-term partnerships with cloud providers should consider outcome-based contracts to better align incentives and performance. Practical guidance for implementing these arrangements is summarised are Tables 7 and 9. In addition, we find that higher task programmability is associated with behaviour-based cloud contracts. Therefore, when tasks are highly programmable, it may be more effective to adopt behaviour-based contracts. Table 8 provides practical suggestions on how organisations can apply this approach when tasks can be clearly specified and monitored. Interestingly, outcome measurability does not significantly influence the choice of cloud contracts, challenging common assumptions and suggesting an avenue for future research. Overall, the study offers actionable insights for practitioners and improves understanding of contract design in cloud outsourcing.

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KEYWORDS
Uncertainty; Cynefin; cloud contract; decision-making

1. Introduction

Cloud contracts play a pivotal role in cloud computing adoption, providing a framework for managing uncertainty (Gupta et al., 2017; Mayuranathan et al., 2019). A well-negotiated cloud contract could improve the certainty for both parties, provide the predictability of legal protection and avoid confusion of jurisdiction determination and applied law (Faye Fangfei, 2013; Shurson, 2025). Furthermore, a well-formulated cloud contract could reduce the risk of an uncertain legal environment (Alrashid, 2025; Faye Fangfei, 2013). Meanwhile, the uncertainty factors may influence the decision-making of cloud contract types (Shi, 2016; Sniazhko, 2019). For example, technological uncertainty, such as hacking, can be addressed through different types of cloud contracts (Wu et al., 2024). However, most cloud contract studies either focus on legal issues (Arzandeh, 2025; Djemame et al., 2013; Haibach, 2015; Kemp, 2018; Oppenheim, 2012), smart contracts supported by blockchain technology (Bartoletti et al., 2025; Dorsala et al., 2020; Tan et al., 2022; H. Wang et al., 2020) or meta-learning (Bukhari et al., 2024), Service Level Agreement (SLA) (Nicolazzo et al., 2024; Qazi et al., 2024), resource allocation (Chen et al., 2024; Yu et al., 2024), contract procurement (Jain et al., 2025) and design (Liu et al., 2024). Largely overlooked in the literature is research on the issue of cloud contracts to manage uncertainty.

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Drawing on Eisenhardt's (1989) contract categorisation, we differentiate two primary contract types within cloud contracting: outcome-based and behaviour-based contracts. This paper defines an outcome-based cloud contract as an agreement between a cloud service provider and a customer that centres on achieving specific outcomes or results. In cloud contracting this typically includes clearly defined performance outcomes such as service uptime, response times, or data throughput. The service or the provider is assessed on whether these outcomes are achieved and not on how they are achieved. For example, the Service Level Agreement (SLA) of Amazon Web Services (AWS) for EC2 requires AWS to maintain 99.99% uptime each month. If AWS fails to meet this target, the customer is entitled to service credits or refunds (AWS, 2022). Conversely, behaviour-based cloud contracts prioritise setting expectations for behaviour, actions, and service levels rather than specifying fixed outcomes. These contracts can stipulate provider behaviours such as continuous monitoring, problem identification, and reporting mechanisms for service availability tracking. It emphasises the provider's management process and how they engage in the process rather than the results. For example, the cloud contract between BJSS and the NHS for the e-Referral Service (Bennett, 2025). This contract emphasises continuous monitoring and logging of NHS digital systems, incident reporting, compliance with NHS data protection and security standards and regular reviewing (Bennett, 2025; BJSS, 2024). Enterprises can choose suitable cloud contract types through pairwise comparisons (Wang & Xu, 2023), as different cloud contracts could address different types of uncertainty (Sniazhko, 2019).

The contracting formulation process naturally establishes an agency relationship between cloud providers and enterprises (Eisenhardt, 1989). This study applies agency theory to tackle the uncertainty in cloud contract choice. Agency theory is a general theory that can be applied to a two-party relationship where one party (agent) works on behalf of another party (principal) (Eisenhardt, 1989; Rungtusanatham et al., 2007). Uncertainty caused by information asymmetry, moral hazard, and different goals (perspectives) between the agent and principal (Eisenhardt, 1989) results in the agency problem. Agency theory is widely used to understand outsourcing (Bahli & Rivard, 2003; Loh & Venkatraman, 1992; Whitaker et al., 2010). In this study, elements from agency theory are tested for their effectiveness in the outsourcing to a cloud environment, which is different from traditional outsourcing. Thus, this study complements agency theory by examining the outsourcing to cloud environments.

In addition, as uncertainty factors significantly impact outcomes (Koh, 2004; Van Landuyt & White, 2026), enterprises should consider these factors in their decision-making processes. There is a rich body of research dedicated to understanding uncertainty. Some of this research focuses on measuring uncertainty to aid decision-making in complex preference relations (Wang & Xu, 2023) while others use modelling (French, 2015; Versteyhe & Debrouwere, 2021) or algorithmic approaches (Khorshidi & Aickelin, 2021) to analyse uncertainty. These efforts extend across various domains such as network design for transportation (Mudchanatongsuk et al., 2008), technology development (Lai et al., 2020), project portfolio implementation (L. Wang et al. 2020), and supply chain management (Fildes & Kingsman, 2011). Surprisingly, there is limited research on how uncertainty factors affect decision-making in cloud contracts.

This paper seeks to address the gaps in our knowledge by combining the Cynefin framework (Snowden, 2002) and agency theory (Eisenhardt, 1989) to address two research questions:

RQ1: What uncertainty factors from agency theory influence cloud contract decision-making?

RQ2: What is the relationship between these uncertainty factors and the types of cloud contracts in a complicated context?

To achieve this, we employ the procedures applicable to the complicated context within the Cynefin framework, which involves sensing potential uncertainty factors through a literature review, analysing cause-and-effect relationships by using a quantitative study, and providing decision-making guidance in discussion (Snowden & Boone, 2007). The Cynefin framework, introduced by Snowden (2002), serves as an analytical tool to aid leaders in decision-making amidst uncertainty, dividing uncertainty into five contexts: chaotic, complex, complicated, simple, and disorder. The disorder scenario can interact with the other four contexts, which can be embedded in any of the others (Hammer et al., 2012). The knowledge increases from chaotic, complex, and complicated to a simple context (French, 2015). When context lies in the chaotic and complex section, no patterns can be identified. The uncertainty is unknown, which requires a tentative and probing approach to be adopted. We need to wait for the response to decide how we can proceed. Once we obtain a response—where even no response is a type of response—we can change the context from chaotic and complex to complicated where we know the uncertainty. In the agency relationship between the cloud provider and the enterprise, uncertainty has been sensed, such as moral hazard, maintenance cost and business complexity (Gupta et al., 2017), lack of industry standards (Won et al., 2022), and changing compliance requirements. This is where cloud contracts can play a role, changing the complicated context to a simple space, where everything is expected, the solution is in place, and the process is in order (French, 2015). In the context of enterprises selecting cloud contracts, the complicated context applies, characterised by the need for external expertise and identifiable cause-and-effect relationships (Snowden & Boone, 2007).

The remainder of this paper is organised as follows: Section 2 identifies uncertainty factors through a literature review and formulates hypotheses regarding their causal relationships with cloud contract decisions. Section 3 outlines the methodology and evaluates the hypotheses. Section 4 discusses the results and provides guidance for the response. The last section summarises our findings and suggests potential directions for future research.

2. Literature review and hypotheses proposition

Cloud computing is a major technological development in information communication technologies (Chand et al., 2015) and an important research area (Suhaib, 2020), as every business is exposed to the cloud (Ciovică et al., 2014). According to Willcocks (2014), cloud computing is very important, not just for each organisation but also for the economy, as it has significantly changed people's behaviour and ways of thinking (Arsovski et al., 2015). Cloud computing provides more flexibility to businesses and people who can access business processes without the restriction of location and time (Ciovică et al., 2014). It is estimated that most of the work will be done in cloud computing, which could reduce operational costs (Chienwattanasook et al., 2021). Additionally, according to Fortune Business Insights (2022), the global cloud computing market's value was USD 405.65 billion in 2021 and is expected to reach USD 1,712.44 billion by 2029. Cloud contracts are the "entrance tickets" to cloud computing. In the selection of cloud contracts, uncertainty stems from various sources, including technological (Sniazhko, 2019), operational (Sniazhko, 2019), and behavioural uncertainties (L. Wang et al., 2020).

2.1. Investment in information systems and cloud contracts

Investing in information systems (IS) is a strategic approach to leveraging advanced technology (Bojanc & Jerman-Blažič, 2012) and mitigating risks associated with technological uncertainty. Following Renkema and Berghout (1997) and Eisenhardt (1989), the definition of investment in IS adopted in this paper is the expenditure of resources on an information system. The resource includes time, effort, money, and human resources.

To safely use cloud computing resources, enterprises may allocate resources to enhance IS to address security concerns. IS investments are essential because embracing technology is a fundamental strategy for risk reduction (Bojanc & Jerman-Blažič, 2012). Such investments empower organisations to defend against threats, share risks with agents, and access expert guidance. It can also alleviate the internal pressure by providing training opportunities for staff to obtain knowledge of cloud computing (Schreieck et al., 2021) and know how to prevent further security issues. In addition, the improved ability of integration through investment in an information system could relieve the challenges in existing enterprises (Garrison et al., 2015; Golightly et al., 2022). It could guarantee the enterprise acquiring the benefits of cloud computing by integrating technology, business processes, and prior experience with technology (Weigelt, 2009). For instance, Kappelman et al. (2019) reported that cybersecurity investments were among the top priorities for European IT executives, reflecting the belief that enterprises should allocate more resources to enhance IT security. Likewise, private investors exhibit a strong interest in cloud-based start-ups focused on IT security, signifying their anticipation of future market trends to deal with technological uncertainty. Liu et al. (2024) believed that investment in the cloud provider can improve the level of data security. Bossler et al. (2025) suggest that investing in IS could address opportunistic behaviour, such as information poaching and manipulation, in the agency relationship between enterprises and the cloud providers by using blockchain technology.

In addition, investments in IS drive innovation (Ryman & Roach, 2024), enhancing an enterprise's capacity for innovative endeavours to tackle the technological uncertainty. IS investments significantly reduce process times (Mohapatra, 2015), providing more time for agents and principals to explore collaborative innovation opportunities. To share sensitive data between two parties and improve innovation, Von Scherenberg et al. (2024) emphasised that it is essential to invest in IS to maintain data sovereignty. IT executives recommend allocating more resources to innovation (Kappelman et al., 2019) as innovation encourages the participation of both parties, gaining competitive advantages and ultimately realising business value (Li et al., 2021). Innovation itself signifies an outcome knowledge perspective (Quintane et al., 2011). Therefore, outcome-based contracts become more appealing in environments with high IS investments for enterprises that plan to adopt cloud computing.

Enterprises invest in IS to enhance the quality of the business process. According to the study conducted by Pranicevic et al. (2011), the more mature the information system is, the better the process quality will be. Investment in IS could improve the enterprise's performance (Moturi & Ngugi, 2015; Parameswaran et al., 2011; Son et al., 2014). Mani et al. (2010) believe that investment in IS could improve the enterprise's information capacity and Bengtsson and Dabhilkar (2009) further explain that the investment in technological capabilities could improve an enterprise's performance. Similarly, Ramanathan (2009) indicates that investment in information technology could improve business efficiency. Han and Mithas (2013) investigated 300 United States enterprises and confirmed that investment in information and communication technology could improve enterprises' performance.

Enterprises invest in IS to develop a healthy relationship between agents and principals. Pranicevic et al. (2011) demonstrate that information system maturity has a significant positive effect on the agent-principal relationship, probably because a mature information system makes the communication smoother between agents and principals. Kappelman et al. (2019) found that enterprises would allocate a budget for IT training, with Han and Mithas (2013) observing that investment in IT staff could facilitate enterprises to better monitor providers' performance and establish better collaborative relationships with providers.

Meanwhile, investments in information systems yield numerous benefits for cloud providers and enterprises, including heightened efficiency, innovation, and improved collaboration (Benlian et al., 2018) to avoid technological uncertainty. Firstly, such investments save time and effort for both parties by streamlining monitoring tools (Poston & Grabski, 2001). For example, the implementation of a traffic surveillance system reduces the need for extensive human monitoring, favouring outcome-based cloud contracts over behaviour-based ones. To improve resource allocation efficiency, Bukhari et al. (2024) believe that smart contracts can be further developed by investing in IS, such as developing the reptile meta-learning algorithm, to manage the SLA in the contract. Therefore, some issues can be exposed earlier and handled in advance to avoid negative results caused by technological uncertainty. Secondly, IS investments drive innovation by providing a platform for both parties to access external knowledge, skills, and technology (Malhotra et al., 2005) to deal with or avoid technological uncertainty. For example, investing in IS, such as developing an advanced algorithm, could optimise the cost (Qu et al., 2024) and avoid unnecessary overprovision (Liu et al., 2025). This innovation, as a product of knowledge management, is more compatible with outcome-based contracts (Korkeamäki et al., 2022). Lastly, these investments foster collaboration by enhancing information sharing and communication (Sriram & Stump, 2004). Effective communication forms the bedrock of collaboration, leading to superior outcomes in terms of product design, functionality, and quality, rendering outcome-based cloud contracts more appealing (Li et al., 2023). Investing in IS, such as developing an innovative contract model, could also address the negative effects in the agency relationship, such as the two parties not collaboratively drafting the contract or are too cautious when agreeing to the contract (Qin et al., 2024). It will enhance the collaboration between the two parties and also balance the evolution between the contract and the software development (Huber et al., 2025).

Furthermore, the outcomes are more uncertain in enterprises that focus on innovation (Ryman & Roach, 2024). Thus, enterprises with high innovation may favour outcome-based contracts over behaviour-based ones. In this context, the research posits that investments in IS have a positive impact on outcome-based cloud contracts but a negative impact on behaviour-based cloud contracts.

H1a: The investment in IS has a positive impact on outcome-based cloud contracts.

H1b: The investment in IS has a negative impact on behaviour-based cloud contracts.

2.2. Task programmability and cloud contract

In business process outsourcing (BPO), process modularity eases the handling of operational uncertainty by simplifying systems (Verma & Chatterjee, 2023; Viana et al., 2017). Business process modularity measures the extent to which a process is standardised and can be decomposed and rearranged into another process without losing functionality (Wang & Hou, 2011) which could reduce the operation uncertainty. Similarly, in cloud computing, IT detachability gauges the degree to which a business process can be separated from IT infrastructure and operated on another system (Tanriverdi et al., 2007). Highly modular and detachable IT-based business processes require minimal interaction between enterprises and providers, resulting in low coordination costs (Ge et al., 2021) which makes the behaviour monitoring easier.

In the relationship between agents (cloud providers) and principals (enterprises), task programmability mirrors business process modularity in the BPO domain and IT detachability in cloud computing. Following Eisenhardt (1985) and Eisenhardt (1989), the definition of task programmability adopted in this study is that the task can be disassembled and programmed. Although the task may constitute several procedures or stages that can be placed in a different order, the elements of the task are always the same.

Enterprises should increase their process control abilities, which includes improving service management skills (Lu et al., 2022) and risk management ability (Djemame et al., 2013; Lu et al., 2022). Such process control ability could also be enhanced by programming the task, thus providing convenience to update and test the service to ensure that the service matches the agreed contract (Gilbert, 2010).

By programming the tasks, the process can be simpler and more transparent (Battleson et al., 2016; Golightly et al., 2022), and thus easier to set the SLA which could facilitate the enterprise's monitoring of the cloud provider (Gilbert, 2010) and would mitigate the risk of a provider's opportunism and operational uncertainty regarding the technology. The task programmability can also improve the smart contract to make sure all rules are transparent and automatic, and enforceable by both parties in the agency relationship (Hanafizadeh & Alipour, 2024). It makes the behaviours can be coded into the operation process and therefore, it is more aligned with behaviour-based cloud contract.

The sensitivity of the data can be reduced by programming the tasks (Coss & Dhillon, 2019), which would then cause less damage if the cloud contract is written inappropriately or not updated on time, as a poor cloud contract can erode the effectiveness of the outcome (Faye Fangfei, 2013). The task programmability could help a poor cloud contract reduce the risk of an unsatisfactory outcome.

With the rapid development of technology, the majority of outsourcing contracts are subject to renegotiation within two years (James, 2017; Power et al., 2004). The task programmability could also improve the cloud contract dynamics by re-assembling tasks in a short time (Battleson et al., 2016) without frequently re-negotiating the cloud contract. As re-negotiation of the cloud contract gives rise to costs (Huang et al., 2021), task programmability could also reduce these contracting costs.

Task programmability quantifies the extent to which a task can be separated into distinct steps, making it clearer than non-programmable tasks (Eisenhardt, 1989). Enhancing business process modularity improves enterprise payoff sustainability (Wang & Hou, 2011), with payoff relating to behaviour-based contracts (Eisenhardt, 1989).

In addition, another related term to task programmability is process codifiability, which measures the extent to which a process can be reassembled into modules (Ying & Aron, 2015). Higher process codifiability reduces operational uncertainty by simplifying and improving the accuracy of process implementation in BPO (Mani et al., 2012). As higher process codifiability clarifies all behaviours/actions during BPO, all activities can be executed based on written instructions (Ying & Aron, 2015).

Furthermore, from a business process management (BPM) perspective, process control is another method for addressing operational uncertainty (Potzick, 2010). BPM aims to map and document business activities, shifting from functional to process-based management (Zairi, 1997). By connecting activities horizontally (Zairi, 1997) BPM simplifies business processes, making them easier to control. Highly programmable tasks are specific (Cheng & McKinley, 1983; Ouchi & Maguire, 1975; Turcotte, 1974) and conform to standard actions (Brass, 1981; Cheng & McKinley, 1983), facilitating more effective process control. Thus, task programmability positively impacts behaviour-based contracts (Goodale et al., 2011; Stroh et al., 1996; Wai Ming & Tat Wai Yu, 2008).

Consequently, this research posits that task programmability has a positive impact on behaviour-based cloud contracts but a negative impact on outcome-based cloud contracts.

H2a: Task programmability has a negative impact on outcome-based cloud contracts.

H2b: Task programmability has a positive impact on behaviour-based cloud contracts.

2.3. Outcome measurability and cloud contract

In BPO, outcome uncertainty, such as in sports research (Lee & Fort, 2008; Oh et al., 2023) and research and development (R&D) in the supply chain (Yang et al., 2022), is a key aspect of operational uncertainty. Outcome measurability's impact on outcome uncertainty has been studied (Ning & Ling, 2023), making it a relevant factor in cloud contract decision-making. Outcome measurability pertains to the extent to which an outcome can be measured (Eisenhardt, 1989). Drawing on Eisenhardt (1985) and Eisenhardt (1989), the definition of outcome measurability adopted in this paper is that some values or characteristics can be used to measure the progress of the outcome. At each stage, the goals or baselines are clear.

To obtain a perceived outcome in a cloud contract, researchers have sought to develop the tools to make the outcomes measurable. Lewis (2019) developed the system usability scale, the usability metric for user experience (UMUX), and the computer system usability questionnaire (CSUQ) to measure the perceived usability. Shawky and Ali (2012) proposed an equation to measure the elasticity that includes the parameters of a system's response to change and the average bandwidth before and after scaling up or down. Shaikh and Sasikumar (2015) built a trust-based evaluation model to assess cloud security and identified several parameters to evaluate cloud security such as specific attacks, the frequency of attacks, loss of data protection or data leakage and improvements in technology. Meanwhile, the service schedule needs to be confirmed by establishing the start date and end date. Service quality can be measured by delay, jitter, bandwidth, and packet loss (Rodrigues et al., 2012).

Kouatli (2020) believed that outcome measurability enhances process performance, drives standardisation, and improves overall efficiency. As measurable outcomes reflect contributions from both parties, enhancing collaboration by improving transparency (Akkermans et al., 2019) which makes process control ineffective in performance-based contracts.

When outcomes are measurable, it becomes easier to control business processes (Eisenhardt, 1989) in operation, leading to increased efficiency, because outcome measurability is closely linked to process visibility (Li & Mao, 2012; Lovelock, 1983). Increased process visibility facilitates control and efficiency (Goodale et al., 2008). High levels of outcome measurability result in improved process performance (outcomes) (Wang & Liu, 2014). In such cases, outcome-based contracts afford greater flexibility for both agents and principals to pursue innovative opportunities. Thus, outcome measurability has a positive impact on outcome-based contracts.

Akkermans et al. (2019) believe the measured outcome implies that the contribution from both parties improves collaboration. They argue that the outcome measurability enhances the level of transparency, which transfers the driver of cost reduction for outsourcing to quality and collaboration improvement. Transparency makes decision-making easier (Akkermans et al., 2019), so enterprises are clearer about the outcome, which gives such enterprises more confidence and establishes trust in the relationship. This would enable enterprises to anticipate that operational performance (outcome) will improve (Akkermans et al., 2019). Alqahtani et al. (2023) also tested that a measurable performance is very important in determining the outcomes. Therefore, the outcome measurability is positively associated with an outcome-based contract.

In line with the above, Eisenhardt (1989) posited that the difficulty of measuring outcomes should be considered. In situations where outcomes are challenging to measure, outcome-based contracts are less efficient. Conversely, when outcomes are easily measured, outcome-based contracts become more attractive. Therefore, it is predicted that outcome measurability has a positive impact on outcome-based cloud contracts but a negative impact on behaviour-based cloud contracts.

H3a: Outcome measurability has a negative impact on behaviour-based cloud contracts.

H3b: Outcome measurability has a positive impact on outcome-based cloud contracts.

2.4. The length of the agency relationship and cloud contract

Behavioural uncertainty such as the planning fallacy (L. Wang et al., 2020) or opportunistic behaviour (Handley & Benton, 2012) is inherent in cloud computing adoption. Reducing behavioural uncertainty involves cultivating a healthy relationship between cloud providers and enterprises, allowing both parties to understand each other better (Eisenhardt, 1989). In line with Eisenhardt (1985, 1989) (Eisenhardt, 1985); Eisenhardt (1989), the definition of the length of an agency relationship adopted here is the time that the cloud customers outsource their business processes to the cloud.

In cloud computing, enterprises are more dependent on providers than in traditional outsourcing (Comuzzi et al., 2013). Dependence on providers increases the risk of opportunistic behaviour from the providers' side (Handley & Benton, 2012). Elements such as business understanding, commitment, communication, and top management support positively impact relationship quality (Ee et al., 2013). If the opportunism is well-managed, it can achieve more satisfactory outcomes, such as improved efficiency, cost savings and better performance (Ngah et al., 2024). Mukherjee et al. (2023) believe that the length of the agency relationship—contract length—impacts on outcomes such as the customer's satisfaction.

Due to individuals being easily influenced by others (Kelman, 1961), maintaining a good relationship between the two parties, especially between top management, is essential to obtain support from both sides to thus achieve the best results. Balanced support could address the unbalanced bargaining power in cloud contracts (European Commission, 2016). In addition, sustaining a good relationship between enterprises and cloud providers could have other outcomes, such as reducing maintenance costs and the complexity of the business (Cao et al., 2017), which would avoid technology lock-in in a cloud contract (Lundqvist, 2019). Less complex business processes will make it easier for enterprises to understand the technology and provide a greater possibility to switch to another provider (Lundqvist, 2019).

Furthermore, Scur and Kolososki (2019) proposed that collaborative and long-term relationships are beneficial to business processes. It was confirmed by Sanchis-Pedregosa et al. (2018), who state that the relationship between enterprises and providers is important in the outcome of outsourcing. As the relationship-specific investment could affect the opportunistic behaviour of providers (Ee et al., 2013), avoiding one side being favoured over the other in a cloud contract (European Commission, 2016).

The SLA of a cloud contract could include a communication plan, a feedback plan and the data code of conduct (Comuzzi et al., 2013), thereby creating mutual communication channels for both parties and helping to establish a good relationship. A healthy agency relationship and a smooth communication channel could address the issue of information asymmetry (European Commission, 2016) and thus avoid behaviour uncertainty.

Business understanding necessitates longer relationships, which benefits business outcomes (Morgan & Hunt, 1994). As relationships mature, enterprises gain confidence in providers' behaviour and prioritise outcomes. Hence, longer relationships have a positive impact on outcome-based cloud contracts.

In addition, in BPM, human resources play a critical role (Amaral et al., 2011; Weske et al., 2004). In outsourcing, one of the objectives of human resource management is to maintain agent-principal relationships. Longer relationships enable agents and principals to better understand each other (Eisenhardt, 1989). This suggests that principals may not need to closely monitor agents they have known for a long time, so they may prioritise outcomes instead.

Furthermore, longer relationships involve greater relationship-specific investment, which is associated with innovation (Wagner & Bode, 2014). Innovation enhances performance (outcome) (Oly Ndubisi & Iftikhar, 2012), making outcome-based contracts more attractive. Consequently, in the context of cloud computing adoption, the length of the agency relationship has a positive impact on outcome-based cloud contracts but a negative impact on behaviour-based cloud contracts.

H4a: The length of the agency relationship has a negative impact on behaviour-based cloud contracts.

H4b: The length of the agency relationship has a positive impact on outcome-based cloud contracts.

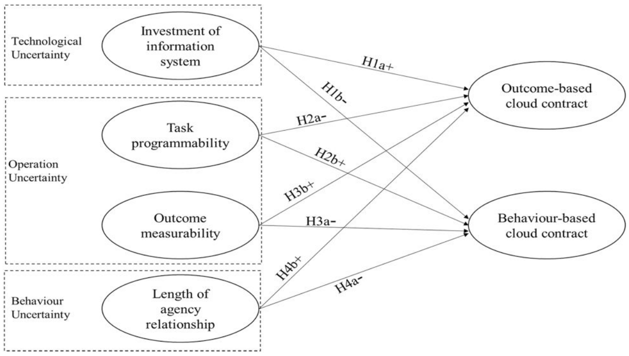

Figure 1. The research model.

The research model is depicted in Figure 1. There are six constructs in the research model. The definition of each construct is as follows:

Investment in an IS: The expenditure of resources on an IS. The resource includes time, effort, money, human resources, etc. (Kivijärvi & Saarinen, 1995; Renkema & Berghout, 1997).

Task programmability: Through a clear definition, the task can be disassembled and programmed. The task may constitute several procedures or stages that can be put in a different order. However, the elements of the task are always the same (Eisenhardt, 1985, 1989).

Outcome measurability: There are values or characteristics that can be used to measure the progress of the outcome. At each stage, the goals or baselines are clear (Eisenhardt, 1985, 1989).

The length of agency relationship: The period that the cloud customers outsource their business processes to the cloud. Here years are the unit to measure the length of the relationship (Eisenhardt, 1985, 1989; Kiratikosolrak et al., 2025).

Outcome-based cloud contract: The cloud contract is based on the specific goal or specification which needs to be met if the provider wants to be paid. It does not matter how the outcome is met (Eisenhardt, 1985, 1989).

Behaviour-based cloud contract: With a behaviour-based cloud contract, the employer only cares about whether the employee works, but does not care how they do it (Eisenhardt, 1989).

3. Methodology and results

This study employed a survey research methodology to gather quantitative data from a representative sample of the population (Edith et al., 2008). A structured questionnaire was utilised to collect data, and participants were asked to respond using a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). This scale allows for a numerical measurement of the variables under

Table 1. Validity of the measurement model.

Measurement variables	Error	Latent variable	Factor loading	Error variance	AVE	CR	Square root of AVE
Investment_IS_Q22	e23	Investment System	0.765	0.372	0.579	0.811	0.761
Investment_IS_Q21	e8		0.751	0.472			
Investment_IS_Q20	e9		0.766	0.372			
Task_Programmability_Q26	e11	Task Programmability	0.741	0.420	0.584	0.760	0.764
Task_Programmability_Q25	e12		0.787	0.319			
Outcome_Measurability_Q35	e15	Outcome Measurability	0.800	0.427	0.528	0.892	0.727
Outcome_Measurability_Q34	e16		0.803	0.384			
Outcome_Measurability_Q33	e17		0.731	0.393			
Outcome_Measurability_Q32	e18		0.738	0.495			
Outcome_Measurability_Q31	e19		0.758	0.384			
Outcome_Measurability_Q30	e20		0.708	0.450			
Outcome_Measurability_Q29	e21		0.725	0.495			
Outcome_Measurability_Q28	e22		0.509	0.993			
Behaviourr_CC_Q14	e6	Behaviour-based CC	0.778	0.242	0.649	0.896	0.806
Behaviour_CC_Q15	e5		0.789	0.233			
Behaviour_CC_Q16	e4		0.848	0.202			
Outcome_CC_Q17	e3	Outcome-based CC	0.812	0.244	0.641	0.886	0.801
Outcome_CC_Q18	e2		0.846	0.203			
Outcome_CC_Q19	e1		0.741	0.293			
Length_Relationship_Q36	e7	Length of Agency relationship	1.000	0.000	1.000	1.000	1.000

investigation. The items of the scale have been previously developed and validated (see Appendix Table A1). The self-administered questionnaire utilises previously developed and validated scales, ensuring the reliability of the data.

Since this study concentrates on individuals knowledgeable about cloud contracts, three screening questions were devised. The first question assessed the respondent's work experience, with a minimum requirement of eight years of experience set for eligibility. Typically, individuals with eight years of experience have acquired management and front-line working skills, making them more inclined to share insights on work-related topics (kiranpatils, 2015). The second screening question determined whether the respondent's organisation outsources business processes to cloud computing or provides cloud computing services, ensuring respondents were familiar with cloud computing. The third screening question asked whether the respondent had participated in cloud contract-related work over the previous three years, which includes but is not limited to drafting cloud contracts, negotiating cloud contracts, managing cloud providers, or providing technological support for cloud contracts. Respondents needed to answer "Yes" to all three questions to continue with the survey.

This study selects China as the data collection source for several reasons. Firstly, according to Ali (2021), the global BPO-to-cloud market is expected to grow at a Compound Annual Growth Rate (CAGR) of 18.8% between 2020 and 2026. The BPO-to-cloud market in China is predicted to grow at a similar rate (18.6%) during the same period, which may result in a comparable rate of cloud contracts being signed. Secondly, China's cloud computing market growth is the fastest in the world, expected to increase from 6.5% in 2020 to 10.5% in 2024 (Interesse, 2022). This rapid growth means an increasing number of cloud contracts have been signed in China, providing a larger pool of updated cloud contract practitioners (target respondents). Thirdly, as the world's second-largest economy (Ali, 2021), China presents a significant potential market for cloud computing, attracting substantial investment in outsourcing (Murray, 2021). Any cloud computing investment begins with signing a cloud contract, making China an ideal location for observing emerging issues relevant to other countries adopting cloud computing at a slower pace. Lastly, China's legal environment is relatively stable. The Ministry of Industry and Information Technology (MIIT) issued a Notice on the Regulation of Cloud Service Market's Business Conduct in 2016, updated in 2019, clearly outlining regulations in the cloud computing market—an essential consideration for cloud contracts. Thus, the BPO-to-cloud market in China is representative from a cloud contract research perspective.

To ensure high-quality responses and a large sample size (Schoenherr et al., 2015), this study uses a survey research firm for data collection. Survey research firms maintain research panels with targeted respondents for specific characteristics (Bearden & Haws, 2012) are widely used in social research due to their efficiency and ease of collecting large sample sizes (Schoenherr et al., 2015). This research chose Wenjuanxing, a professional survey research firm established in 2006, specialising in questionnaire surveys, examinations, and voting. By early 2020, Wenjuanxing had accumulated over 4 billion respondents, serving 30,000 industries and 90% of Chinese universities, including Huawei, Tsinghua University, and Peking University. Numerous studies have analysed data collected by

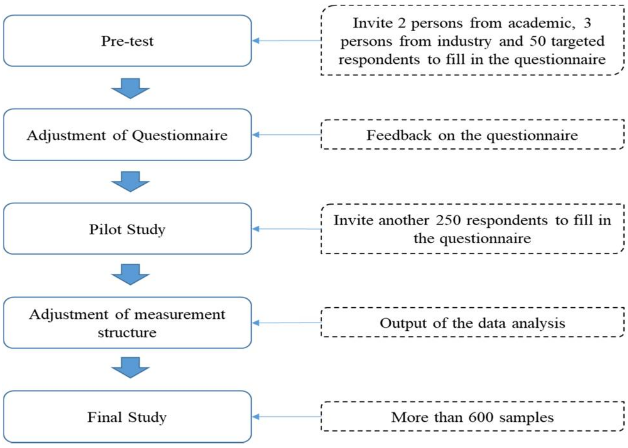

Figure 2. The process of pre-test and pilot study.

this firm (Choi et al., 2020; Guo et al., 2021; Wang et al., 2021; Wei et al., 2021; Yang et al., 2019).

Regarding the sample size, the study follows established principles. The minimum sample size required is 230, considering the 23 parameters in the study (Hair, 2019). Additionally, the estimation procedure for Structural Equation Modelling (SEM) analysis is Maximum Likelihood Estimation (MLE), necessitating a minimum sample size of 50 for stable results (Hair, 2019). Furthermore, with six constructs and the potential for missing data, a sample size of 150 is suggested by Hair (2019). However, to ensure accuracy and account for deviations from multivariate normality, the survey research firm collected 685 complete questionnaires. After deleting the outliers, 622 responses were left for further analysis.

The study follows three steps to conduct the analysis: the pre-test, pilot study, and full study. The purpose of the pre-test and pilot study is to ensure that the questionnaire is understandable and that the research design is viable (Forza, 2002). There are key differences between the pre-test and pilot study. Firstly, the sample sizes differ. The pre-test involves a small sample, typically fewer than 30 participants (Perneger et al., 2015), while the pilot study has a larger sample size than the pre-test but smaller than the full study. Secondly, their objectives differ. The pre-test aims to assess the questionnaire's clarity in terms of language, wording, and potential ambiguities (Malik, 2017). Thirdly, the processes are distinct. In the pre-test, the researcher focuses on obtaining feedback regarding respondents' opinions on the questionnaire and their answering experience. In contrast, the pilot study mirrors the final study's process but with a smaller sample size, concentrating on the implementation, analysis, and output of the study. The complete process for the pre-test and pilot study in this research is illustrated in Figure 2.

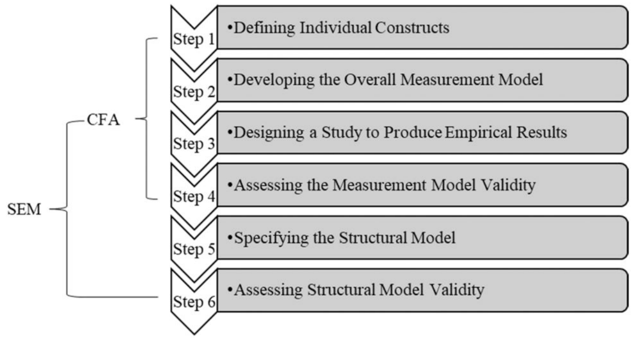

Figure 3. Data analysis process.

Table 2. Correlations between constructs.

Construct		Construct	R
Outcome-based-CC	<->	Behaviour-base-CC	0.694
Outcome-based-CC	<->	Investment-System	0.713
Outcome-based-CC	<->	Task-Programmability	0.688
Outcome-based-CC	<->	Outcome-Measurability	0.659
Behaviour-based-CC	<->	Investment-System	0.575
Behaviour-based-CC	<->	Task-Programmability	0.679
Behaviour-based-CC	<->	Outcome-Measurability	0.549
Behaviour-based-CC	<->	Length-Relationship	−0.099
Investment-System	<->	Task-Programmability	0.673
Investment-System	<->	Outcome-Measurability	0.719
Task-Programmability	<->	Outcome-Measurability	0.758
Outcome-based-CC	<->	Length-Relationship	−0.13

The study employs SEM and Confirmatory Factor Analysis (CFA) for a comprehensive multivariate data analysis, following the six steps outlined by Hair (2019). These steps include defining individual constructs, developing the overall measurement model, designing the study for empirical results, assessing measurement model validity, specifying the structural model, and assessing structural model validity. The use of CFA in the initial stages ensures the robustness of the measurement model. The entire data analysis process is visualised in Figure 3.

Ensuring validity is a critical concern within the realm of measurement models (Hair, 2019). In this study, a thorough examination of discriminant validity was conducted, which underscores the distinctiveness of measurement items when assessing the same construct (Hair, 2019). Assessing discriminant validity involves comparing the square root of Average Variance Extracted (AVE) with the correlation between two constructs. The benchmark for satisfactory discriminant validity is that the square root of AVE should surpass the correlation between the two constructs (Fornell & Larcker, 1981; Hair, 2019).

In Tables 1 and 2, the square root of AVE values for investment in information systems, task programmability, outcome measurability, length of agent relationship, behaviour-based cloud contracts, and outcome-based cloud contracts are 0.761, 0.764, 0.727, 1.000, 0.806, and 0.801, respectively. Importantly, all these construct values exceed the corresponding correlation values between the constructs. Consequently, the measurement model aligns with the stipulated criteria for discriminant validity.

To assess the measurement model, this study utilised a range of Goodness-of-Fit (GOF) statistics, including the Chi-square (χ^2) statistic, Degrees of Freedom (df), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI),

Parsimony Normed Fit Index (PNFI). Data analysis was conducted using Amos 27 software.

Table 3. The CFA goodness-of-fit (GOF) indices of the measurement model.

Basic GOF	Acceptable range	Results from AMOS
χ^2	Meaningless due to the large sample size	585.592
df		216
Absolute Fit Measures		
RMSEA	<0.08 (Awang, 2012; Shadfar & Malekmohammadi, 2013)	0.052
Incremental Fit Index		
CFI	≥ 0.9 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	0.944
Parsimony Fit Index		
PNFI	>0.5 (Shadfar & Malekmohammadi, 2013)	0.781

The findings of the CFA stage, presented in Table 3, reveal that the measurement model exhibits a strong fit. After confirming its validity and implementing the necessary adjustments, the finalised measurement model is depicted in Figure 4.

During the SEM stage, a similar set of fit indices was employed to assess the model's adequacy. The outcomes of these Goodness-of-Fit assessments are detailed in Table 4. While there are slight variations in the values of fit measures between the SEM and CFA models, the SEM model still demonstrates a commendable fit.

An essential aspect of evaluating model validity and hypothesis testing, as emphasised by Hair (2019), involves scrutinising individual parameter estimates. Table 5 furnishes information on unstandardised and standardised parameter estimates, standard error, critical ratio, and P values, with instances marked as *** if the P value is less than 0.01. Apart from the relationships between behaviour-based cloud contracts and outcome measurability, as well as outcome-based cloud contracts and outcome measurability, all other relationships display P values less than 0.05, signifying their statistical significance. Consequently, the sample data lend support to all relationships except for H3a + and H3b-, indicating that six out of eight hypotheses are upheld, as succinctly portrayed in

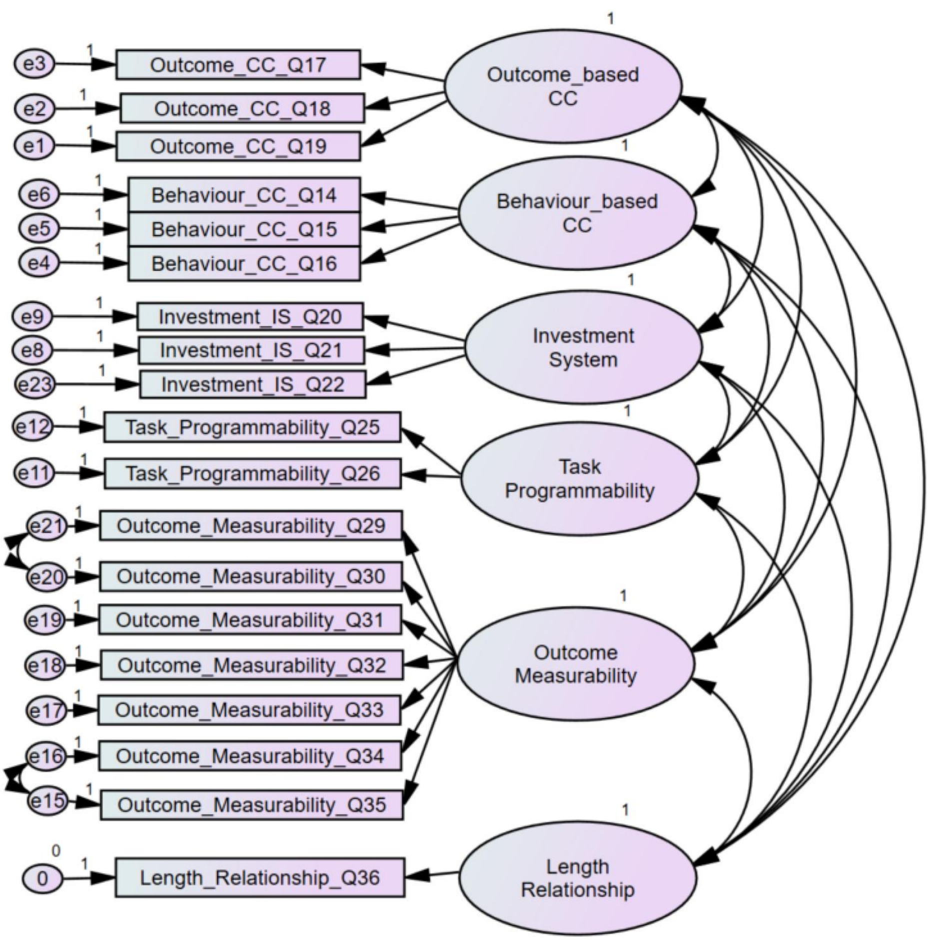

Figure 4. The measurement model after the modification.

Table 5. This underscores the validity of the SEM model.

Figure 5 encapsulates a comprehensive presentation of the data analysis results, while Table 6 provides a condensed summary of the findings.

Table 4. Comparison of good-of-fit measures between CFA model and SEM model.

Basic GOF	Acceptable range	CFA model (after modification)	SEM model
χ^2	Meaningless due to	264.382	295.322
df	large sample size	136	137
Normed Chi-square	<5 (Schumacker, 2010)	1.944	2.156
Absolute Fit Index			
RMSEA	<0.08 (Awang, 2012; Shadfar & Malekmohammadi, 2013),	0.039	0.043
Incremental Fit Index			
CFI	≥0.9 (Al-Mamary & Shamsuddin, 2015; Awang, 2012)	0.979	0.974
Parsimony Fit Index			
PNFI	>0.5 (Shadfar & Malekmohammadi, 2013)	0.762	0.764

4. Discussion

4.1. Technological uncertainty

The results of our data analysis confirm the validity of both H1a and H1b. Notably, these findings diverge from the predictions of traditional agency theory, as outlined by Eisenhardt (1989). This deviation is likely attributed to cloud contracts' unique characteristics compared to traditional outsourcing agreements.

Firstly, in cloud contracts, responsibilities are shifted from providers to enterprises, particularly with self-service evaluations (Schneider & Sunyaev, 2016). This shift necessitates increased investment in information systems by enterprises, reducing the uncertainty from the cloud provider's side and making behaviour-based monitoring less relevant. Secondly, the role of the IT department transitions from a planner in traditional outsourcing contracts to a service integrator in cloud contracts (Schneider & Sunyaev, 2016). Therefore, the behaviour (the process) is more uncertain. This shift towards outcome-focused objectives prompts more substantial investments in information systems. Additionally, the ownership of infrastructure investments, apart

Table 5. Structural parameter estimates for SEM model.

Research hypothesise	Construct		Construct	Unstandardised parameter estimate	Standard error	Critical ratio	P	Standardised parameter estimate
H1b-	Behaviour-based CC	<	Investment System	0.222	0.073	3.033	0.002	0.223
H1a+	Outcome-based CC	<	Investment System	0.376	0.065	5.759	***	0.379
H2b+	Behaviour-based CC	<	Task Programmability	0.748	0.112	6.656	***	0.721
H2a-	Outcome-based CC	<	Task Programmability	0.495	0.087	5.678	***	0.48
H3a-	Behaviour-based CC	<	Outcome Measurability	−0.172	0.093	−1.851	0.064	−0.173
H3b+	Outcome-based CC	<	Outcome Measurability	0.02	0.077	0.255	0.799	0.02
H4a-	Behaviour-based CC	<	Length Relationship	−0.025	0.009	−2.705	0.007	−0.099
H4b+	Outcome-based CC	<	Length Relationship	−0.032	0.008	−3.854	***	−0.124

Shaded cells indicate non-significant results (p>0.05).

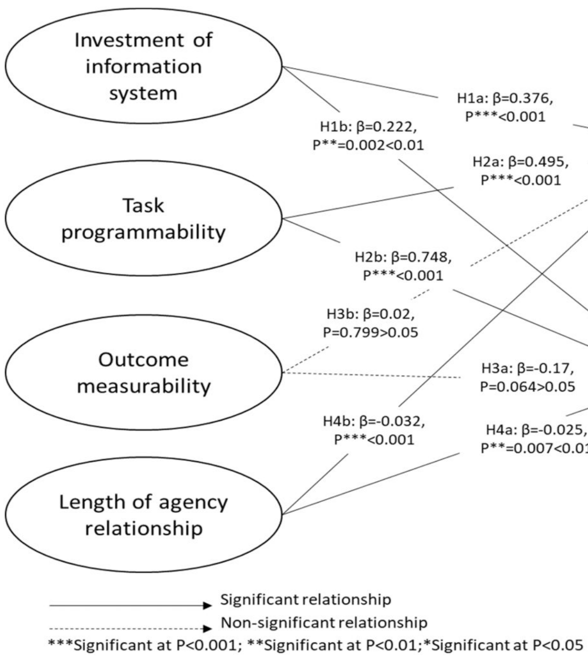

Figure 5. Results of the data analysis.

Table 6. Summary of findings.

Hypothesis	Supported?
H1a: The investment in information system has a positive impact on outcome-based cloud contract.	Yes
H1b: The investment in information system has a negative impact on behaviour-based cloud contract.	Yes
H2a: The task programmability has a negative impact on outcome-based cloud contract.	Yes
H2b: The task programmability has a positive impact on behaviour-based cloud contract.	Yes
H3a: The outcome measurability has a negative impact on behaviour-based cloud contract.	No
H3b: The outcome measurability has a positive impact on outcome-based cloud contract.	No
H4a: The length of agency relationship has a negative impact on behaviour-based cloud contract.	Yes
H4b: The length of agency relationship has a positive impact on outcome-based cloud contract.	Yes

Table 7. Practical advice for enterprises on investment in IS.

Activity	Dos	Do nots
Define clear outcome goals	Comprehensive outcome goals, such as revenue growth, cost savings, customer satisfaction, or time-to-market for new products and services.	Focusing solely on uptime and availability or behaviour-related outcomes, such as how the outcomes should be met.
Invest in data-analytic platforms	Consider the data security outcome in the contract.	Overlook data governance in the contract.
Encourage innovation	Put specific innovation incentives in the contract.	Ignore change management and encourage innovation in contracts without any specific outcome.
Plan for Contingencies	Put solutions in the contract for possible contingencies, such as service disruptions, data breaches, or vendor lock-in, etc.	Vague or no solution for contingencies.
Invest in advanced technology	Invest in technologies that can support the outcome	Invest in the technologies that have lost sight of the business objectives.

from IaaS, typically resides with cloud providers, reducing the enterprise's need for behaviour monitoring. Finally, amplified investments in information systems can give rise to legal uncertainties about technology in cloud computing due to immature market regulations, making the formulation of behaviour-based cloud contracts challenging.

Based on the results, several practical recommendations can be offered to enterprises investing in IS (see Table 7). It is suggested when adopting outcome-based cloud contracts, organisations should carefully consider the following activities. First, define clear and measurable goals—such as revenue growth, cost savings, or customer satisfaction—while avoiding vague measures like resource availability. It emphasised the outcomes while investing the IS, which will make the outcome-based cloud contract more favourable (Shanmugam & Dhingra, 2023). Second, address data security outcomes and data governance requirements explicitly when investing in data analytics platforms. IS would be especially effective in decreasing the likelihood of data breaches during data sharing (Zhang et al., 2024) or in distinguishing between legitimate and illegitimate content (Doshi & Schmidt, 2024). Third, specify innovation incentives and clearly articulate the expected innovation outcomes in the contract. It is better for knowledge transfer between the two parties, and it can encourage collaboration to facilitate the generation of the innovation (Samant & Kim, 2023). Fourth, establish a contingency plan (outcome) to manage potential disruptions. For example, putting the description of disruptions and recovery outcomes into the estimating time contingency which could improve the resilience ability to the disruptions (Zarghami, 2024). Finally, invest in advanced technologies such as smart contracts, blockchain (Cui et al., 2024), and sophisticated models or algorithms (Greiner et al., 2026) to enhance outcome visibility and ensure alignment with business objectives. Enterprises could obtain benefits through the outcome-based cloud contract if they want to invest in IS.

4.2. Operation uncertainty

Our data robustly support both H2a and H2b. Cloud contracts significantly differ from their traditional outsourcing counterparts. Many cloud contracts are less customised (Dhar, 2012), with predetermined aspects, resulting in higher task programmability, which makes the operation less uncertain. This characteristic simplifies task monitoring, as outlined in our literature review, confirming that task programmability favours behaviour-based cloud contracts and hampers outcome-based ones. Nevertheless, a minority of outcome-based cloud contracts persists due to transparency issues concerning account management, data storage location, and subcontractors' involvement (Bushey et al., 2015). Task programmability, reducing the operation uncertainty, remains a pivotal factor in contract selection.

Based on our findings, several practical recommendations can be made regarding task programmability when adopting a behaviour-based cloud contract (see Table 8). First, the need to ensure that the expected behaviours are explicitly programmable—such as responsiveness, communication protocols, adherence to security standards, and collaboration practices—rather than relying on vague or generic descriptions. Clearly defined behaviour helps reduce the likelihood

Table 8. Practical advice for enterprises on task programmability.

Activity	Dos	Do nots
Clearly Define Behavioural Expectations	Make the behavioural expectations programmable, such as responsiveness, communication protocols, adherence to security protocols, and collaboration standards	Generally, give a description of the behavioural expectation (such as cloud providers should respond in time)
Establish KPI for Behaviour	The KPI demonstrates programmable attributes, such as the response time to inquiries and the frequency of communication updates	No KPI for behavioural monitoring
Develop a Clear Process Map for Behaviour	Break down the process into several steps and develop a clear process map for implementation	No specific written instructions for behavioural processes, or the process is not doable
Provide Training or Support	Regularly provide training or support for the behavioural process. Each step or process should have an expert on one specific part	No expert in one single process

of uncooperative, opportunistic, or inappropriate conduct (Xiong et al., 2025). Second, break down the expected behaviours by defining clear KPIs for each element. The behaviour will be programmed through the establishment of clear KPI elements, which will contribute to enhancing operational effectiveness. (Alqahtani et al., 2023; Holmbom et al., 2014). Third, make effective use of process mapping to ensure that behavioural processes can be documented and executed on a step-by-step basis. For example, BPM and Notation can be used for behavioural process modelling, allowing for more effective control (Strutzenberger et al., 2024). Finally, provide regular training for staff on each element and ensure that at least one expert is available for each area to offer support. Expert could provide substantial guidance on the behaviour, which could reduce some risks (Lowry et al., 2026). Enterprises will avoid dissatisfaction with the cloud provider's performance if they can program the task when adopting a behaviour-based cloud contract.

Our data does not corroborate either H3a or H3b. One potential explanation is the intricacy of measuring outcomes in cloud computing. Certain job roles, such as attorneys, accountants, and planners, rely heavily on intangible information (Lovelock, 1983), making outcome measurement challenging. While cloud computing outcomes can sometimes be quantifiable, involving simulations or algorithmic issues (Taylor et al., 2018; Tiganoaia et al., 2019), they are more tangible. When enterprises possess knowledge of measurable outcomes, they are better equipped to monitor processes as the level of operational uncertainty decreases, favouring behaviour-based contracts. For example, because outcomes are easily measurable, many cloud providers offer greater transparency, enabling enterprise clients to monitor performance directly (Siddiqui, 2024). This transparency can make behaviour-based contracts more appealing, which may relate to compliance in different areas or cultural differences.

In addition, some enterprises enhance outcome measurability by adopting blockchain-based smart contracts (Aguilera et al., 2021; Dorsala et al., 2020; Xu et al., 2020), allowing for automatic measurements and penalty enforcement (Kuo et al., 2017). To reduce operation uncertainty, both enterprises and cloud providers must collaborate to ensure that blockchain-based smart contracts meet their needs, thereby reinforcing the appeal of behaviour-based contracts due to the increased interaction during the process.

Moreover, when outcomes are highly measurable, enterprises tend to focus on process uncertainty to achieve the desired results. For instance, in cloud computing, a measurable outcome could be a service disruption of no more than three seconds. While this threshold is quantifiable, the reasons for disruptions can range from poor system performance to data centre outages or operational errors. In such scenarios, enterprises prioritise processes, such as disaster recovery, incident response, and business continuity plans, to ensure disruptions remain within acceptable levels (Dwares, 2021), making outcome-based contracts less ideal. In similar scenarios, if the outcome is highly measurable, the provider (agent) tends to hit the KPI while neglecting broader goals (Taylor, 2021). To avoid the disruption being over three seconds, other resources may be borrowed, which is against the compliance requirements. Therefore, a behaviour-based contract should be adopted by enterprises to follow the compliance requirements.

From the cloud provider's perspective, when outcomes are highly measurable, the majority of the risk rests with the provider (agent). However, as uncertainty can stem from a broad array of factors (Xu & Liu, 2024), providers may seek to share this risk with enterprises by promoting behaviour-based cloud contracts.

Finally, when outcomes are highly measurable, the relationship between enterprises and providers may become formal and transactional (Shahzad et al., 2014). In contrast, behaviour-based contracts can offer greater flexibility and informality (Chuang et al., 2020), creating space to build trust and foster long-term relationships.

Table 9. Practical advice for enterprises on length of agency relationships.

Activity	Dos	Do nots
Maintain Open Communication	Set up the outcome expectation for each discussion	Have ineffective conversations between two parties without any output or target
Collaborate on Problem-Solving	Develop clear responsibilities and milestones for the problem-addressing process	Depend on one party to solve all the problems
Encourage Innovation	Specify a clear outcome improvement for each innovation action, such as revenue group and cost savings.	No outcome or plan for any innovation suggestions
Renegotiate Contract	Keep renegotiating the contract every two or three years and adjust it if needed.	One contract forever

4.3. Behaviour uncertainty

Our data upholds both H4a and H4b. As discussed in the literature review, long-term agency relationships cultivate better mutual understanding (Eisenhardt, 1989) which could reduce behaviour uncertainty (Kaushal & Kwantes, 2006). With growing confidence in the provider's behaviour, the necessity for behaviour-based contracts diminishes. Additionally, longer relationships also facilitate effective behaviour monitoring (Eisenhardt, 1989). However, this monitoring can occasionally trigger defensive reactions from providers, perceiving it as intrusive and indicative of distrust (Gans et al., 2001; Ju & Gao, 2017). In such cases, outcome-based contracts are deemed more trustworthy.

Furthermore, during long relationships, both enterprise and provider managers become familiar with one another, and the behaviour uncertainty decreases (Berger & Calabrese, 1975), reducing the need for behaviour monitoring. A focus on outcomes can also enhance the social relationship between the two parties, as it provides clear goals for the provider (Ju & Gao, 2017).

Long agency relationships can lead to relationship-specific investments and foster innovation (Ju & Gao, 2017), but they may also give rise to complacency and undermine motivation (Vafeas & Hughes, 2016). Updating outcome assessment criteria is vital to maintaining a focus on outcomes.

In the realm of cloud computing, long agency relationships remain feasible, although cloud contracts may be shorter than traditional outsourcing agreements (Dhar, 2012). Providers may initially offer short or medium-term contracts, automatically renewable if both parties are content (Uncitral, 2019). Nevertheless, long agency relationships do not guarantee effective behaviour monitoring, making outcome-based cloud contracts the preferred choice.

Table 9 provides practical advice for enterprises on how to maintain a healthy agency relationship in cloud contracts. First, maintain open communication between the two parties by clearly setting outcome expectations in the contract. The expectations may include the agreed outcome for plans, activities and targets, which could promote flexibility (Li et al., 2023). Second, when problems arise, ensure that both parties share responsibilities and work collaboratively to resolve them. Responsibilities should be allocated with consideration of internal capabilities to ensure a fair and viable collaboration (Oshri et al., 2025). Third, establish positive innovation targets that benefit both sides. Then the two parties could work collaboratively and adjust their own activities to align with the targets (Im & Ahuja, 2023). Finally, allow for contract renegotiation every one to two years to ensure alignment with a dynamic business environment. As discussed in the findings section, a healthy and long agency relationship will promote the positive effectiveness of the outcome. The renegotiation process can strengthen what has worked well in the past, integrate feedback, and align the original contract with changing objectives (Huber et al., 2025).

In conclusion, our study affirms that investments in information systems and the length of agency relationships positively influence outcome-based cloud contracts while negatively affecting behaviour-based cloud contracts. Task programmability has the converse effect on cloud contracts. These findings provide valuable insights for researchers in investigating cloud contracts and offer guidance for evaluating them in terms of process control (behaviour-based) or outcome control (outcome-based). These insights promote the decision-making in cloud contracts under technological uncertainty, operational uncertainty and behaviour uncertainty.

5. Conclusions

This paper is guided by the Cynefin framework (Snowden & Boone, 2007) and applies agency theory (Eisenhardt, 1989) to address the complicated decision-making context in cloud contracts, contributing to the growing body of literature on uncertainty management and decision-making frameworks in business process outsourcing. By examining uncertainty emanating from technological, operational and behavioural factors, we extend prior work on the role of uncertainty (Ji & Dimitratos, 2013; Sniazhko, 2019) in contract design. This paper applies the Cynefin framework by seeking solutions from a complicated scenario to sensing potential sources of uncertainty through a literature review, analysing cause-and-effect relationships using a quantitative study, and offering decision-making guidance in the discussion (Snowden & Boone, 2007). It also draws on agency theory to examine uncertainty in the relationship between principals (enterprises) and agents (cloud providers) by testing the effectiveness of four factors from agency theory in the selection of cloud contract. Furthermore, it provides empirical evidence on how investment in information systems, task programmability, outcome measurability, and the duration of agency relationships interact within agency theory to shape cloud contract choices.

The results highlight insights into cloud contract decision-making. From a technological perspective, investment in IS positively impacts the selection of outcome-based cloud contracts while negatively affecting behaviour-based contracts. Similarly, from a behavioural standpoint, the length of agency relationships fosters outcome-based contracts. Therefore, if enterprises wish to invest in an IS or maintain a longer and healthier agency relationship with cloud providers, outcome-based cloud contracts are the better choice for them. Tables 7 and 9 offer practical guidance for enterprises when considering investment in an IS or maintaining a sustainable agency relationship with cloud providers.

Conversely, task programmability exerts an opposite effect by favouring behaviour-based contracts. Table 8 provides practical advice for enterprises if they wish to programme tasks by setting up clear KPI for the behaviour, writing up clear step-by-step instructions for the behaviour or providing training on each element of the behaviour in the cloud contract.

Interestingly, outcome measurability does not significantly influence contract choices, challenging existing assumptions in the literature (Khorshidi & Aickelin, 2021; Koh, 2004). These findings provide both theoretical and practical implications, enriching our understanding of the factors that drive contract design in uncertain environments. The potential explanation has been provided in the discussion section. It can also provide potential future research direction in cloud contract.

This study revisits agency theory and examines the impact of four elements on cloud contracts. The findings reveal that, unlike the assumptions of traditional agency theory (Eisenhardt, 1989), three elements—investment in IS, outcome measurability, and the length of the relationship—exert different effects on cloud contracts. The study offers possible explanations for these results. As cloud contracts differ from traditional outsourcing contracts and possess distinctive characteristics (Dhar, 2012), certain aspects of traditional agency theory may not fully align with the observed outcomes. This research contributes to the advancement of agency theory by highlighting exceptional cases that extend its applicability. We combine the Cynefin framework with agency theory into a unified approach, providing an example of how multiple theoretical perspectives can be combined to address decision-making under uncertainty.

While this study focuses on technological, operational, and behavioural uncertainties, future research could explore additional dimensions such as environmental and demand uncertainties (Ji & Dimitratos, 2013). Moreover, although the Cynefin framework was used to address complicated decision-making contexts, its application to other contexts, such as simple scenarios, could yield valuable insights. For instance, applying the Cynefin framework to complaint management could enhance cloud contract practices by categorising and resolving complaints based on historical patterns (Ishar & Roslin, 2016; Snowden & Boone, 2007).

As this study collects data solely from China, it is important to acknowledge the contextual limitation. Although the data are representative of this setting, comparing the findings with those from other regions could provide valuable insights from different perspectives. For instance, comparisons with other developing countries could reveal whether similar economic contexts yield different outcomes (Ofori et al., 2025); whereas comparisons with other Asian countries could help assess the influence of geographic proximity (Haddad et al., 2024), and with Western countries could shed light on the role of cultural differences (Zhang et al., 2025). Such cross-regional analyses would contribute to extending the applicability and explanatory power of both the Cynefin framework and agency theory.

Finally, the development of simulations (Dyson & Shale, 2010; Koh, 2004) and algorithms (Khorshidi & Aickelin, 2021) to model uncertainty in cloud contracts represents another promising avenue for research. These developments could be incorporated into the approach that we adopted to provide to shed further light on the dynamic nature of the relationship between enterprises and cloud providers.

Disclosure statement

This paper used ChatGPT (GPT-5, OpenAI, 2025) solely for language improvement purposes.

This research involves human participants and receives ethical approval from the Ethics Committee of Newcastle Business School (NBS), reference number 12700.

Author contributions

CRediT: **Qin Lu**: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Validation, Visualization, Writing – original draft, Writing – review & editing; **Nadja Damij**: Funding acquisition, Supervision, Writing – review & editing; **Jason Whalley**: Supervision, Writing – review & editing.

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Appendix Table A1. Measurement construction of the questionnaire

Constructs	Original description	Source	Adjusted description
Behaviour-based Cloud Contract	The contracts contain specific technological provisions that the supplier must abide by when manufacturing our product.	(Bai et al., 2016)	The contracts contain specific technological provisions that the cloud supplier must abide by when providing the cloud service.
	The contracts contain specific provisions that give us the right to audit the supplier's manufacturing procedure.		The contracts contain specific provisions that give us the right to audit the cloud supplier's service procedure.
	The contracts contain specific provisions that give us the right to inspect the supplier's facilities.		The contracts contain specific provisions that give us the right to inspect the cloud supplier's facilities.
Outcome-based Cloud Contract	The contracts specify interim goals that we expect the supplier to achieve.		The contracts specify interim goals that we expect the cloud supplier to achieve.
	Our contracts contain performance standards we expect the supplier to meet in the product they supply us.		Our contracts contain performance standards we expect the cloud supplier to meet in the service they supply us.
	Our contracts specify deadlines for the supplier to deliver the products.		Our contracts specify deadlines for the cloud supplier to deliver the service.
Investment in Information Systems	Our partner was able to develop appropriate technical solutions for the project.	(Yu, 2014)	Our cloud supplier was able to develop appropriate technical solutions for the project.
	Our partner was willing to put more effort and investment into building our contract relationship.		Our cloud supplier was willing to put more effort and investment into building our contract relationship.
	Our partner has assigned a sufficient amount of their equipment for this contract.		Our cloud supplier has assigned a sufficient amount of their equipment for this contract.
Task Programmability	My work is very standardised; it does not vary much from customer to customer.	(Goodale et al., 2008)	My work is very standardised; it does not vary much from supplier to supplier.
	The nature of my work is such that each customer has different needs and the work is different for every customer.		The nature of my work is such that each supplier has different missions, and the work is different for every supplier.
	My responsibilities are clearly defined.	(Stroh et al., 1996)	Our cloud supplier's responsibilities are clearly defined.
	I can see the results of my work.		I can see the results of our cloud suppliers' work.
	I am given a lot of freedom to decide how to do my work.		I give our cloud providers lot of freedom to decide how to do their work.
Outcome Measurability	If customers watch employees at my workplace they can easily tell how well they are doing their jobs.	(Goodale et al., 2008)	If we watch the employees at our cloud suppliers' workplace we can easily tell how well they are doing their jobs.
	Customers can always tell if they have received good service from me.		We can always tell if we have received good service from our cloud supplier.
	The user had several sources of objective data that indicated how well the development team met the project goals.	(Wang & Liu, 2014)	We had several sources of objective data that indicated how well the cloud supplier met the project goals.
	It was possible for the user to determine whether the project was completed on time.		It was possible for us to determine whether the project was completed on time.
	It was possible for the user to determine whether the project was completed within budgeted costs.		It was possible for us to determine whether the project was completed within budgeted costs.
	It was possible for the user to determine whether the project was completed according to the user's satisfaction.		It was possible for us to determine whether the project was completed according to our satisfaction.
	There were quantifiable measures depicting the extent to which project targets were achieved.		There were quantifiable measures depicting the extent to which project targets were achieved.
	If the user wanted to, the user can accurately, reliably measure the extent to which the completed system met its goals.		If we wanted to, we can accurately and reliably measure the extent to which the completed system met its goals.
Length of The Agency Relationship	The length of the agency relationship with suppliers.	(Zu & Kaynak, 2012)	How many years have we been doing business with the cloud suppliers?

Source: Author.