zentrum Nachhaltige Transformation
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Fair Software Licensing & Cloud in public companies

Requirements for efficient and growth-oriented market design

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Executive Summary

Most important results

The results of the study highlight the challenges public companies face when they want to use the cloud[1]. They are confronted with the licensing practices of some dominant software and cloud providers - such as Microsoft, which the German Federal Cartel Office has already proven to have a dominant market position[2].

In a recent decision report, the UK Competition and Market Authority (CMA) has found, as part of its investigation into the cloud computing market, that Microsoft's licensing practices create an unfair advantage for its own cloud computing services and thus potentially harm competitors. The CMA points to probable negative
"pan-European (i.e. UK and EEA)" impact on customers, including the public sector, by limiting choice, innovation and higher prices)[3].

These two studies show how specific unfair practices such as hidden costs, lock-in effects and lack of transparency can affect the efficiency, innovation and growth potential of these companies and the economy as a whole.

Surveys U1 and U2 provide an insight into the problem. The study focuses on public and municipal companies in Germany, i.e. companies that are wholly or partly owned by the public sector and are therefore accountable to the citizens of this country.

A. Major loss of prosperity due to cloud license restrictions

More than 80 percent of the participating public companies have already partially or completely switched to cloud solutions, in the first survey it was 80.5 percent, in the second survey even around 87 percent (see Fig. I/5 and Fig. II/4).

For around half of the companies participating in the first study, cloud licenses account for up to of total IT expenditure (Fig. I/3). At the same time, 81.5 percent

[1] This paper is an independent report funded the Computer C Communications Industry Association (CCIA Europe). The views and conclusions in this report are our own and do not the views of CCIA Europe.
[2] Federal Cartel Office. Case Report December 9, 2024: Microsoft - Determination of paramount importance for competition across markets. Case number B6-26/23, decision of September 27, 2024. Accessed on January 22, 2025. https://www.bundeskartellamt.de/SharedDocs/Entscheidung/DE/Fallberichte/Missbrauchsaufsicht/2024/B6-26-23.pdf.
[3] Cloud Infrastructure Services, Provisional Decision, CMA, January 28, 2025, available at https://www.gov.uk/cma-cases/cloud-services-market-investigation

opted for the cloud from their software provider (Fig. I/7). This suggests that a certain "inertia" (Savanta study) plays an important role in the decision to use the cloud[4] - especially for public and municipal companies. As a result, familiarity with existing systems and discounts on existing software solutions would be a key factor that makes it difficult to switch to alternative providers. In addition, the supervisory bodies, which primarily made up of regional politicians, not only want the solution to be efficient but also, and above all, to be functional.

The additional costs for the transfer of already purchased software licenses to the
Cloud costs that do not originate from the software provider are estimated by participants in the first survey to account for up to 25% of annual expenditure (see Fig. I/14). This figure corresponds to the costs calculated by Professor Jenny for private-sector companies.

This study does not allow any direct conclusions to be drawn about the exact additional costs, but based on available market data, these can be roughly estimated at between 27 and 120 million euros per year[5] - for the additional license costs alone following a cloud switch. To clarify the context: This sum relates to the estimated
309,000 employees in the member companies of the VKU and thus results in additional costs of around 87 to 388 euros per employee and year[6].

The significance of this burden becomes clear when you consider the potential impact on public services. If these funds were used for other purposes, they could contribute to financing infrastructure projects, improving the education system or healthcare, for example. An example from the healthcare sector: these funds could be used to hire up to 2,000 nurses every year[7] - an urgently needed relief given the shortage of skilled workers in this area.

Despite the vagueness of these figures, they point to one key finding: current practice is damaging companies and the common good.

The problem of this high, additional burden will become even more acute: 80% of respondents expect their IT expenditure to increase over the next five years (see Fig. I/4).

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[4] Savanta. 2024. *Assessing the Impact of Software Licensing Practices*. Accessed January 22, 2025. https://info.savanta.com/l/1038663/2024-01-31/98tx5h/1038663/1706715090z4m1HiQG/Assessing_the_impact_of_software_licensing_practices.pdf. [5] The total annual IT costs were estimated at €432.6 million based on average IT costs of €1,400 per employee and around 309,000 employees in VKU companies.€ . See also: You Logic AG. "Average IT costs for companies." Accessed January 22, 2025. https://it- dienstleister.de/blog/durchschnittliche-it-kosten-unternehmen/; Association of Municipal Enterprises
e.V. (VKU). "About us." Accessed January 22, 2025. https:// .www.vku.de/verband/ueber-uns/
[6] VKU, "About us," accessed January 22, 2025.
[7] The calculation is based on a gross annual salary of approximately € 45,000. See also: Medi-Career. "Nursing specialist salary and collective agreements 2025." Accessed on January 22, 2025. https://www.medi- karriere.de/medizinische-berufe/pflegefachkraft-gehalt/.

Around 71% did not have the option of transferring previous software solutions to the new cloud free of charge (Fig. II/15). 6 out of 10 participants in the first survey stated that these additional costs made the desired solution economically unattractive (see Fig. I/16).

B. Lock-in effects cost paralyze the dynamics

Lock-in effects limit the possibilities for financial and technical optimization of software use and were perceived as a central problem in both surveys. Technical dependencies, a lack of interoperability and legal barriers prevent companies from switching providers or using more cost-effective alternatives.

Around 80 percent of participants in the second survey (n=150) stated that they had incurred additional costs in order to move existing software licenses to new cloud infrastructures (see Fig. II/9).

This not only has immediate financial consequences, but also affects long-term strategic decisions. Public institutions that are dependent on technological sovereignty run the risk of remaining permanently dependent on a small number of providers, which significantly limits innovation and competitiveness.

C. Changing provider is made more difficult

A significant proportion of companies stated that the use of cloud services is hindered by additional license costs and limited functionality. Despite the potential benefits of switching to another cloud provider, most IT managers see this step as difficult, with 44% citing technical complexity and 56% the high migration costs as the main obstacles. After switching cloud providers, around 70% of participants also had to purchase new licenses (see Fig. I/24).

D. Dependencies are being expanded

In order to consolidate their market dominance, some providers are resorting to problematic measures.

Around 42 percent of the participants in the first survey were offered discounts or credits for using the respective cloud by the software providers; in most cases, discounts were offered on other software offerings and on services from the software company (see Fig. I/20 and Fig. I/22). Around a third of the participants (Fig. I/31) were offered a combination of software licenses and cloud usage.

Even if discounts or specific offers for companies are generally in line with the market, in this area they are primarily based on the combination of software and cloud offerings. This is the case, for example, with integrated solutions from a provider family, such as the Microsoft Office 365 software family and the Microsoft Azure cloud platform. With these tie-ups, the providers are excluding competitors who only offer software or cloud solutions.

E. Consumer sovereignty is limited

Around 26% of the participants in Survey 1 (Fig. I/34) complain about a lack of transparency and confidentiality clauses in their software contracts, which prevent a comparison with other public companies. And a number of companies would like clearer information on prices, price trends and more transparency in the description of service packages. One participating company would like to see a clear separation of software and cloud infrastructure. In Survey 2, which had a large number of participants, around 14% (see Fig. II/6.) of the participating companies still wanted more transparency; however, the structure of the participants in this survey was significantly different to the first survey.

In the personal interviews, there was also frequent talk of concerns about "retaliation": anyone demanding too much transparency or even comparability with other companies would have to expect harsh reactions in case of doubt, such as the supposedly contractually agreed, unannounced checks by the software providers.

The results of the study indicate that the current distortions for software licenses and cloud services are causing disadvantages for both individual companies and the economy as a whole: High costs and unpredictable cost increases, technical and financial dependencies, lack of transparency - these are keywords that suggest expensive distortions and untapped efficiency potential.

This is particularly unfortunate for public companies - they have to guarantee reliable service provision and economical use of their resources. As a result, there is a risk that both targets will be played off against customers by providers.

In addition to the efficiency disadvantages, the additional burdens that have become apparent also limit the ability to use resources for innovation and performance improvements.

Unsurprisingly, there is a clear desire (see, for example, the answers to the open questions in both surveys) on the part of companies for politicians and regulatory authorities to **curb** the **abusive behavior of dominant companies and** stop **undesirable developments.** Here, as in the accompanying roundtables, the desire to intensify the public discussion on the topic of "fair software licensing" and thus increase the pressure on politicians and authorities became clear.

Overall, the results make it clear that current licensing practices are not just a business problem, but a structural challenge that needs to be addressed on several levels. For the target group, the results offer starting points for strengthening their position and entering into dialog with providers and regulatory authorities.

Options for action

...the company

Greater transparency regarding contractual terms and license models can be created by the companies themselves. It is true that open exchange on the details of the contracts is prohibited to users by the contracts. However, the example of Switzerland shows that the establishment of a "clearing house" by a lawyer can be very promising[8]. The involvement of a lawyer also makes it possible to represent one's own interests, as the Swiss example also shows.

In addition, the most recent US Government Accountability Office (GAO) report from November 2024 points to the problem of restrictive software licensing practices[9]. These practices include higher fees for the use of third-party software or technical restrictions that can often limit the adoption and utilization of the full potential of cloud services, in this case by U.S. government agencies. The GAO's recommendations for US authorities could also be helpful for public companies in Germany. A comparable approach would be to establish clear responsibilities for dealing with restrictive license terms and implement policies to analyze and reduce such practices.

In the area of public companies in particular, the formation of purchasing alliances is also an option. This can have a significant impact not only on the results of price negotiations, but also on the technical framework conditions.

...of the regulatory authorities

All over Europe, regulatory authorities are becoming increasingly aware of abuses and undesirable developments in the markets under investigation. Authorities in the UK, Spain, Denmark and France have already published critical reports or are about to do so.

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[8] Foundation SMEs for Law Enforcement (SKR). "Media release: Crowdlobbying for SMEs." Accessed January 22, 2025. https:// .www.kmu-stiftung.ch/images/medienberichterstattung/medienmitteilung-skr.pdf

[9] U.S. Government Accountability Office. Cloud Computing: Selected Agencies Need to Implement Updated Guidance for Managing Restrictive Licenses. GAO-25-107114, published November 2024. Accessed January 22, 2025. https:// .www.gao.gov/assets/gao-25-107114.pdf

before that[10]. The problem is by no means new, but has been on the European Commission's agenda for more than two years. While the EU is still discussing the issue, other players are moving faster: the US Federal Trade Commission (FTC) has already launched a comprehensive antitrust investigation into the cloud, AI and licensing practices of major technology companies[11].

With the introduction of Section 19a of the Act against Restraints of Competition (GWB) in 2021, the Federal Cartel Office was given an important instrument to strengthen the regulation of dominant companies in the digital sector. This regulation enables the authority to place companies with paramount cross-market significance under special abuse supervision at an early stage, even before concrete damage occurs. As the Bundeskartellamt emphasizes, the of this power is to address anti-competitive behaviour by large digital groups in good time and to protect competition in the long term[12].

In the Microsoft case, the authority found that the company could potentially engage in abusive behavior due to its dominant position in the areas of productivity software and cloud services. Accordingly, in December 2024, Microsoft was classified as a company with paramount importance across markets[13] - a significant step, but only the prerequisite for further action by the Federal Cartel Office. The task now is to initiate proceedings swiftly. The Bundeskartellamt itself constantly emphasizes the urgency of focusing on the digital sector and in particular on the power of large digital groups and explicitly points out their potential power to endanger democracy[14].

From the consumer's point of view, two central problems stand in the way of the effectiveness of the processes:

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[10] Competition and Markets Authority. "Cloud Services Market Investigation." Accessed January 22, 2025. https://www.gov.uk/cma-cases/cloud-services-market-investigation; Comisión Nacional de los Mercados y la Competencia (CNMC). "The CNMC Launches a Public Consultation on Cloud Services in Spain." Press release, May 7, 2024. Accessed January 22, 2025. https://www.cnmc.es/sites/default/files/editor_contenidos/Notas%20de%20prensa/2024/20240507_%20NP%20consulta%20cloud_en_GB%20r.pdf; Danish Competition and Consumer Authority. "The Danish Competition and Consumer Authority Is Examining the Market for Cloud Services for Businesses and the Public Sector." Accessed January 22, 2025. https://en.kfst.dk/nyheder/kfst/english/news/2024/20240712- the-danish-competition-and-consumer-authority-is-examining-the-market-for-cloud-services-for-businesses-and-the-public-sector; Autorité de la concurrence. "Cloud Computing: The Autorité de la Concurrence Issues Its Market Study on Competition in the Cloud Sector." Press release, June 29, 2023. Accessed January 22, 2025. https://www.autoritedelaconcurrence.fr/en/press-release/cloud- computing-authorité-de-la-concurrence-issues-its-market-study-competition-cloud.

[11] Refna Tharayil, "US FTC Launches Antitrust Probe into Microsoft's Cloud, AI, and Licensing Practices," *Tech Monitor*, November 28, 2024, accessed January 22, 2025, https://www.techmonitor.ai/digital- economy/big-tech/us-ftc-launches-antitrust-probe-into-microsofts-cloud-ai-and-licensing-practices.

[12] Federal Cartel Office. "Rules for the Digital Economy." Accessed January 22, 2025. https://www.bundeskartellamt.de/DE/DigitalWirtschaft/RegelnDigitalwirtschaft/regelndigitalwirtschaft_node.html.

[13] Bundeskartellamt, *case report p. December 2024*, accessed on January 22, 2025.

[14] KNA. "Head of the Federal Cartel Office: Digital companies could harm democracy." *Evangelische Zeitung*, August 8, 2024. Accessed January 22, 2025. https://evangelische-zeitung.de/kartellamtschef-digitalkonzerne-koennten-demokratie-schaden.

The slowness of the procedure(s): It is true that the slowness of the processes is partly due to the high complexity of the issues and the authority's limited human resources given the size of the digital groups. However, a comparison with other proceedings of the German Federal Cartel Office or international regulatory authorities makes it clear that decisions and measures must be accelerated in order to be effective, especially in the dynamic digital market.

A structural problem: The Federal Cartel Office's broad discretionary powers, which it considerable leeway when deciding whether to initiate proceedings, can in fact lead to a lack of legal protection. Companies and public institutions that suffer from potentially unfair license and usage conditions often have no way of persuading the Federal Cartel Office to take concrete action. At the same time, civil enforcement in such cases is usually futile.

...the policy

The year 2025 is an election year and probably also a crisis year. The better use of software, the cloud and artificial intelligence, to which cloud and software providers in particular offer important access for SMEs, can play an important role in unleashing opportunities for growth and innovation.

Politicians have four options for remedying the shortcomings:

- **Measures against market-dominating practices**: Instead of a blanket separation of software and infrastructure for all cloud providers, regulatory interventions should specifically target abusive tying practices by individual market-dominating companies. Such practices, in which software and infrastructure offerings are artificially bundled, can already be prevented by the
  existing antitrust law should be addressed. Consistent enforcement of these laws could reduce dependencies and strengthen competition - without this implying the break-up of large companies.
- Improving **transparency and cost control**: Similar to the recently passed SAMOSA law in the USA, state-funded companies above a certain size could obliged to carry out comprehensive software management audits. In particular, these should identify hidden fees or additional costs for the use of cloud services that are not included in the
  original contract, as well as restrictions on data access and provider selection[15].

[15] Billy Hurley, "SAMOSA Act Passes House," *IT Brew*, December 11, 2024, accessed January 22, 2025, https:// .www.itbrew.com/stories/2024/12/11/samosa-act-passes-house

- The promotion **of market transparency** and the standardization of licensing conditions could stimulate competition and accelerate the digital transformation.
- Create **incentives for third-party providers**: Measures to strengthen smaller providers could include targeted innovation support, simplified market access conditions and support programs for the development of interoperable solutions.

1. Introduction

This study is about transparency on licensing conditions in the cloud market for public companies. They are accountable to citizens as their owners and customers for efficient use of funds AND reliable services. Misalignments in the important market for software applications in the cloud reduce efficiency and innovation for the respective company and beyond.

Current challenges

The use of clouds promises considerable competitive advantages for the German economy. The Federation of German Industries (BDI) estimates that cloud technologies could generate up to 250 billion€ in additional added value in the EU[16]. In Germany, SMEs in particular would benefit from the flexibility and scalability, which would strengthen their international competitiveness[17].

This trend has been reinforced by the pandemic-related acceleration of digitalization and continues to gain momentum with the introduction of technologies such as artificial intelligence[18]. In 2023, the European cloud computing market reached volume of over €110 billion and is expected to grow to €129 billion by 2024[19]. This growth is driven by the increasing demand for flexible and scalable IT solutions [20].

The German Economic Institute (IW) anticipates an increase in economic output of 0.1% of gross domestic product at best by 2025. According to a study by auditors PriceWaterhouseCoopers (PWC)[21], around 40% of all companies will benefit from considerable potential for cost reductions and productivity gains.

Of course, the expected benefits not limited to the private sector. The German Economic Institute (IW) expects public companies - for example in the area of services of general interest - to make administrative processes more efficient and achieve better results.

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[16] Federation of German Industries (BDI), *Cloud Computing: Value Creation in the Digital Transformation*, 2012, page 7, https://bdi.eu/media/presse/publikationen/information-und-telekommunikation/Cloud_Computing.pdf.
[17] Bundesverband der Deutschen Industrie e.V., *Cloud Computing*, 7.
[18] Foundry. *Cloud Computing Study 2024: Artificial Intelligence Fuels Next Wave of Cloud Expansion*. Accessed December 2, 2024. https://1624046.fs1.hubspotusercontent-na1.net/hubfs/1624046/R-ES_Cloud_2024.pdf.
[19] "Cloud Computing in Europe," *Gale eBooks*, Gale, accessed December 2, 2024, https://proxy.parisjc.edu:8293/topics/8472/cloud-computing-in-europe/.
[20] Thomas Heimann, "IT trends 2024: IT budgets will be reallocated," *Capgemini Blog*, December 14, 2023, https:// .www.capgemini.com/de-de/insights/blog/it-trends-2024-it-budgets-werden-umgeschichtet/
[21] PricewaterhouseCoopers GmbH Wirtschaftsprüfungsgesellschaft, "Cloud Business Survey: Chancen und Hürden der Cloud-Transformation," *PwC Germany*, January 25, 2024, https://www.pwc.de/de/cloud-digital/cloud-business-survey- chancen-und-huerden-der-cloud-transformation.html.

provide access to digital services[22]. This is particularly relevant for the digitalization of healthcare or energy supply. And the IW estimates that employees could spend an average of 100 working hours a year on their core tasks if they were to use the technical solutions consistently[23].

These public companies are the focus of this research project. Predecessor study for

private companies confirmed for public companies

As Professor Jenny found in a sensational study on "anticompetitive practices" in the cloud market in 2022[24], the existing potential for modernization in this field is often not exploited because the market conditions put customers at a structural and systematic disadvantage.

In the aforementioned study, for example, Jenny speaks of up to 28 percent additional costs for the use of already licensed software after switching cloud providers. Jenny's findings were startling and eye-opening, but related to private-sector companies.

This study aims to shed light on the situation for municipal and public companies in Germany. It is about transparency regarding licensing conditions in the cloud market for public companies. They are accountable to citizens - their owners and customers - for the efficient use of funds AND for reliable services.

One particularly problematic aspect of licensing and cloud issues is companies' dependence on certain providers, which makes it difficult or even economically unattractive to switch to alternatives. This financial lock-in - often facilitated by non-transparent contractual terms and bundled offers - means that customers sometimes have to pay considerably more when they migrate their software to the cloud.
There are also technical lock-in effects: some of the software already paid for by the user cannot be used on new clouds. In addition, the transfer is often extremely time-consuming and expensive. Microsoft Azure, as the leading provider in Germany, is a particular focus of the regulatory authorities[25]. They are taking an increasingly critical look at whether the licensing practices of the major providers are hindering fair market conditions and contributing to the formation of monopolies.

These licensing practices not only lead to higher costs, but also to massive dependencies and restricted negotiating positions for licensees,

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[22] Vera Demary, "How the state can drive digital progress," *Institut der deutschen Wirtschaft Köln*, 2024, accessed December 2, 2024, https:// .www.iwkoeln.de/studien/wie-der-staat-digitalen-fortschritt-vorantreiben-kann.html
[23] Cologne Institute for Economic Research, *The digital factor*, 5.
[24] Frédéric Jenny, *Fair Software Licensing: Protecting Competition in Cloud Infrastructure Services*, CISPE, 2021, accessed December 2, 2024, https:// .www.fairsoftwarestudy.com/
[25] Bundeskartellamt, "Microsoft," accessed December 2, 2024, https:// .www.bundeskartellamt.de/DE/DigitalWirtschaft/VerfahrenGegenGrosseDigitalkonzerne/Microsoft/Microsoft.html

especially public and municipal organizations[26]. This problem is exacerbated by so-called lock-in effects, which make it almost impossible to switch providers. Such practices not only threaten economic competitiveness, but also Europe's technological sovereignty.

Although initiatives such as the European Digital Markets Act (DMA) attempt to create fair competitive conditions, it is often criticized that the existing regulatory framework is not sufficient to take preventive action against abuse[27]. Antitrust interventions often come too late and are limited in their effectiveness. However, a key problem is not only that the DMA does not cover certain aspects or that antitrust measures are too slow to take effect, but rather that there are too few antitrust measures on the cloud computing market in Germany.

Regulators are increasingly critical of the concentration of power in this market, with a particular focus on licensing practices and potentially anti-competitive behavior[28]. A CCIA report highlights that licensing models for productivity software can limit the choices of cloud customers[29].

This study addresses precisely these issues and analyzes the licensing situation in public companies. An important goal is to provide decision-makers in the public sector with valuable insights **that not only help them to optimize their IT costs in the long term and avoid potential lock-in traps, but also ensure that they can make a selection of providers not only on the basis of the best price, but also on basis of functions and performance features .**

[26] Cloudflare, "What is vendor lock-in? | Vendor lock-in and cloud computing," accessed December 2, 2024, https:// .www.cloudflare.com/de-de/learning/cloud/what-is-vendor-lock-in/
[27] CISPE, "The DMA is nothing more than 'un coup d'épée dans l'eau'," September 18, 2023, https://cispe.cloud/the-dma-is- nothing-more-than-un-coup-depe-dans-leau/.
[28] Competition and Markets Authority, "CMA launches market investigation into cloud services," *GOV.UK*, October 5, 2023, https:// .www.gov.uk/government/news/cma-launches-market-investigation-into-cloud-services
[29] Computer & Communications Industry Association, "New Research: EU Cloud Customers' Choice Limited by Productivity Software Licensing," February 7, 2024, https://ccianet.org/news/2024/02/new-research-eu-cloud-customers-choice-limited- by-productivity-software-licensing/.

2. Methodology

2.1 Overview

This study, which focuses on public and municipal companies, is dedicated to analyzing licensing practices in the European cloud market and examines their impact on competition, innovation and cost structures. It combines theoretical approaches with empirical results from two comprehensive surveys to provide decision-makers from business, politics, science and journalism with a clear picture of the challenges and opportunities. The aim is to create more transparency and offer options for action for a more sustainable and fairer use of the cloud.

The data collection of this study was conducted in two phases and is based on a combination of qualitative and quantitative approaches to comprehensively analyze the licensing situation in the cloud market. Two surveys were conducted to capture different perspectives and levels of detail: the first survey (U1) with a long, detailed questionnaire and the second, shorter survey (U2). The target group of the study consisted of IT managers in public and municipal companies in Germany who have experience with cloud services and the licensing models of hyperscalers. For U1, 40 participants were recruited, while U2 reached a larger sample of 150 people. Table 2.1 provides an overview of the implementation and timeline of the surveys.

On the one hand, the aim of the study was to verify the results of Prof. Jenny's study on competitive conditions and practices in cloud infrastructure services for the public sector - Prof. Jenny found, among other things, that private companies incur up to 25% additional costs when they move their software licenses to a cloud that not provided by the software provider. Secondly, we wanted to investigate the distortions of competition caused by the licensing practices of hyperscalers and analyze their impact on public and municipal companies in order to derive recommendations for action.

Table 2.1

Phase	Description	Goal	Period
Phase 1: Planning	Development of the Research questions and the Study designs. Cooperation with Experts on the concept.	Ensuring the Relevance and validity of the study.	October 2023 - January 2024
Phase 2: Pre-Test	Validation of the U1-Questionnaire through pre-test with six companies in the 8KU. Adaptations made.	Improvement of the Comprehensibility and Structure of the questions	January 2024 - March 2024
Phase 3: U1-Survey	Implementation of the first Survey (U1) with 40 IT Ladders. Data collection through open and closed questions.	Extraction deeper Insights into the Experience and Challenges of the target group.	April 2024 - November 2024
Phase 4: U2-Survey	Implementation of the second, shorter survey (U2) with 150 participants. Focus on specific topics such as Lock-in effects.	Supplement and Validation of the Results from U1.	October 2024 - November 2024
Phase 5: Analysis	Evaluation of the data from U1 and U2. Quantitative and qualitative analyses carried out.	Identification of Trends, Key findings n and Fields of action.	November 2024
Phase 6: Roundtable	Presentation and discussion the results with experts. Identification of regulatory and political Need for action.	Extraction more practical Recommendations and Extension of the Perspective through Expert opinions.	November 2024
Phase 7: Report	Creation of the final Report based on the Analysis and the results of the Roundtable.	Documentation of the Results and Development of Recommendations for action gen.	December 2024 - January 2025

2.2 Information on the first survey

The **first survey (U1**) was designed to be comprehensive and detailed in order to gain in-depth insights into the experiences and challenges of IT managers in public and municipal companies. The questionnaire combined closed-ended questions such as multiple-choice, single-choice and Likert scale questions to collect structured data, with open-ended questions that gave respondents the opportunity to share their individual perspectives. The questionnaire was developed in close collaboration with industry expert Dr. Ralf Resch. To validate its comprehensibility and structure, a pre-test was carried out with six companies from the network of the eight largest municipal companies (8KU). This place from January 31 to March 25, 2024. The structure and wording of individual questions were optimized based on the feedback from this pre-test. The first survey was then conducted online and asynchronously in a survey period from 16 April to 11 November 2024. Participants were recruited specifically by email on the basis of publicly available information on IT managers in the respective organizations. The questionnaire was created using the GDPR-compliant Lamapoll tool. At the beginning of the questionnaire, the participants received an introduction informing them about the objectives of the study and the content of the questionnaire. The questionnaire was only available in German.

The data in this study is therefore based on a sample that specifically includes company representatives from the public sector. Specifically, the sample comprises 40 IT managers from public companies in Germany

2.3 Information on the second survey

In contrast to the first survey (U1), the **second survey (U2)** was designed to be more focused. It aimed to quantify specific topics such as lock-in effects and to supplement the results of U1. Multiple-choice, single-choice and Likert scale questions as well as an open question were used. The questionnaire was developed on the basis of the first survey and the insights gained from it. The survey was conducted online and asynchronously in a survey period from October 22 to November 5, 2024. The sample comprises 150 IT managers from public companies in Germany. A panel from the provider CINT was used to reach the target group in a targeted manner. This provider ensured that only IT managers were contacted and implemented measures to ensure data quality and the reliability of the results. Two screening questions ensured that only relevant people took part in the survey: The first question checked whether the respondent worked in a municipal or public company and the second question checked whether the company had moved its IT infrastructure to a cloud. The questionnaire was also completed using the GDPR-compliant tool Lamapoll tool.

2.4 Challenges

Various challenges in the course of data collection. One of the greatest difficulties was recruiting a sufficiently large number of participants for the first round of the survey. Despite targeted approaches and incentives, recruitment proved to be challenging due to the specific requirements of the target group. There was also a relatively high drop-out rate, as some participants did not complete the questionnaire in full. This led to gaps in the data set and reduced the number of completed questionnaires. To facilitate participation, some questions were designed as optional. Although this measure increased the willingness to participate, it led to incomplete answers in certain areas, which further limited the completeness of the data.

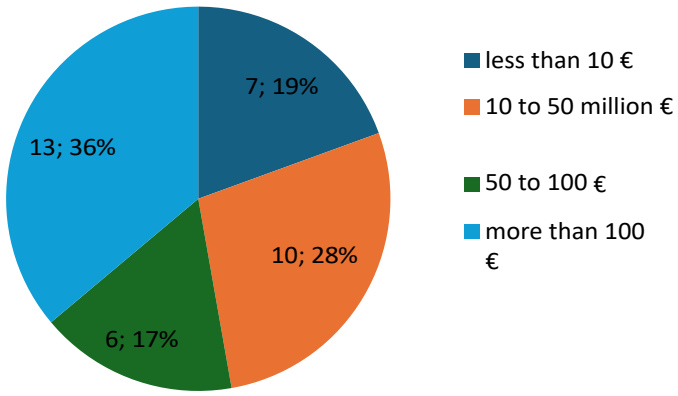
3. Results

3.1 Results of the first survey

The questionnaire was in full or in part by 40 participants. 5 (15%) work in companies with a turnover of less than € 10 million, 10 (29%) in companies with a turnover of € 10 to 50 million, 6 (18%) in companies with a turnover of € 50 to 100 million€ and 13 (38%) in companies with a turnover of more than € 100 million. The three most frequently represented sectors were energy generation and distribution with 26 (30%), water with 20 (23%) and telecommunications with 11 (12%). The results of the first survey are presented below in the form of figures and tables.

Figure I/1
Question: Please the annual turnover of your company.

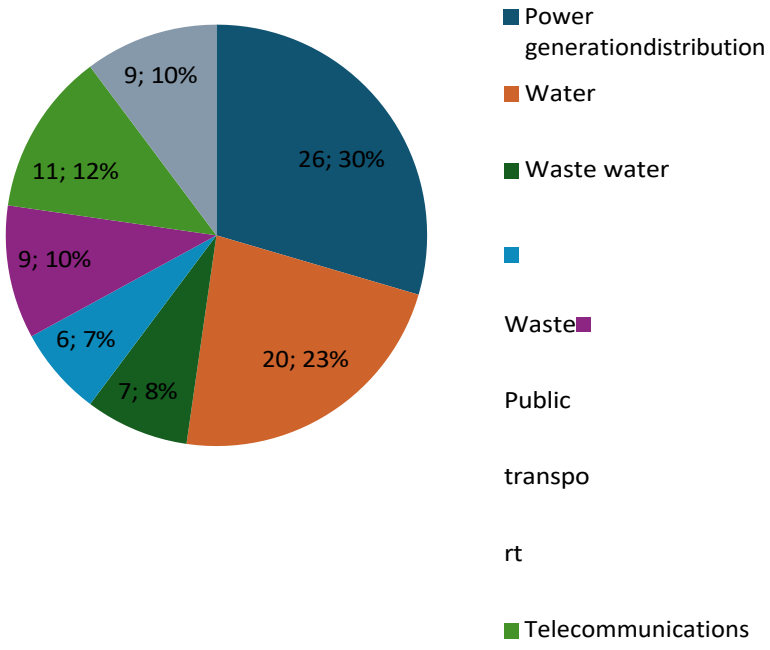
Options	Quantity	Frequency
less than 10 million €	7	19%
10 to 50 million €	10	28%
50 to 100 million €	6	17%
more than 100 million €	13	36%
Total	36 Answers	36 Participants



Note. n= 36

Figure I/2
Question: Which sector does your company belong to? (multiple choice possible)

Options	Quantity	Frequency according to Participants	Frequency according to Answers
Power generation, distribution	26	30%	29,55%
Water	20	23%	22,73%
Waste water	7	8%	7,95%
Waste	6	7%	6,82%
PUBLIC TRANSPORT	9	10%	10,23%
Telecommunications	11	12%	12,50%
Miscellaneous	9	10%	10,23%
Total	88 Answers	37 participants	



Note. n= 37

Figure *I/3*

Question: What proportion of your IT expenditure spent on cloud services?

Options	Quantity	Frequency
less than 5 %	11	33,33 %
5 to 10 %	8	24,24 %
10 to 25 %	8	24,24 %
25 to 50 %	3	9,09 %
More than 50 %	0	0,00 %
Don't know	3	9,09 %
Total	33 Answers	33 Participants

Figure I/4

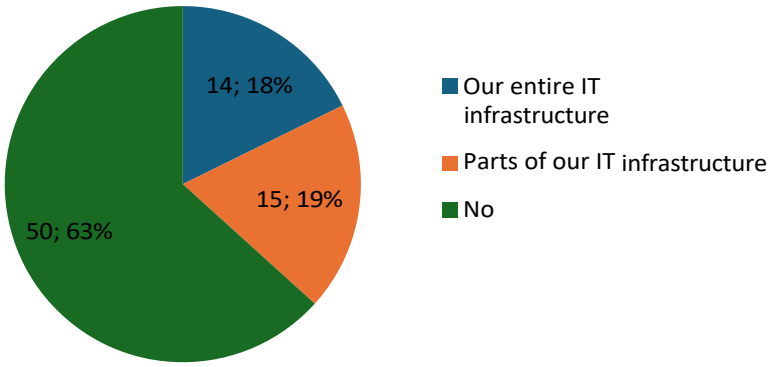
Question: How do you think the proportion of your IT spending on cloud services will change over the next five years?

Options	Quantity	Frequency
Becomes lower	1	3,03 %
Remains similar	6	18,18 %
Becomes larger	26	78,79 %
Don't know	0	0,00 %
Total	33 Answers	33participants

Figure I/5

Question: Has your company made the decision in the past to move its IT infrastructure or parts of it to a cloud?

Options	Quantity	Frequency
Our entire IT infrastructure	14	37,84 %
Parts of our IT infrastructure	15	40,54 %
No	8	21,62 %
Total	37 Answers	37 Participants



Note. n= 37

The analysis of open question 6 (Please indicate which parts of your IT infrastructure you have migrated) shows that there is a variety of migrated components. Several companies have migrated key areas of their infrastructure, including Customer Relationship Management (CRM), Enterprise Resource Planning (ERP) and Human Resources (HR). In addition, applications such as email services, including Exchange Server, have been integrated into the Microsoft Cloud as well as Office 365. Some companies reported the relocation of specific applications such as telecommunications, runtime environments and web services. In addition, it was stated that parts of the Microsoft infrastructure, including

SharePoint, were migrated step by step. Other organizations focused on smaller applications that were also transferred to the cloud.

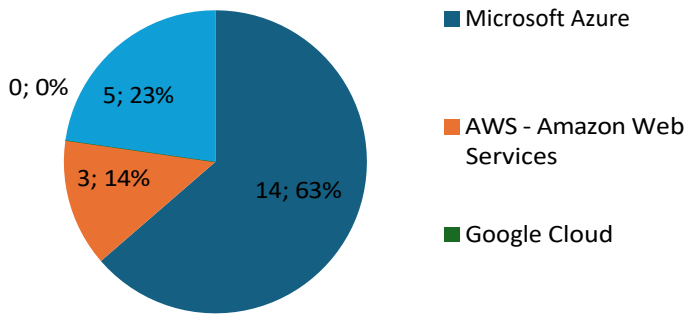
Figure I/7
Question: Has your company opted for the cloud infrastructure of your software provider?

Options	Quantity	Frequency
Yes	22	81,48 %
No	5	18,52 %
Total	27 Answers	27 Participants

Part A: Relocation to the software provider's cloud infrastructure
(if applicable)

Figure I/11
Question: *Which cloud infrastructure did you ?*

Options	Quantity	Frequency by participant	Frequency for answers
Microsoft Azure	14	63,64 %	63,64 %
AWS - Amazon Web Services	3	13,64 %	13,64 %
Google Cloud	0	0,00 %	0,00 %
Other, specify:	5	22,73 %	22,73 %
Total	22 answers	22 participants	



Note. n= 22

Figure I/12

Question: If you have chosen Microsoft Azure or Microsoft 365, to what extent have the following factors influenced your decision? (Only if the previous question was answered with "Microsoft Azure"; n=14.)

Einfluss through the possibility of using dual-use rights, for example for Windows Server, with additional flexibility for editions

Options	Quantity	Frequency
Not applicable	2	13,33 %
Did not play a role	2	13,33 %
To a certain extent	6	40,00 %
An important factor	2	13,33 %
A decisive factor	3	20,00 %
Total	14 Answers	

Influence through discounts, credits, bundled consumption units or other Microsoft-specific benefits

Options	Quantity	Frequency
Not applicable	5	35,71 %
Did not play a role	4	28,57 %
To a certain extent	2	14,29 %
An important factor	0	0,00 %
A decisive factor	3	21,43 %
Total	14 Answers	

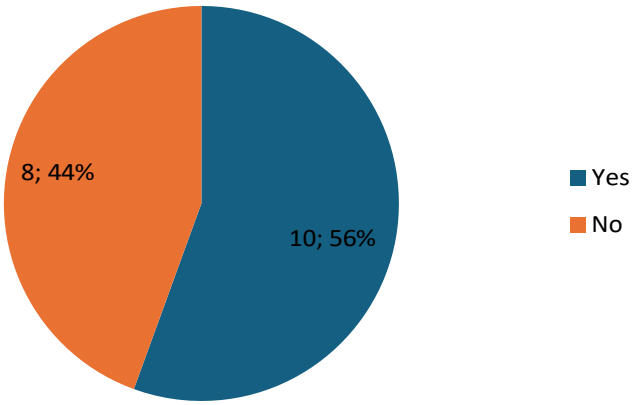
Influenced by free, extended security updates for older versions of Microsoft products

Options	Quantity	Frequency
Not applicable	2	14,29 %
Did not play a role	5	35,71 %
To a certain extent	5	35,71 %
An important factor	1	7,14 %
A decisive factor	1	7,14 %
Total	14 Answers	

There was also an open question (Were there any other factors?). Only one participant answered "modernity, mobility".

Figure I/13

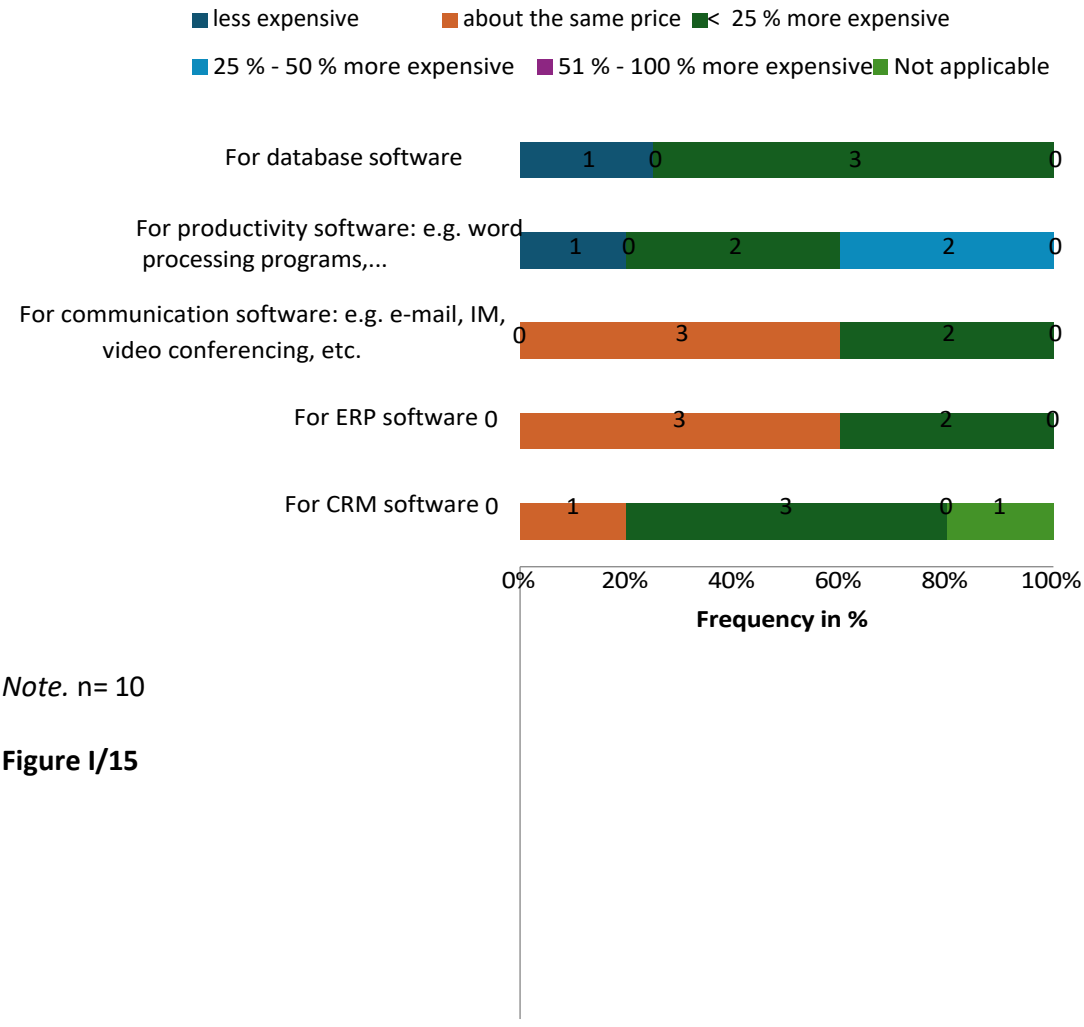
Question: Were you able to transfer and operate existing software licenses without additional costs?



Note. n= 18

Figure I/14

Question: Please indicate the additional costs by the relocation of your software licenses. (The question only had to be answered if the previous question was answered with "No"; n=10).



Note. n= 10

Figure I/15

Question: Did you have the option of transferring your software licenses to the cloud of a third-party provider at no additional cost? (n=14; basis Fig. 1/12)

Options	Quantity	Frequency
Yes	4	28,57 %
No	10	71,43 %
Total	14 Answers	

Figure I/16
Question: Has the inclusion of these additional costs made this option economically unattractive? (Follow-up questions to the above; n=10)

Options	Quantity	Frequency
Yes	4	40,00 %
No	6	60,00 %
Total	10 Answers	

Figure I/17
Question: Do you receive security and software updates for your software applications? (n=14)

Options	Quantity	Frequency
Yes	14	100%
No	0	0%
Total	14 Answers	

Figure I/18
Question: Do security and software updates of software applications cause additional costs? (follow-up question to the previous one; n=14)

Options	Quantity	Frequency
Yes	10	71,43 %
No	4	28,57 %
Total	14 Answers	

Figure I/19
Question: Have you been informed that the same software products are not available in a third-party cloud infrastructure, have limited functionality or may incur additional costs? (n=20)

Options	Quantity	Frequency
Yes	6	30,00 %
No	14	70,00 %
Total	20 Answers	

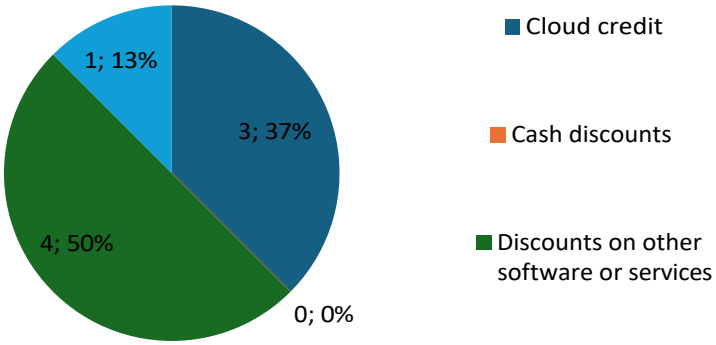
Figure I/20
Question: Were you offered discounts or credits by the software provider for your software applications? (n=19)

Options	Quantity	Frequency
Yes	8	42,11 %
No	11	57,89 %
Total	19 Answers	19 Participants

Figure I/21
Question: Did these discounts or credits enable you to operate your existing software licenses more cheaply than on a third-party cloud infrastructure? (Follow-up question to the previous question with answer Yes; n=5)

Options	Quantity	Frequency
Yes	1	12,5 %
No	2	25,0 %
No idea	2	25,0 %
No mention	3	37,5 %
Total	8 answers	

Figure I/22
Question: How are these discounts offered? (Follow-up question to Figure I/20; n=8)



Note. n= 8

Part B: Relocation to the cloud infrastructure of a third-party provider
(Follow-up questions to answer "No" in Figures 7 and 9; n= 4)

Figure I/2
Question: Which cloud infrastructure did you choose?

Options	Quantity	Frequency by participant	Frequency for answers
Microsoft Azure	3	75%	75%
AWS - Amazon Web Services	0	0%	0%
Google Cloud	1	25%	25%
Other, specify:	0	0%	0%
Total	4 answers		

Figure I/24
Question: Did you have to purchase new software licenses? (n=7)

Options	Quantity	Frequency
Yes	5	71,43 %
No	2	28,57 %
Total	7 Answers	

Figure I/25
Questions: Have you purchased additional licenses or concluded service and support contracts in order to use existing software licenses in the cloud of your choice? (n=7)

Options	Quantity	Frequency
Yes	6	85,71 %
No	1	14,29 %
Not applicable	0	0,00 %
Total	7 answers	7 Participants

Figure I/26
Question: Did your company incur additional costs when transferring software licenses?

Options	Quantity	Frequency
Yes	2	50%
No	2	50%
Total	4 answers	

Figure I/27
Question: Please indicate the additional costs you have incurred due to the relocation of your licensed software of the above mentioned product groups

Options	Quantity	Frequency
No additional costs	0	0%
less than 5 % more	0	0%
5 - 10 % more	1	100%
10 - 25 % more	0	0%
25 - 50 % more	0	0%
more than 50 %	0	0%
Total	1 answers	

Figure I/28
Question: Do your software applications have limited functionality on your cloud infrastructure?

Options	Quantity	Frequency
Yes	1	12,50 %
No	7	87,50 %
Total	8 answers	

Figure I/29
Question: Do you receive security and software updates for your software applications?

Options	Quantity	Frequency

Yes	8	100%
No	0	0%
Total	8 answers	

Figure I/30
Question: Do security and software updates of software applications cause additional costs? (Follow-up questions to the previous one)

Options	Quantity	Frequency
Yes	3	37,50 %
No	5	62,50 %
Total	8 answers	

Part C: All participants

Figure I/31
Question: Have you ever received an offer for a bundle of software products and cloud infrastructure?

Options	Quantity	Frequency
Yes	7	33,33 %
No	14	66,67 %
Total	21 Answers	

Figure I/32
Question: Have you rejected offers for bundles of software products and infrastructure because you could not keep up with the price conditions offered by Microsoft for software? (Specification for the answer "Yes" in the preliminary question)

Options	Quantity	Frequency
Yes	2	25,0 %
No	3	37,5 %
No answer	3	37,5 %
Total	5 answers	

Figure I/33
Question: How much more expensive the software licenses offered for operation in the cloud infrastructure of a third-party provider? (Follow-up question to the answer "Yes" in the preliminary question)

Options	Quantity	Frequency
Up to 10 % more expensive	1	50%

11-25 % more expensive	1	50%
26-50 % more expensive	0	0%
51-75 % more expensive	0	0%
76-100 % more expensive	0	0%
More than twice as expensive	0	0%
Total	2 answers	

Figure I/34
Q: Has the lack of transparency and clarity in licensing terms led to difficulties in accurately predicting the true cost of software licenses in the cloud?

Options	Quantity	Frequency
Yes	11	50%
No	11	50%
Total	22	

Figure I/34
Question: Have confidentiality clauses or a lack of transparency hindered your ability to compare yourself with other VKU members and consequently affected your ability to assess value for money?

Options	Quantity	Frequency
Yes	5	26,32 %
No	9	47,37 %
Not applicable	5	26,32 %
Total	19	19

In the context of open question 35 (If you are not satisfied with the current licensing situation for cloud computing: What suggestions do you have to improve the fairness of software licensing in the cloud? What changes could be made to the licensing of 'must-have' productivity software to improve choice and the barriers to moving to the cloud?"), a total of four companies responded. One recurring aspect here is increasing transparency. Another aspect relates to the presentation of prices and service level agreements (SLAs) as well as cloud exit costs. In addition, a clearer description of the individual license packages is required to enable companies to make informed decisions. Another proposal includes the demand for more stable and predictable license models by reducing changes to the license conditions during ongoing operations. In addition, clear contact persons at providers such as Microsoft and clear price lists were called for. Finally, it was noted that the licensing of software products should be designed independently of the deployment model.

3.2 Results of the second survey

The questionnaire was completed in full by 150 participants. 41 (24%) work in companies with a turnover of less than €10 million, 75 (44%) in companies with a turnover of €10 to 50 million, 35 (20%) in companies with a turnover of €50 to 100 million€ and 21 (12%) in companies with a turnover of more than €100 million. The three most frequently represented sectors were energy generation and distribution with 39 (23%), telecommunications with 39 (23%) and water with 33 (19%).

The sample initially consisted of 172 participants. A subsequent control question on cloud usage excluded 22 participants from the survey, so the following results relate to the remaining 150 participants.

Figure II/1
Question: Do you work in a public company, a municipal institution or an organization that is predominantly publicly financed or state/municipally controlled? (n=361)

Options	Quantity	Frequency
Yes	172	47.65%
No, I work in a private sector companies.	189	52.35%
Total	361 Answers	361 Participants

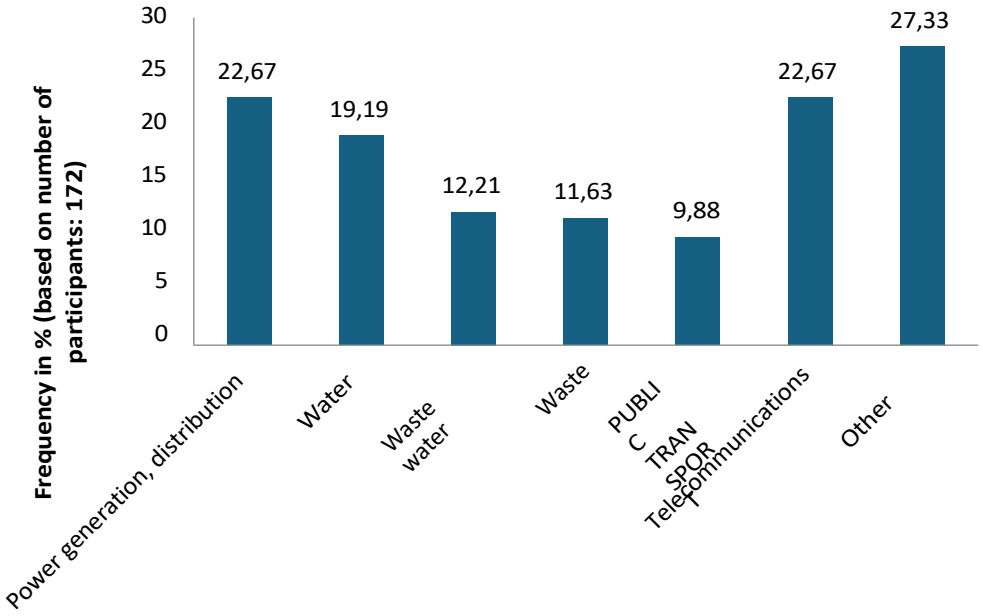
Figure II/2
Question: Annual turnover of your company (n=172)

Options	Quantity	Frequency
less than 10 million €	41	23.84%
10 to 50 million €	75	43.60%
50 to 100 million €	35	20.35%
more than 100 million €	21	12.21%
Total	172 Answers	

Figure II/3
Question: Which industry does your company belong to?

Options	Quantity	Frequency according to Participants	Frequency according to Answers
Power generation, distribution	39	22.67%	18.06%

Water	33	19.19%	15.28%
Waste water	21	12.21%	9.72%
Waste	20	11.63%	9.26%
PUBLIC TRANSPORT	17	9.88%	7.87%
Telecommunications	39	22.67%	18.06%
Miscellaneous	47	27.33%	21.76%
Total	216 answers	172 participants	



Note. n= 172

Figure II/4

Question: Has your company made the decision in the past to move its IT infrastructure or parts of it to a cloud? (control question)

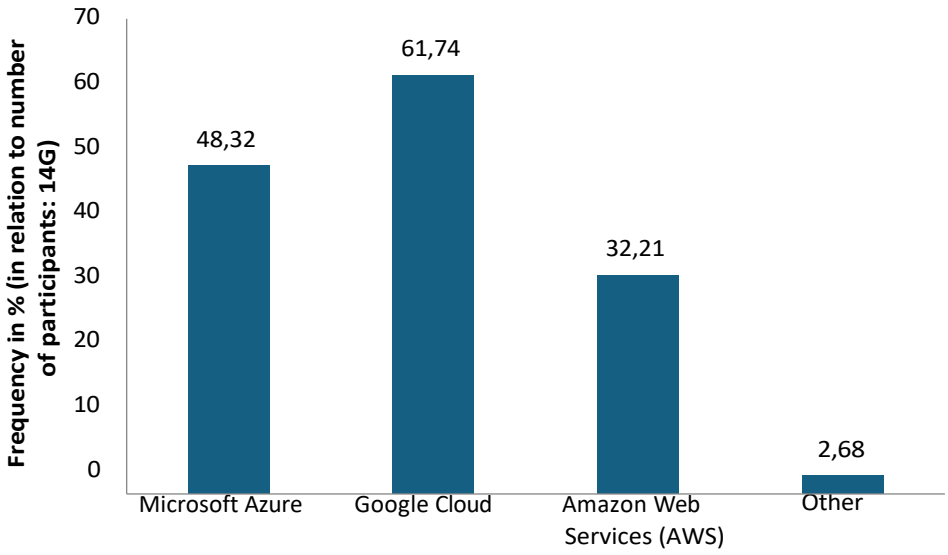
Options	Quantity	Frequency
Yes	149	86.63%
No	23	13.37%
Total	172 Answers	172 Participants

Figure II/5

Question: Which cloud provider(s) did you choose?

Options	Quantity	Frequency according to Participants	Frequency according to Answers
Microsoft Azure	72	48.32%	33.33%

Google Cloud	92	61.74%	42.59%
Amazon Web Services (AWS)	48	32.21%	22.22%
Other	4	2.68%	1.85%
Total	216 answers	149 participants	

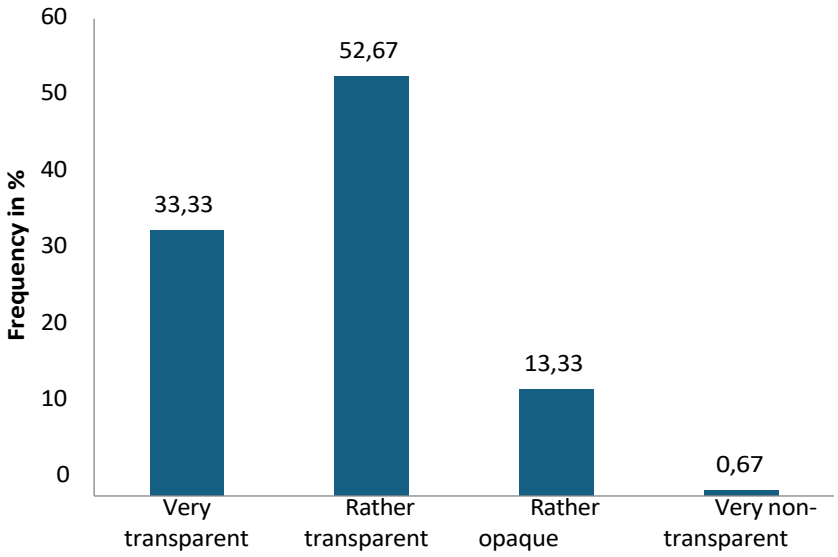


Note. n= 149

Figure II/6

Question: How transparent do you find the licensing models of the cloud providers you use?

Options	Quantity	Frequency
Very transparent	50	33.33%
Rather transparent	79	52.67%
Rather opaque	20	13.33%
Very non-transparent	1	0.67%
Total	150 Answers	150 Participants

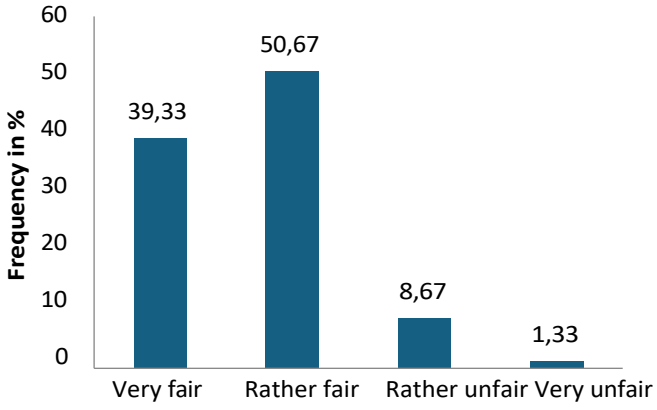


Note. n= 150

Figure II/7

Question: How fair do you think the pricing of the licensing models is in relation to the services offered?

Options	Quanti	Frequency
Very fair	ty 59	39.33%
Rather fair	76	50.67%
Rather	13	8.67%
unfair Very	2	1.33%
unfair Total	149 Answers	149 Participants

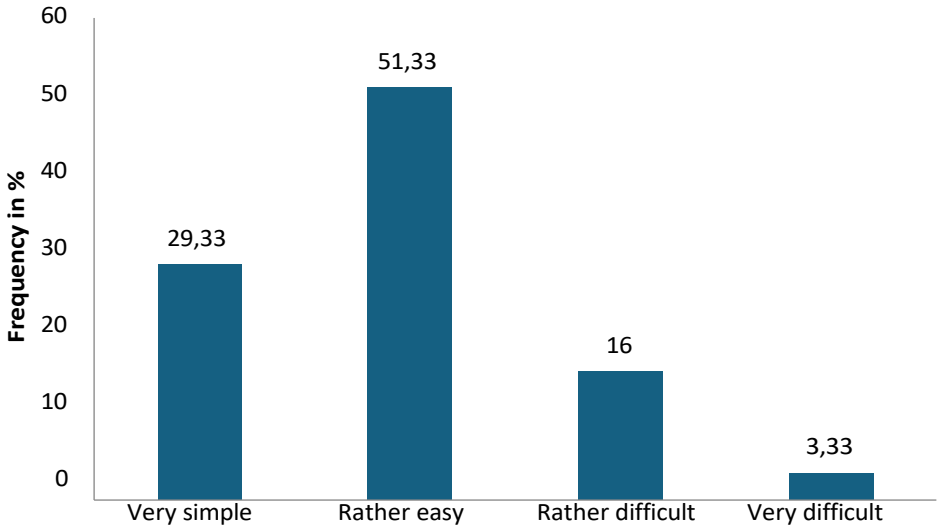


Note. n= 149

Figure II/8

Question: How do you assess the feasibility of switching your company another cloud provider?

Options	Quantity	Frequency
Very simple	44	29.33%
Rather simple	77	51.33%
Rather difficult	24	16%
Very difficult	5	3.33%
Total	150 Answers	150 Participants



Note. n= 150

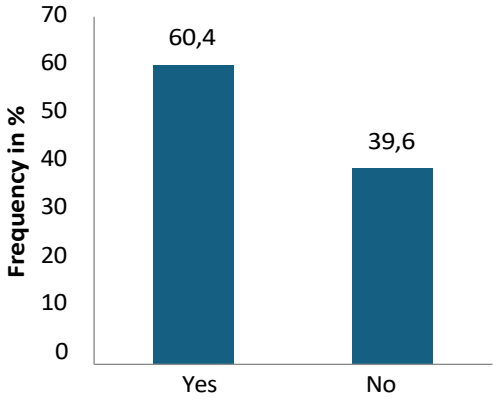
Figure II/9

Question: Have you incurred additional costs to move your existing software licenses to a cloud infrastructure?

Options	Quantity	Frequency
Yes	121	80.67%
No	29	19.33%
Total	150 Answers	150 Participants

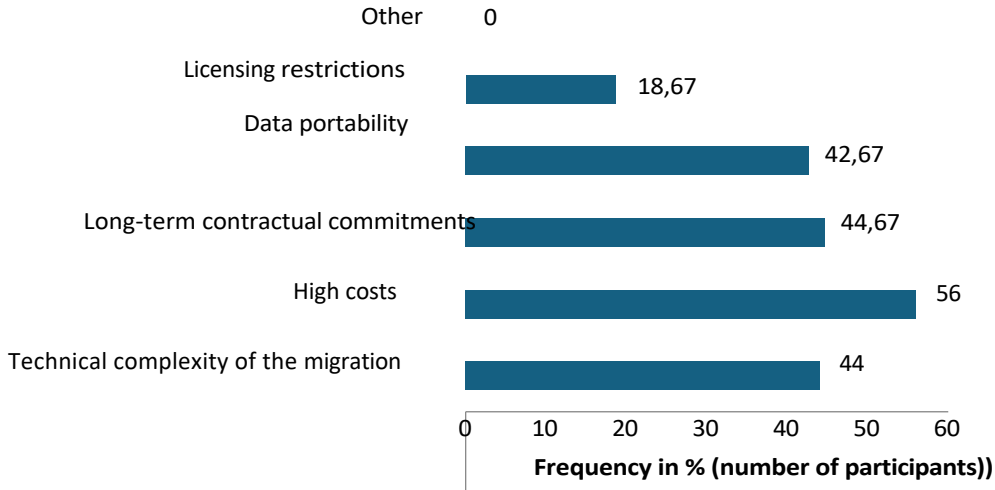
Figure II/10

Question: Do your software applications have limited functionality on your cloud infrastructure?



Note. n= 150

Figure II/11
Question: Which factors would pose the greatest challenges when switching to another cloud provider? (n=149)



Note. n= 149

The last question 12 was formulated as an open question; it was not compulsory to answer it.
It is "Do you have any further comments or observations on the licensing conditions in the cloud market?"

A total of 130 participants answered the question. The results were grouped into two meaningful categories. The first category includes all responses relating to the variations of "No", "Don't know", "No comments", "Don't know" etc. This category includes 73 (56.15%) responses. The second category includes all other comments. A total of 57 (43.85%) specific comments from participants were recorded in this category. These include criticism of

the complexity of the licensing conditions, the lack of flexibility, the hidden costs and the change of provider. Positive comments were also made about security, user-friendliness and pricing. Finally, wishes were expressed for lower prices or better data protection regulations.

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5. Glossary

Explanation of key terms:

Cloud computing

While the term 'cloud computing' is often used to describe a variety of products and services, a key common feature of the cloud is that it enables the scalable provision of shared resources [30].

With traditional or "on-premise" IT, activities usually take place in a private infrastructure with predefined capacity, on-site servers and an ad hoc system management service. In contrast, users of cloud computing services can create, generate and store data via a shared infrastructure, which is usually provided by a third-party provider on a pay-per-use basis. This section introduces the main product offerings for cloud services and their delivery models, and briefly discusses the different types of customers that purchase cloud services.

In general, cloud computing solutions can be categorized into three different "service models" (i.e. infrastructure, platform and software) and four "delivery models" (i.e. public, private, shared and hybrid). The combination of these two dimensions broadly covers the entirety of cloud services.

Service models

Cloud services can also categorized by deployment model. A cloud computing deployment model is defined by where the infrastructure for deployment is located and who has control over that infrastructure.

Deployment models

- Public clouds are environments that are managed, maintained and administered by an external cloud service provider. The resources are available to all registered users, usually via a web browser.
- Private clouds are environments that are managed and maintained by the organization that uses them. Usually, the infrastructure for the environment is located in a data center that the organization controls. Therefore, the organization is responsible for purchase, maintenance and technical support. In addition, the owner is also responsible for any software or client application installed on the end-user system.
- Community clouds are semi-public clouds that are shared by members of a selected group of organizations that usually share a common

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purpose or mission so that they can share responsibility for maintaining the cloud.
- Hybrid clouds are the most common cloud implementations, consisting of
a combination of two or more other cloud deployment models. The clouds themselves are not mixed, but several separate cloud environments are connected with each other.

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