AI in Tourism: Unveiling the Potential and Benefits for SMEs in the Hotel Sector

Results of an online survey among hotels in Austria, France, Germany, Greece and Switzerland

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> Executive Summary

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Executive Summary (I)

- An **online survey** was designed to assess the adoption, benefits and challenges of **Artificial Intelligence (AI) technologies** among SMEs in the European hospitality industry. The questionnaire was disseminated through hotel associations spanning **five countries: Austria, Germany, Greece, France, and Switzerland**. Garnering **feedback from 1,115 hotels**, the sample encapsulates a broad spectrum of the hotel industry, reflecting variations in establishment size, classification, and geographical setting. Given that Greece heavily dominates the sample (50% of hotels in sample), and its results differ considerably from other regions, we have conducted specific analyses focusing on the DACH region, encompassing Germany (D), Austria (A), and Switzerland (CH).
- The rapid evolution of Artificial Intelligence (AI) presents a transformative opportunity for the hospitality sector. As this study reveals, the **potential benefits of AI are vast, ranging from operational efficiency to enhanced customer experiences**. However, the journey to successful AI adoption is multifaceted and requires a **comprehensive strategy that addresses both technological and human elements**.

Executive Summary (II)

Key Findings:

- **Current State of AI Adoption**: The study shows that the level of AI adoption varies across the hospitality industry. While chain hotels and higher-star or larger properties show a higher propensity to integrate AI technologies, smaller properties and those in certain regions lag behind. This disparity highlights the need for a more consistent approach to AI integration across the industry.
- **Holistic Approach to AI Adoption**: The integration of AI in the hospitality sector is not merely about implementing advanced tools. It demands a focus on education, ensuring hoteliers, especially from older generations, understand the tangible benefits and associated costs of AI. This foundational knowledge is crucial for informed decision-making and effective AI integration.

Executive Summary (III)

- **Personalized Customer Experiences**: AI's potential in personalizing guest experiences is evident. Technologies like facial recognition for swift check-ins, passport validation for enhanced security, and chatbots for real-time guest communication are just the tip of the iceberg. However, the industry's reception to these innovations is varied. While some technologies, such as real-time revenue management and SEO enhancement, are hailed as revolutionary, others, like virtual assistants, received a lukewarm response.
- **Operational Efficiency**: AI's impact isn't limited to guest experiences. The survey highlighted its pivotal role in fraud protection, streamlining employee training, and ensuring consistent occupancy rates, underscoring AI's potential to revolutionize the back-end operations of hotels.

Executive Summary (IV)

- **Collaboration is Key**: A significant takeaway from the study is the need for a symbiotic relationship between hoteliers and technology providers. Recognizing that technology providers often drive innovation, it's essential for hoteliers to collaborate closely with them, ensuring solutions are tailored to specific needs and challenges.
- **Addressing Resistance**: Change management emerged as a crucial aspect of AI adoption. Resistance, especially from the older generation of hoteliers, can be a significant barrier. Addressing this requires strategies that encompass training, support, and a focus on showcasing tangible benefits.

➢ In summary, the hospitality industry is on the cusp of a technological revolution with AI at the forefront. While the **benefits are clear, the path to successful adoption is fraught with challenges**. By focusing on **education, fostering collaboration and understanding the nuanced needs of the sector, the industry can fully harness the transformative power of AI** and ensure a future that's efficient, guest-centric and ahead of the curve.

> AI in the hotel sector

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Potential of AI in the hotel sector (I)

Artificial intelligence (**AI**) offers a transformative potential for the hotel sector, from enhancing guest experiences to streamlining operations and driving revenue growth. As the technology continues to evolve, its adoption will likely become a key differentiator in the competitive hospitality landscape.

- **1. Enhanced Customer Experience**: Artificial Intelligence (AI) in the hotel sector offers the potential to significantly enhance the guest experience. AI-driven systems can provide **personalized messages and recommendations** to guests before their stay, enhancing their anticipation and planning. During their stay, **facial recognition systems** can streamline check-in processes, while **virtual assistants and chatbots** can respond to guest queries, manage in-room technologies, and even handle reservations. AI also makes it possible to collect information about customer preferences by adding them to customer profiles. Post-stay, AI can **automate feedback responses** and offer personalized promotions to encourage return visits.
- **2. Operational Efficiency**: AI technologies can **automate or enhance various tasks** in hotels. For instance, **real-time revenue management** can adjust room rates based on current market conditions and other factors like weather. **Predictive analytics, using AI algorithms**, can analyze vast amounts of historical and current data to **forecast** likely future outcomes, aiding in operational planning. Furthermore, AI can assist in creating effective job advertisements and interview questions, considering the job role and company policy.

Potential of AI in the hotel sector (I)

- **3. Personalized Marketing and Service Offerings**: AI allows hotels to better **understand guest preferences**, using available data to offer more tailored experiences. This **personalization** extends to marketing, with AI-driven systems suggesting optimal images, titles, and texts for marketing campaigns. Such **targeted marketing** can lead to higher conversion rates, directly impacting revenue.
- **4. Competitive Advantage and Customer Loyalty**: In the luxury hotel sector, where many establishments offer high-end amenities like premium restaurants and spas, differentiation comes from understanding and catering to guest needs. AI-driven insights provide this edge, leading to improved guest satisfaction. A better guest experience not only increases the likelihood of return visits but also boosts referrals and the potential for guests to spend more during subsequent stays.
- **5. Back-end Operations and Predictive Maintenance**: AI can play a pivotal role in the back-end operations of hotels. **Predictive maintenance**, for instance, uses AI systems to monitor technological systems in the hotel, identifying potential issues before they lead to breakdowns. This proactive approach can lead to significant cost savings and prevent disruptions that could negatively impact the guest experience. The use of AI can also optimise energy and water consumption, as well as food waste.

AI use cases in the hotel sector (I)

Interaction type	Domain	AI technology	Description
Direct interaction with customers	Service (Reception)	ChatBot	Instant messaging applications that can simulate and process a written human conversation by generating automated responses based on user requests (Oracle, n.d.). Often available on websites, social networks and messaging systems.
	Service	**Virtual assistants or voice assistants**	**They are software agents that can be voice-activated to perform specific tasks by processing human voice input and generating consistent and tailored responses (e.g., Apple's Siri, Amazon's Alexa, etc.) (Buhalis & Moldavska, 2022). They can be used to allow guests to manage different technologies in their room using voice commands (Kılıçhan & Yılmaz, 2020).**
	Service (Reception)	Passport validation	Automated entry and validation of passport information at customer check-in, including automated translation capabilities (Nam et al., 2021; Mallys, 2019).
	Service (Reception)	**Facial recognition systems**	**Identifying or verifying an individual's identity based on their face at customer check-in (e.g. using kiosks/automated check-in kiosks or applications) (Nam et al., 2021; Revfine, n.d.; Mallys, 2019).**
	Service	Robotic technologies	A robot is an autonomous physical object equipped with AI and sensors that enable it to perceive its environment, make decisions and perform actions accordingly (Bulchand-Gidumal, 2020). There are many robots: room service robots (Kılıçhan & Yılmaz, 2020; Nam et al., 2021), concierge robots (Kılıçhan & Yılmaz, 2020), receptionist robots (Kılıçhan & Yılmaz, 2020), chef robots (Kılıçhan & Yılmaz, 2020), etc.

AI use cases in the hotel sector (II)

Background operations	Marketing	Customer profiling	Customer profiling is based on the analysis of interactions between a large number of data points (restaurants, spas, etc.) (Nam et al., 2021; Bulchand-Gidumal, 2020).
	Marketing	Personalised service for customers	Personalisation techniques aim to provide users with information personalised to their preferences and limitations (including the method of associating recommendations) (Nam et al., 2021; Bulchand-Gidumal, 2020; Bhattacharjee, Seeley & Seitzman, 2017). For example: personalised emails, recommendations, information provided via a guest app.
	Marketing	Analysis of customer appreciation and loyalty	Sentiment analysis is an AI task that analyses text and assesses whether it is 'negative', 'positive' or 'neutral', as well as more specific emotions such as 'very happy', 'happy', 'sad', 'angry', etc. (Sarker, 2021).
	Marketing	Automated responses to customer	The system automatically generates personalised suggestions in response to a customer review using sentiment and topic analysis (FHT, n.d.).
	F&B	Automatic menu creation and validation	Automating the costing of menu changes and streamlining the routine validation process (Nam et al., 2021).
	F&B	Table management	Using AI algorithms to optimise and automate restaurant placement (DigitalFoodLab, n.d.).
	F&B	Solution for measuring and monitoring food waste	Using a technology called computer vision to measure and monitor food waste by automatically capturing food waste with smart cameras placed above waste bins (Kitro, n.d.; Hotel Business, 2019).

AI use cases in the hotel sector (III)

Background operations	Finance	Real-time revenue management	Room rates are updated in real time to reflect current market conditions (Hollander, 2023).
	Administration / Finance/ HR	Predictive analysis	Use of algorithms and AI techniques to analyse large amounts of historical and current data to predict the most likely future outcomes and improve operational planning (Nam et al, 2021; Bulchand-Gidumal, 2020; Doborjeh, Hemmington, Doborjeh & Kasabov, 2022; Bhattacharjee, Seeley & Seitzman, 2017). For example: occupancy, hotel profitability, human resource allocation, feedback and hotel responses.
	Administration	Room allocation	Room allocation is optimised using AI to maximise room utilisation and profits (Nam et al., 2021).
	HR	Workforce planning	Automated personnel planning using AI algorithm: especially rule based engine (Lineup.ai, n.d.; Celayix, n.d.; Rose, 2022).
	Property	Predictive maintenance	Monitoring of machines during normal operation to detect and predict possible malfunctions (AltexSoft, 2018).
	Property	Optimisation of energy and water consumption	- Use of wireless IoT technology and real-time AI-driven automation (Nam et al., 2021; Pagel, 2022; Shukla, 2023). - Use of an AI-based power backup system that manages power charging and distribution by adjusting these parameters based on usage levels and needs (Nam et al., 2021).
	Property	Orchestration services	Automated management of various processes between applications and IT systems (Nam et al., 2021; Databricks, n.d.).
	Property	Motion detection	The room automatically adjusts its temperature according to the presence of the guest, detected by a sensor (Nam et al., 2021).

Generative AI in the Hotel Industry (I)

- Generative AI has made rapid progress in recent years, with the development of models such as GPT, Bard, PaLM, Stable Diffusion, Make-A-Video and DALL-E 2. These models have been trained on large datasets and are constantly updated.
- Their capabilities range from **high-quality text recognition to the generation of text, images, video and audio**. However, they are prone to biases and inaccuracies, such as generating false information or having limited access to knowledge (Maslej et al., 2023, p.12).
- Despite these challenges, tools such as ChatGPT have been shown to **improve the quality of work and increase productivity**, particularly for tasks such as generating employee references, responding to customer service requests, brainstorming, search engine queries and drafting emails (Noy & Zhang, 2023).

Generative AI in the Hotel Industry (II)

- Models such as DALL-E 2 can create stunningly **realistic images and art**, model fashion and interior design, or edit photos using natural language descriptions. There are also services that can generate font combinations for brochures or automatically create names and logos (Lin, 2022).
- Gartner predicts that by 2025, 30% of large companies' **marketing messages will be automated**, up from less than 2% in 2022. By 2030, a film created 90% by AI is expected to be a major success (Wiles, 2023).
- Generative AI offers SMEs in the hospitality and tourism sector **more control over their creative projects in the social media age**, allowing them to manage these projects in-house (Tuomi, 2023). However, these technologies must be user-friendly and beneficial for businesses to adopt them.
- Personalising the customer experience is becoming increasingly important in the hospitality industry. AI technologies can **create highly personalised experiences**, **understand customers** and deliver exceptional stays. Generative AI plays a crucial role in this trend, enabling the recommendation of personalised options and creating unique experiences.

Potential scenarios for the use of generative AI (I)

Case studies	Description
Text generation and summarisation, information extraction and translation	Text generation for emails Summarise emails, meeting notes and minutes to make them useful in any business process Select keywords, categorise elements (e.g. contacts in emails, social network profiles of customers, suppliers, etc.) Improve the composition of correspondence by adjusting grammar, word choice, tone and formality. Translating
Integration with chatbots and other systems (e.g. PMS, CRM)	Providing information, taking orders, assisting with and confirming bookings, dealing with customer enquiries and complaints Preparing sales presentations and other documents such as company policies, privacy policies, etc.
Human resources	Creation of attractive and effective advertisements, interview questions taking into account employment and company policies Provision of information on conditions, regulations, laws etc. Learning process (generation of quizzes or tutorials etc.)
Marketing	Analyse customer comments (identify themes, emotions and trends or patterns) Break down comments by category (e.g. quality of service or food) Personalise responses to online customer reviews Generate synthetic data to improve the performance of AA models (e.g. customer comment analysis) Text generation and copywriting (e.g. posting to blogs, social networks, email campaigns and other texts) Text title optimisation and text optimisation for Search engines Keyword suggestions Personalisation of information and recommendations according to customer preferences Create images of rooms and facilities without the need for expensive professional photography

(Cookorico, 2023 ; Carvalho & Ivanov, 2023 ; Wiles, 2023 ; Gonzalo, 2023 ; Simseo, 2023 ; Hotelchamp, 2023 ; Morand & Benassi-Faltys, 2023)

Potential scenarios for the use of generative AI (II)

New products and services	**Generating new ideas** **Identifying new opportunities**
Restaurant	Create personalised menus based on customer tastes and dietary restrictions Customise restaurant menus based on customer data and dietary trends
Design	**Creation of 3D models of rooms (with furniture and decoration)**
Customer experience	Personalisation based on customer habits (creation of a personalised room, room customisation) Personalised responses (e.g. chatbot communication) Voice interaction
Decision support	**Suggestions for possible decisions**

(Cookorico, 2023 ; Carvalho & Ivanov, 2023 ; Wiles, 2023 ; Gonzalo, 2023 ; Simseo, 2023 ; Hotelchamp, 2023 ; Morand & Benassi-Faltys, 2023)

> The Survey

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The survey: background (I)

- In today's rapidly evolving technological landscape, the tourism sector, particularly the hotel industry, is at a crossroads. As businesses strive to enhance operational efficiency and customer experience, the **potential of artificial intelligence (AI) technologies emerges as a promising avenue**. However, the adoption of such technologies is not without its challenges, especially for Small and Medium-sized Enterprises (SMEs) that often lack the resources of larger corporations (Dredge et al., 2018; OECD, 2021).
- The **TOE (Technology-Organization-Environment) framework is a key model for understanding the factors influencing technology adoption**. It offers a holistic perspective, encompassing current technologies and those in the wider market. Beyond just technological and organizational aspects, the TOE framework emphasizes the environmental context, highlighting its crucial role in shaping business decisions on technology integration (Nam et al., 2021; Leung, Lo, Fong & Law, 2015).

The survey: background (II)

- Given this backdrop, there's a pressing **need to understand how SMEs in the hotel sector perceive and integrate AI technologies**. This study, underpinned by the TOE framework and enriched by feedback from industry stakeholders, aims to bridge this knowledge gap. By **examining the benefits, challenges, and practical applications of AI**, the research seeks to provide actionable insights that can guide SMEs in the hotel industry towards successful AI adoption.

- We opted for an **online survey** as our primary data collection tool to gather insights into the current landscape of the hotel sector. This method allowed us to efficiently reach a wide range of participants within the industry, ensuring a comprehensive understanding of the prevailing trends, challenges, and opportunities related to technology adoption.

The questionnaire

- The questionnaire (see annex 1), comprising 21 questions, was crafted drawing insights from a literature review, which included the TOE framework, semi-structured interviews, feedback from hotels, and expertise from hotel associations such as HotellerieSuisse in Switzerland, IHA in Germany, and ÖHV in Austria.
- The questionnaire is divided into several sections:
  - **General information** about the hotel: This section collects demographic and operational data, allowing the analysis of the specific features of hotels according to their characteristics and location.
  - **Organisation (data/IT):** This looks at the internal management of information systems and data storage.
  - **TOE framework**: This section examines the factors that influence the adoption of AI, based on the vision of the establishments, their digitalisation policy and external factors.
  - **AI technologies in practice**: This assesses the current use of AI and the perceived benefits, leaving room for any unmentioned technologies.
  - **Challenges or barriers**: This section aims to identify the challenges faced in integrating AI.
  - **Opinions on benefits**: This gathers opinions on the most relevant areas for the application of AI in tourism by SMEs.

The survey administration

- The questionnaire was translated in 4 languages : French, German, English and Greek.
- The survey was addressed **between May to July 2023** to the member hotels of the different hotel associations:
  - ÖHV in Austria
  - IHA in Germany
  - GNI/GHR in France
  - Research Institute for Tourism (RIT) for the Hellenic Chamber of Hotels in Greece
  - HotellerieSuisse in Switzerland
- The different hotel associations contacted their members either by email (A, CH, D, GR) or through newsletters (F).
- As not all hotels replied to all questions, the number of responses can vary from one to another question.

> The Sample

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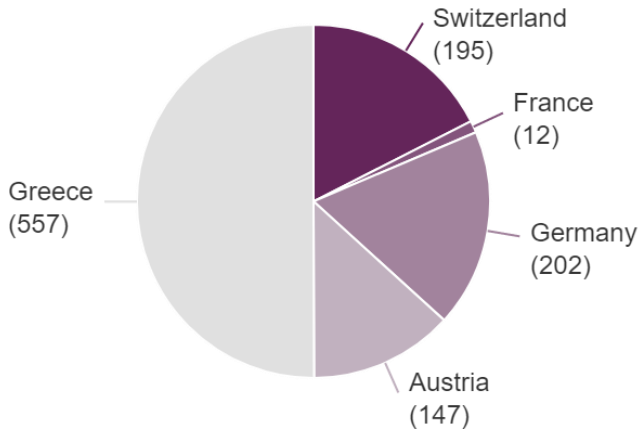
Methodological remarks: sampling

In total, we received **1,115 individual responses** from hotels through the online survey. However, there were significant variations in response rates by country. Given that Greece heavily dominates the sample and its results differ considerably from other regions, we have conducted **specific analyses focusing on the DACH region, encompassing Germany (D), Austria (A), and Switzerland (CH).**

In which country is your hotel located?

Effective responses: 1,113 *Response rate: 100%*



- Greek hotels with more than 550 responses provide around 50% of all the responses in the sample, whereas France with 12 responses provides 1% of the overall sample
- German hotels: around 18% of the overall sample
- Swiss hotels: around 17% of the overall sample
- Austrian hotels: around 13% of the overall sample

Summary of further overall sample characteristics

A breakdown of the responses reveals:

- **Hotel Location**: Most hotels were located in coastal areas (23%), rural villages (22%) and large cities (22.8%). Smaller towns accounted for 16% and mountain villages/stations for 15%.
- **Hotel Type**: A majority were independent hotels (82%), with 12% belonging to hotel chains and 6% being part of a hotel cooperation.
- **Guest Profile**: 76% catered mainly to vacationers or leisure travelers, while 19% primarily served business travelers.
- **Hotel Classification**: In the sample, 90% of the hotels were classified. The majority were 3-star hotels (35%), followed by 4-star hotels (34%). 5-star hotels accounted for 10% and 2-star hotels for 17%.
- **Hotel Size** : The sample comprises hotels representing a diverse range in terms of room numbers. The median values for room numbers in these hotels are as follows: Austria stands at 50 rooms, Germany at 44 rooms, Greece at 35 rooms, and Switzerland leads with 54 rooms.

Country-specific insights highlighted variations in hotel locations, types, and classifications across countries. For instance, vacation/leisure hotels were predominant in Austria, Greece and Switzerland, while business hotels were more common in Germany.

- **Further sample details** on a **country-base** are shown in **annex 2**.

Comparison of classified hotels by country: sample versus hotel population

		1*	2*	3*	4*	5*	Other	Source
Austria	Sample	0%	1%	26%	68%	4%	0%	
	Population	0,4%	4%	36%	57%	2%	0%	WKO 2023: Tourismus und Freizeitwirtschaft in Zahlen 2022
Germany	Sample	0%	3%	47%	48%	3%	0%	
	Population	1%	4%	58%	36%	2%	0%	Statista, January 2023
Greece	Sample	6%	27%	32%	22%	13%	0%	
	Population	12%	33%	29%	18%	8%	0%	Research Institute for Tourism (RIT)
Switzerland	Sample	0%	3%	40%	40%	12%	5%	
	Population	1%	5%	45%	27%	6%	17%	HotelllerieSuisse 2023

The colour-coded table, where blue indicates above-average values and red below, shows a disparity between hotel categories in Austria, Germany and Switzerland. In particular, 4* hotels are over-represented, while 3* hotels are under-represented. This skewness should be taken into account when analysing country-specific data.

Sources:

A: https://www.wko.at/branchen/tourismus-freizeitwirtschaft/tourismus-freizeitwirtschaft-in-zahlen-2023.pdf

D: https://de.statista.com/statistik/daten/studie/30359/umfrage/klassifizierte-hotels-nach-anzahl-der-hotelsterne/

CH: https://www.hotelleriesuisse.ch/de/branche-und-politik/kennzahlen/wirtschaftskennzahlen

Comparison of hotel sizes by country: sample versus population

		0-19 rooms	20-49 rooms	50-99 rooms	100-249 rooms	>250 rooms	Source
Austria	Sample	6%	41%	30%	19%	3%	
	Population	na	na	na	na	na	
Germany	Sample	14%	38%	33%	12%	2%	
	Population	40%	35%	14%	10%	2%	IHA 2023, Hotelmarkt Deutschland
Switzerland	Sample	5%	39%	35%	17%	4%	
	Population	48%	33%	12%	5%	1%	HotellerieSuisse 2023
		0-20 rooms	**21-50 rooms**	**51-100 rooms**	**>101 room**		
Greece	Sample	24%	43%	18%	16%		
	Population	41%	38%	13%	9%		Research Institute for Tourism (RIT)

- The color-coded table for hotel categories reveals a sample bias: small-scale hotels are underrepresented, while larger hotels, particularly those with 50 to 100 rooms, are overrepresented in comparison to the overall hotel population.

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> The Survey Results: Information System and Data Management

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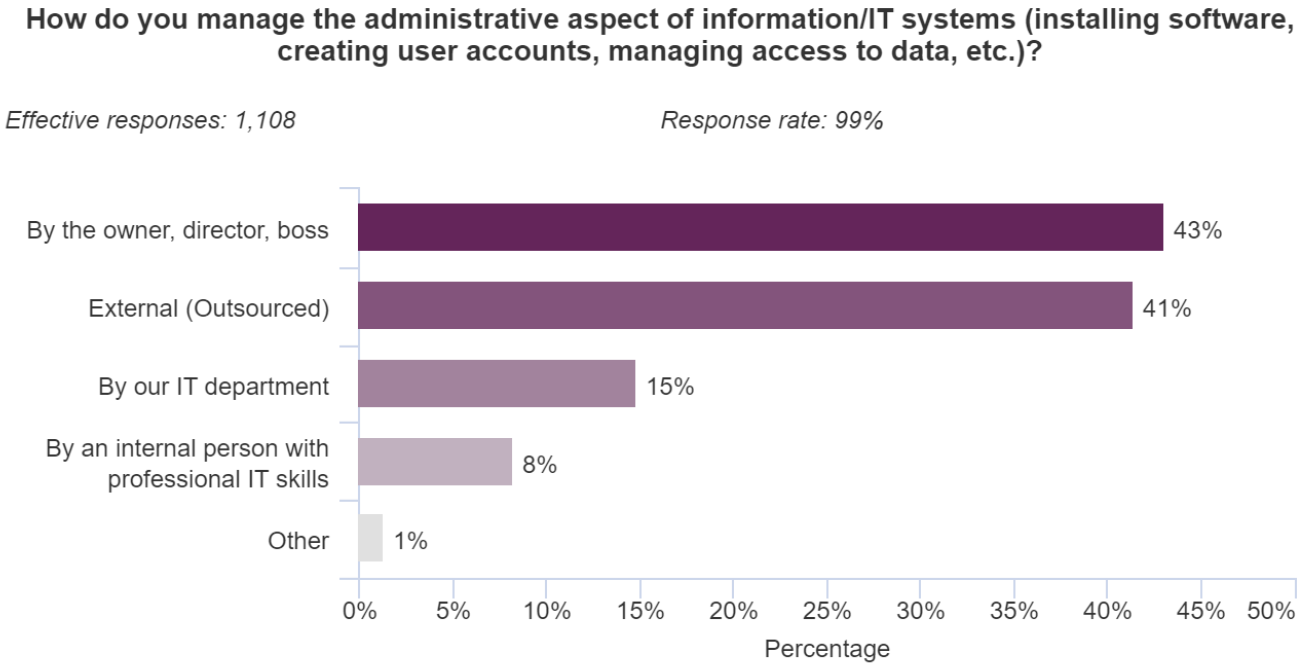
Management of administrative aspects of information/IT systems (overall sample)

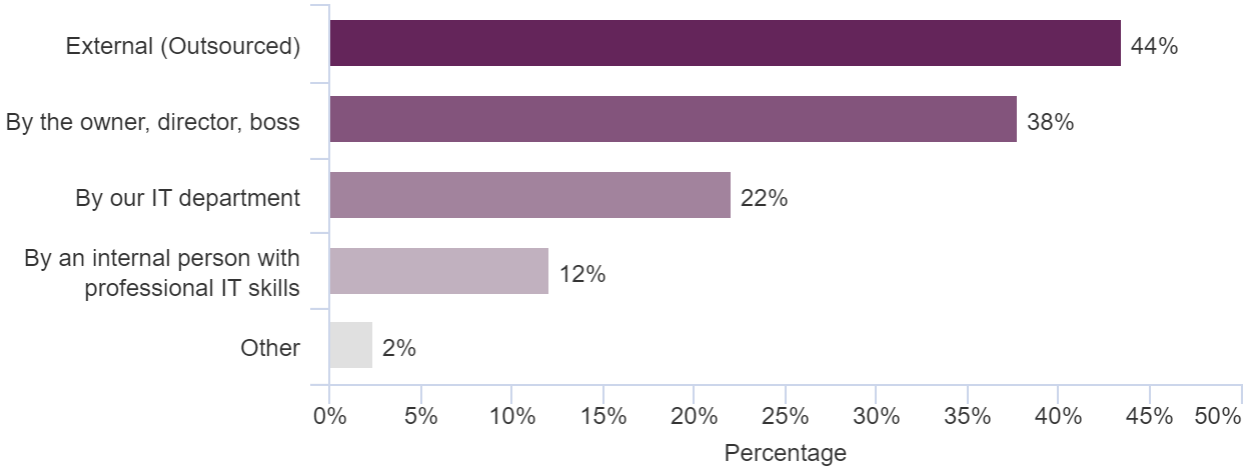


In most hotels, information technology is directly managed in-house, with 43% overseen by the owner or director. However, 41% of hotels choose to either fully or partially outsource this responsibility

Management of administrative aspects of information/IT systems (only hotels of DACH region)

How do you manage the administrative aspect of information/IT systems (installing software, creating user accounts, managing access to data, etc.)?

Effective responses: 540 *Response rate: 99%*



In the DACH region's hotels, almost half (44%) outsource the administrative aspects of information/IT, while 38% manage their information technology in-house.

Management of administrative aspects of information/IT systems versus hotel profile

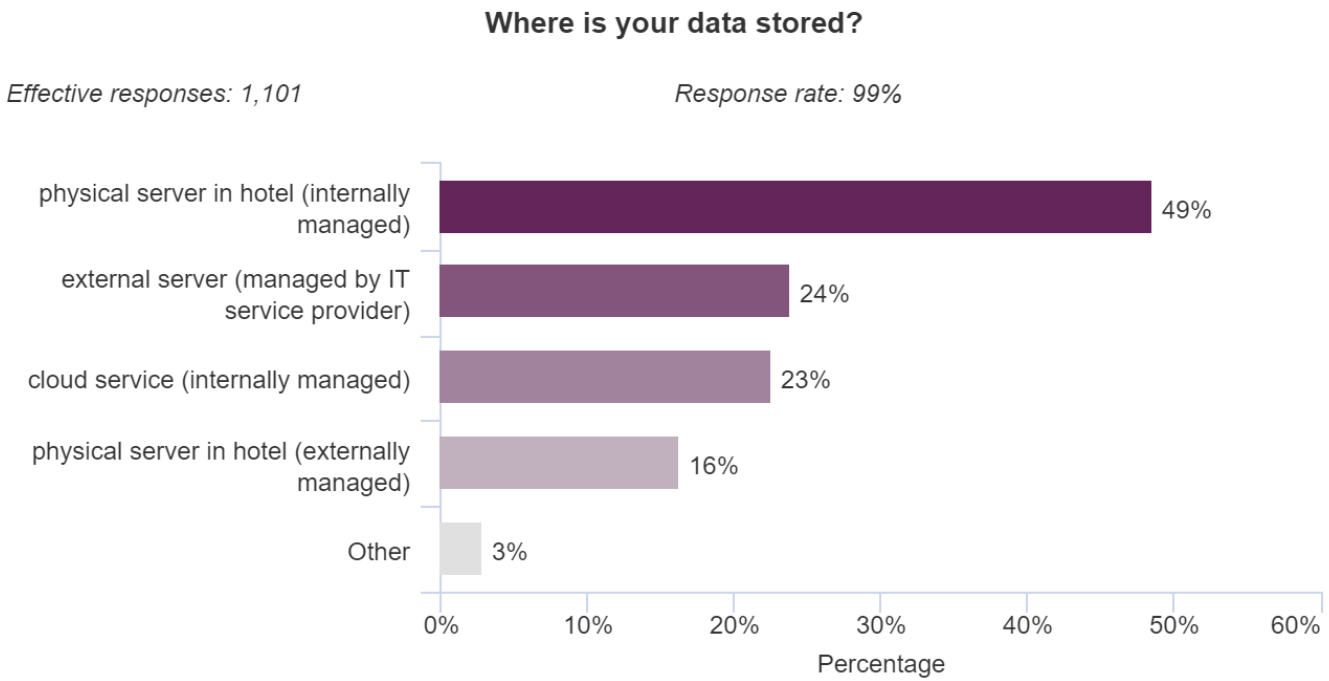
	1*-2*	3*	4-5*		Overall
By the owner, director	70%	50%	24%		***43%***
External	26%	42%	50%		***41%***
IT Departement	2%	8%	26%		***15%***
Internal, skilled person	3%	7%	10%		***8%***
Other	0%	1%	2%		***1%***
	SME hotel	**Hotel Cooperation**	**Hotel Chain**		**Overall**
By the owner, director	49%	33%	10%		***43%***
External	42%	47%	33%		***41%***
IT Departement	7%	26%	60%		***15%***
Internal, skilled person	8%	11%	4%		***8%***
Other	1%	3%	1%		***1%***
	Austria	**Germany**	**Greece**	**Switzerland**	**Overall**
By the owner, director	39%	42%	48%	32%	***43%***
External	43%	40%	40%	47%	***41%***
IT Departement	26%	16%	8%	25%	***15%***
Internal, skilled person	12%	16%	4%	8%	***8%***
Other	1%	4%	0%	2%	***1%***

	well above the average for the sample as a whole
	below the average

In 1* - 2* hotels and SME hotels, IT systems are predominantly managed by the owner or director, whereas 3* to 5* hotels, and those belonging to a chain or cooperation, typically rely on a dedicated IT department or outsource these tasks.

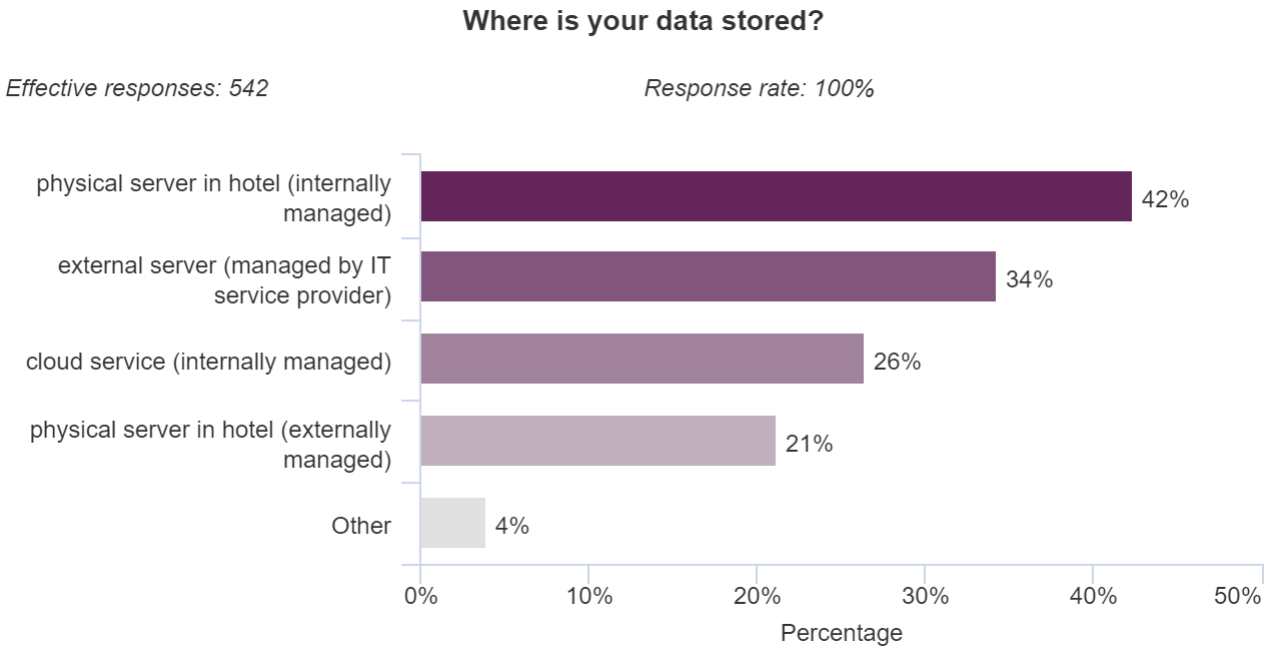
(blue values that are well above the average for the sample as a whole, and red values that are below the average)

Data storage (overall sample)



The majority of hotels primarily store their data on on-site physical servers. However, cloud services are gaining traction, with one in every four hotels now utilizing them for data storage

Data storage (only hotels of DACH region)



In 42% of hotels, data is primarily stored on on-site physical servers. Yet, in the DACH region, external servers are preferred by 34% of hotels, a notable increase compared to the overall sample at 24%.

Data storage versus hotel profile

	1*-2*	3*	4-5*		Overall
Physical server in hotel (internally managed)	55%	50%	46%		***49%***
External server (Managed by IT service provider)	13%	24%	27%		***24%***
Cloud service (internally managed)	24%	18%	23%		***23%***
Physical served in hotel (externally managed)	6%	14%	22%		***16%***
Other	3%	4%	0%		***3%***
	SME hotel	**Hotel Cooperation**	**Hotel Chain**		**Overall**
Physical server in hotel (internally managed)	52%	36%	34%		***49%***
External server (Managed by IT service provider)	22%	33%	35%		***24%***
Cloud service (internally managed)	21%	26%	34%		***23%***
Physical served in hotel (externally managed)	15%	24%	19%		***16%***
Other	3%	6%	0%		***3%***
	Austria	**Germany**	**Greece**	**Switzerland**	**Overall**
Physical server in hotel (internally managed)	42%	49%	55%	36%	***49%***
External server (Managed by IT service provider)	37%	21%	13%	46%	***24%***
Cloud service (internally managed)	25%	26%	19%	28%	***23%***
Physical served in hotel (externally managed)	26%	20%	12%	19%	***16%***
Other	3%	5%	2%	4%	***3%***

In 1* - 2* and SME hotels, data is primarily stored on physical servers located within the hotel, while chain hotels typically outsource this task to external servers maintained by service providers or utilize cloud services. Interestingly, hotels in Austria and Switzerland also heavily rely on external servers for data storage.

(blue values that are well above the average for the sample as a whole, and red values that are below the average)

> The Survey Results: TOE factors (Technology – Organization -Environment)

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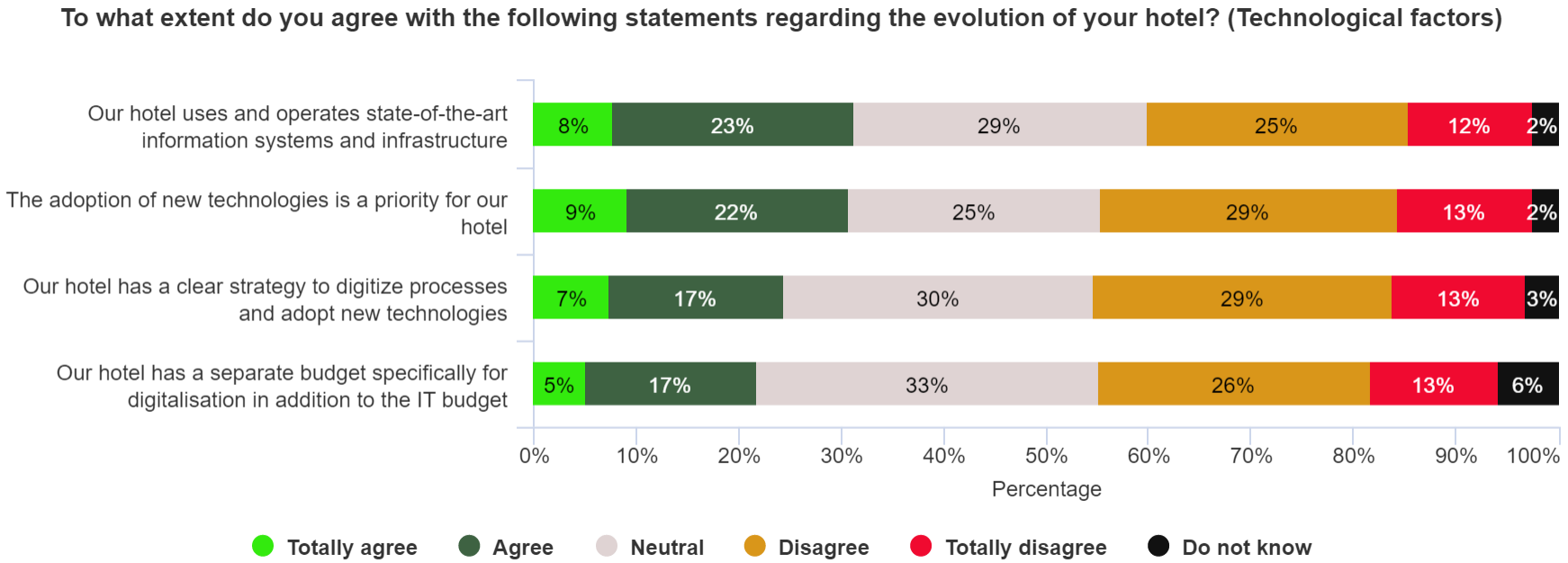
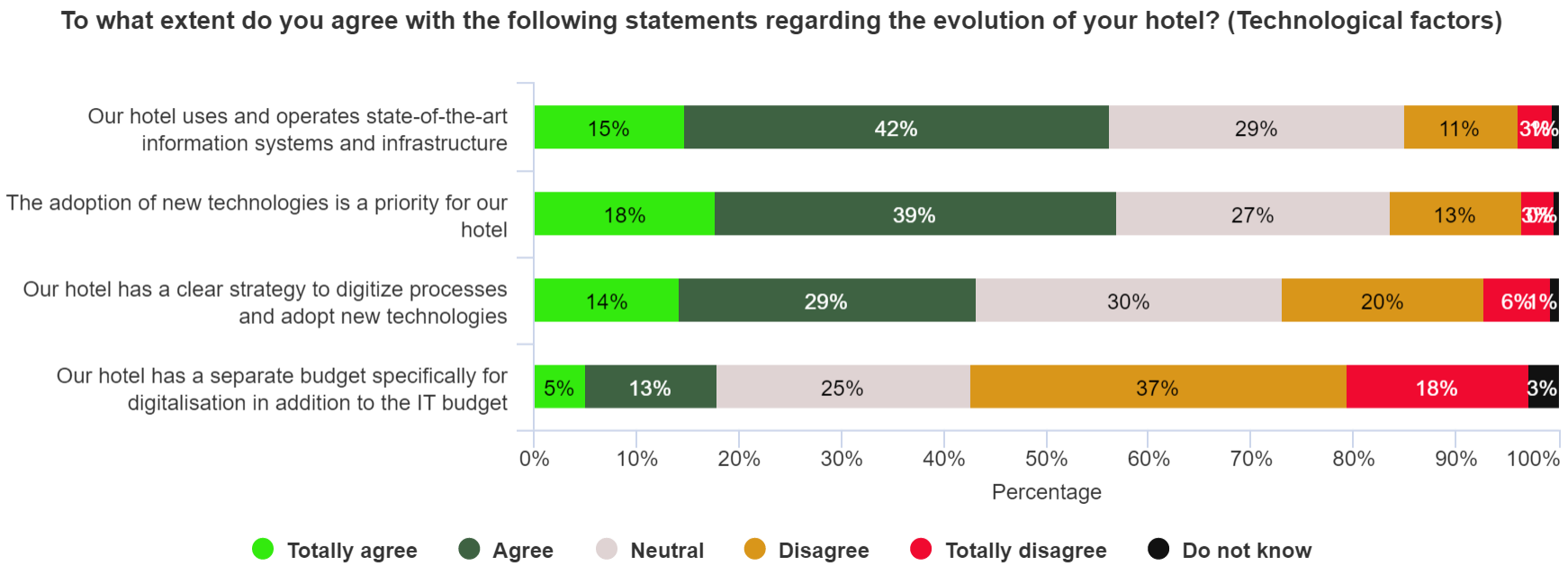
Extent of Agreement with the Technological Factors in the TOE Model (overall sample)



Only approximately 30% of hotels acknowledge that they utilize state-of-the-art IT and prioritize the adoption of new technologies. However, a even lower percentage, at 24%, feel confident in having a clear strategy to navigate the challenges and opportunities of digital transformation.

Extent of Agreement with the Technological Factors in the TOE Model (only hotels of DACH region)



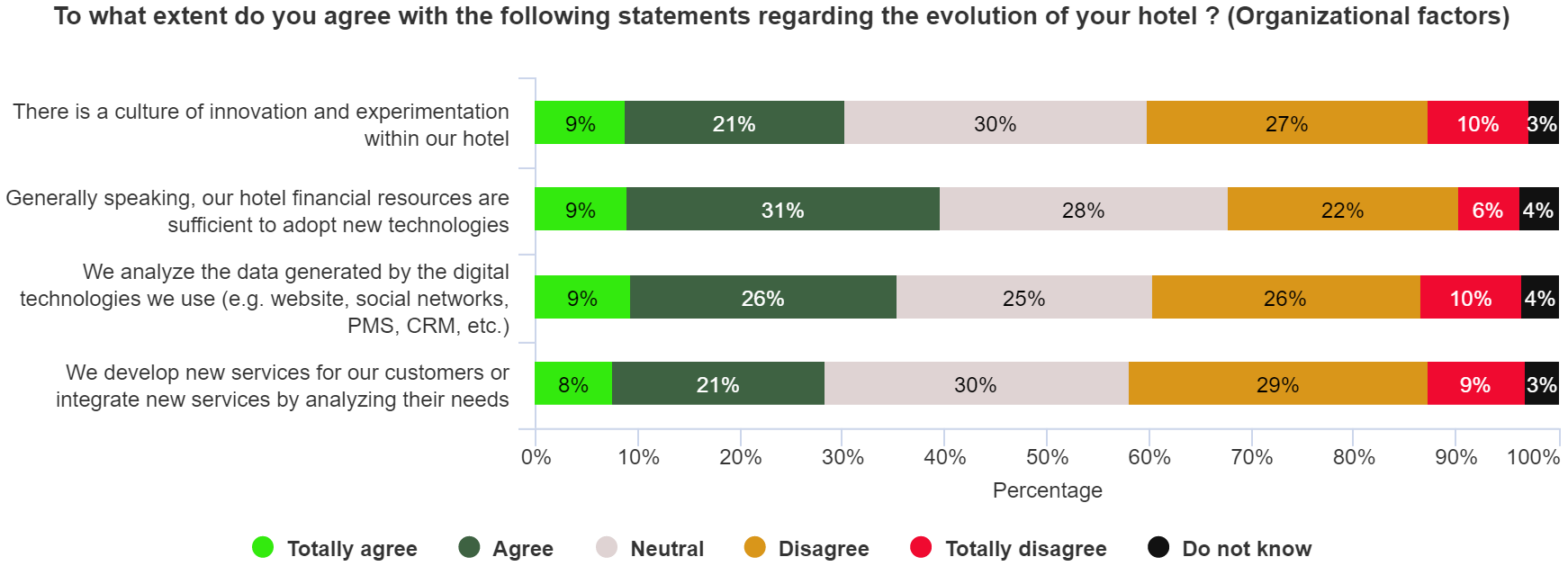
In the DACH region, around 60% of hotels consider themselves to be using state-of-the-art IT and place a high priority on adopting new technologies, a figure that contrasts with the 30% observed in the wider sample. Already, 43% of these hotels have a well-defined strategy to address the complexities of digital transformation. However, it's worth noting that only 18% have a dedicated budget for digital transformation initiatives.

Alignment with Technological Factors by Hotel Profile

% agree & totally agree	**1*-2***	**3***	**4-5***		**Overall**
Uses advanced IT systems	15%	24%	37%		***31%***
Prioritizes tech adoption	10%	25%	37%		***31%***
Clear digitization strategy	11%	19%	32%		***24%***
Separate digitalization budget	30%	18%	23%		***22%***
	SME hotel	**Hotel Cooperation**	**Hotel Chain**		**Overall**
Uses advanced IT systems	28%	57%	38%		***31%***
Prioritizes tech adoption	27%	50%	46%		***31%***
Clear digitization strategy	22%	38%	37%		***24%***
Separate digitalization budget	21%	18%	30%		***22%***
	Austria	**Germany**	**Greece**	**Switzerland**	**Overall**
Uses advanced IT systems	64%	46%	6%	61%	***31%***
Prioritizes tech adoption	63%	46%	4%	64%	***31%***
Clear digitization strategy	44%	40%	5%	46%	***24%***
Separate digitalization budget	17%	16%	25%	19%	***22%***

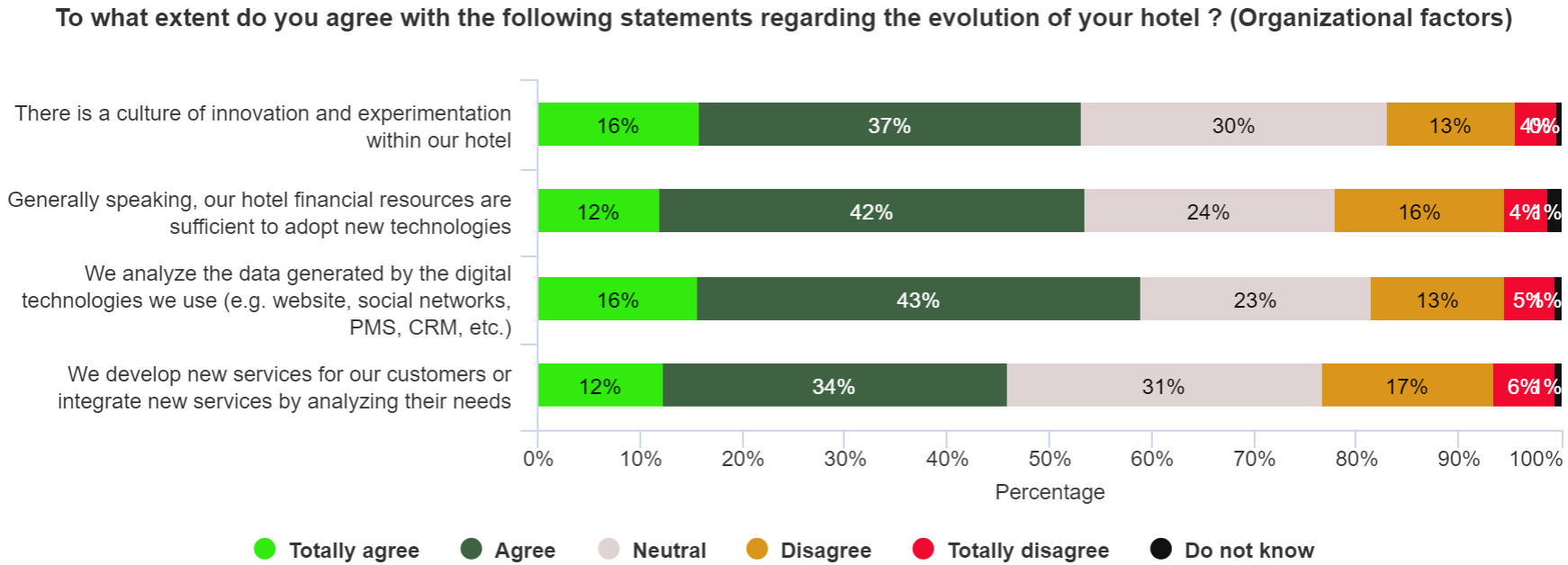
The table reveals that Greek hotels, along with 1* and 2* establishments, show limited agreement with the technological factors of the TOE model. In contrast, hotels from Austria, Germany, and Switzerland, as well as branded hotels, register values significantly above the sample average. It's noteworthy that the overall sample average is heavily skewed by the inclusion of approximately 50% Greek hotels.

Extent of Agreement with the Organisational Factors in the TOE Model (overall sample)



Across the wider sample, readiness to adopt technology presents a mixed picture. While 40% of hotels are confident in their financial ability to adopt new technologies, a slightly lower 35% are actively engaged with the data generated by digital tools. The innovation mindset seems to be in its infancy, with only 30% feeling that their hotel fosters an innovative atmosphere. Only 29% are adapting their services based on a deep understanding of what customers want.

Extent of Agreement with the Organisational Factors in the TOE Model (only hotels of DACH region)



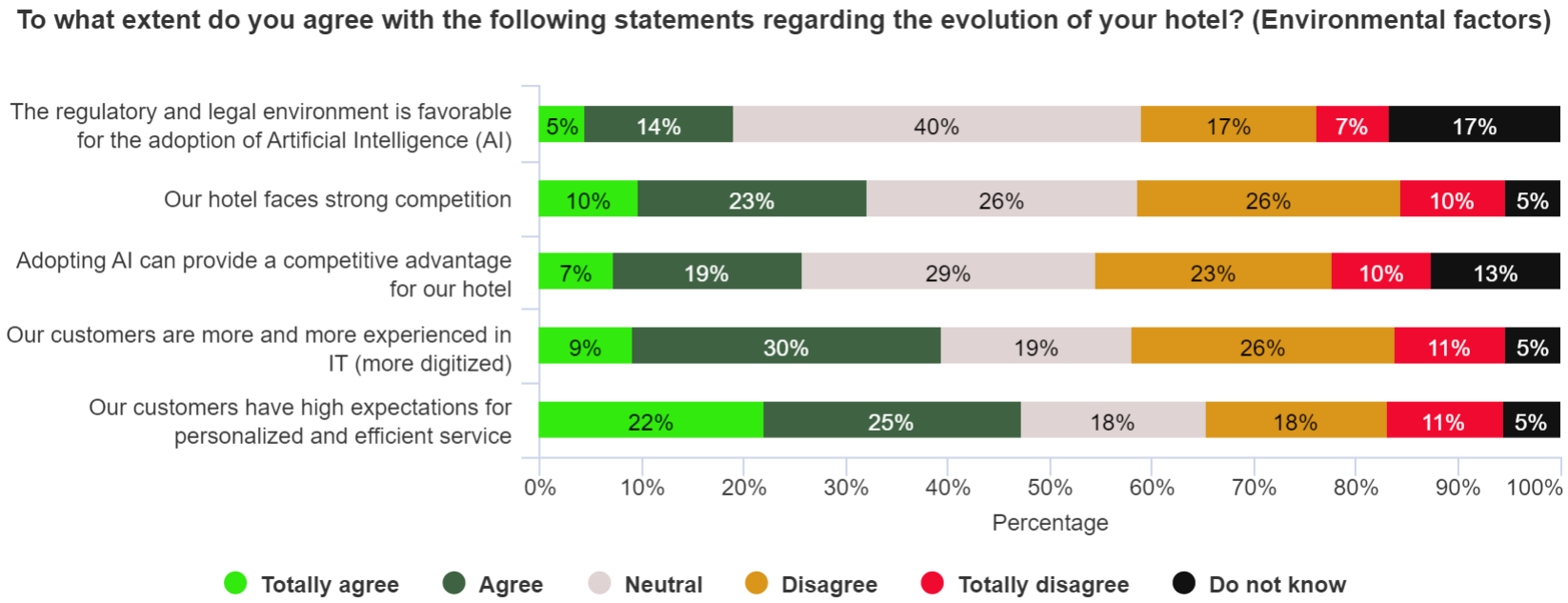
In the DACH region, hotels display a more progressive stance towards technological adoption compared to the overall sample. While 54% of DACH hotels are confident in their financial ability to integrate new technologies, only 40% of hotels in the broader sample share this sentiment. Similarly, 59% of DACH hotels actively harness and analyze digital data, a marked increase from the 35% in the general sample. The innovative spirit seems to be more pronounced in the DACH region, with 53% believing they cultivate an innovative environment, in contrast to the 30% in the overall sample. Furthermore, 46% of DACH hotels are keen on aligning their services with customer needs, a significant leap from the 29% in the broader survey.

Alignment with Organisational Factors by Hotel Profile

% agree & totally agree	**1*-2***	**3***	**4-5***		**Overall**
Innovation culture present	14%	26%	35%		***30%***
Adequate financial resources for tech	42%	39%	39%		***40%***
Analyze digital data	19%	29%	43%		***35%***
Develop services based on customer needs	21%	22%	32%		***29%***
	SME hotel	**Hotel Cooperation**	**Hotel Chain**		**Overall**
Innovation culture present	27%	66%	36%		***30%***
Adequate financial resources for tech	40%	57%	29%		***40%***
Analyze digital data	33%	60%	42%		***35%***
Develop services based on customer needs	26%	48%	35%		***29%***
	Austria	**Germany**	**Greece**	**Switzerland**	**Overall**
Innovation culture present	57%	43%	8%	59%	***30%***
Adequate financial resources for tech	51%	51%	26%	59%	***40%***
Analyze digital data	68%	51%	12%	62%	***35%***
Develop services based on customer needs	53%	38%	11%	49%	***29%***

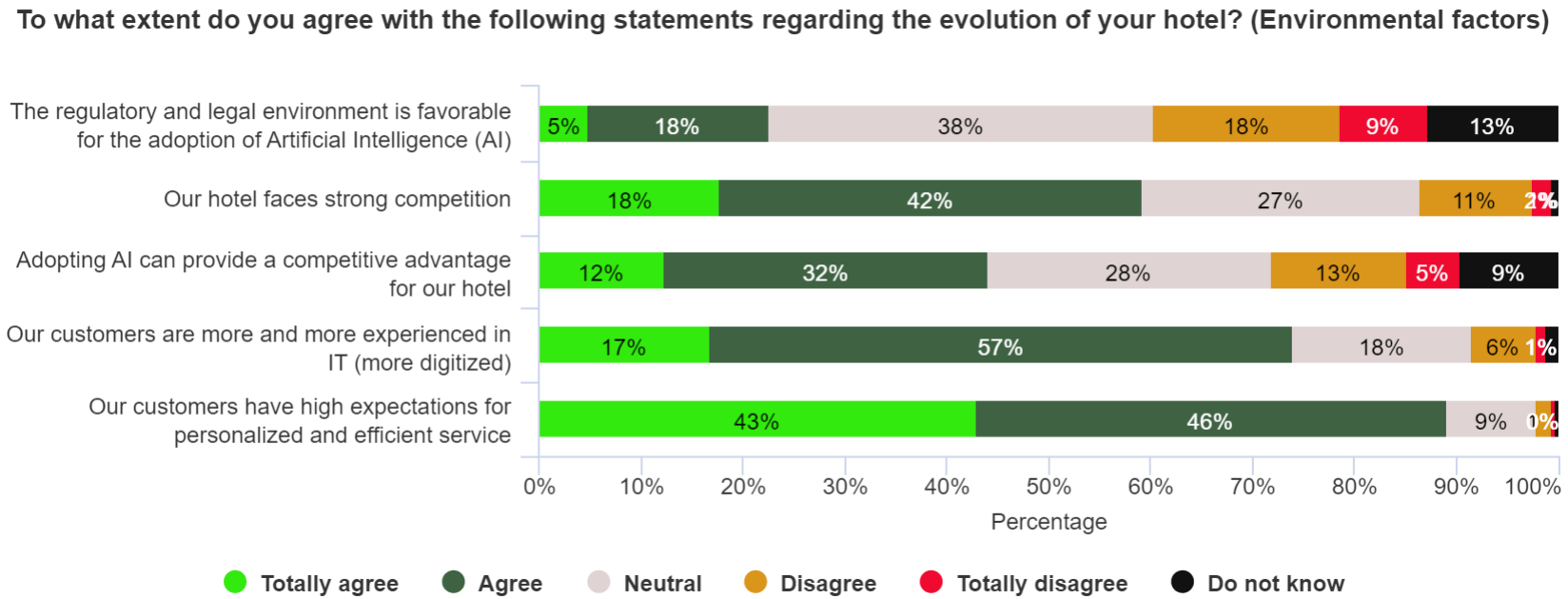
The table reveals that Greek hotels, along with 1* and 2* establishments, show limited agreement with the organisational factors of the TOE model. In contrast, hotels from Austria, Germany, and Switzerland, as well as branded hotels, register values significantly above the sample average. It's noteworthy that the overall sample average is heavily skewed by the inclusion of approximately 50% Greek hotels.

Extent of Agreement with the Environmental Factors in the TOE Model (overall sample)



Almost half of the hotels surveyed believe that heightened customer expectations for personalized and efficient services act as a catalyst for technology adoption, with 39% acknowledging that customers are increasingly tech-savvy. However, only a third perceive that they are up against intense competition, which might explain why a mere 26% see AI as a potential competitive edge. Additionally, there appears to be skepticism regarding the regulatory environment for AI adoption, with just 19% of hotels feeling that the current framework is conducive.

Extent of Agreement with the Environmental Factors in the TOE Model (only hotels from DACH region)



In the DACH region, hotels are acutely aware of the evolving landscape of customer expectations. A staggering 89% of them recognize the growing demand for personalized services, a figure that stands in contrast to the 47% observed in the broader sample. This heightened awareness is further underscored by the fact that 74% of DACH hotels acknowledge their customers' increasing tech-savviness, nearly double the overall sample rate of 39%. The competitive landscape in the DACH region is palpably intense, with 60% of hotels sensing this pressure, compared to just 33% in the overall sample. This heightened sense of competition might be the driving force behind the 44% of DACH hotels that view AI as a potential differentiator, a sentiment that surpasses the overall sample's 26%.

Alignment with Environmental Factors by Hotel Profile

% agree & totally agree	**1*-2***	**3***	**4-5***		**Overall**
Favorable AI regulations	17%	18%	21%		***19%***
Hotel faces strong competition	10%	28%	39%		***33%***
AI offers competitive edge	11%	26%	27%		***26%***
Customers are tech-savvy	9%	38%	44%		***39%***
High expectations of guests for personalized service	13%	42%	53%		***47%***
	SME hotel	**Hotel Cooperation**	**Hotel Chain**		**Overall**
Favorable AI regulations	19%	24%	15%		***19%***
Hotel faces strong competition	29%	66%	42%		***33%***
AI offers competitive edge	24%	43%	32%		***26%***
Customers are tech-savvy	36%	75%	47%		***39%***
High expectations of guests for personalized service	43%	89%	53%		***47%***
	Austria	**Germany**	**Greece**	**Switzerland**	**Overall**
Favorable AI regulations	27%	16%	15%	25%	***19%***
Hotel faces strong competition	64%	52%	5%	63%	***33%***
AI offers competitive edge	46%	41%	7%	45%	***26%***
Customers are tech-savvy	79%	67%	5%	77%	***39%***
High expectations of guests for personalized service	90%	84%	6%	93%	***47%***

The table reveals that Greek hotels, along with 1* and 2* establishments, show limited agreement with the environmental factors of the TOE model. In contrast, hotels from Austria, Germany, and Switzerland, as well as branded hotels, register values significantly above the sample average. It's noteworthy that the overall sample average is heavily skewed by the inclusion of approximately 50% Greek hotels.

Overall evaluation of TOE factors

- The TOE (Technology-Organization-Environment) model offers a comprehensive lens to understand the dynamics shaping the adoption of new technologies within the hotel industry. When examining the technological factors, it's evident that some segments of the hotel market (SME hotels, economy to mid-scale hotels) lack the technological infrastructure and expertise for robust adoption. Only a fraction sees AI as a potential competitive edge, despite nearly half recognizing the rising tide of customer expectations for personalized services and the increasing tech-savviness of their clientele.
- From an organizational perspective, while 40% of hotels believe they have the financial means to adopt new technologies and 35% actively analyze digital data, there's a clear gap in the industry's readiness. Only 30% of hotels feel they foster an innovative culture, suggesting a need for a shift in internal dynamics to fully embrace technological innovations. In contrast, hotels from the DACH region exhibit a heightened organizational preparedness, further emphasizing the disparities faced by SME hotels, particularly those in the budget to mid-tier segments.
- From an environmental perspective, the data shows a clear divergence in perceptions between different regions and hotel segments. Greek hotels, as well as budget and midscale SME hotels, show limited resonance with the environmental factors of the TOE model. In sharp contrast, properties from the DACH region (Austria, Germany and Switzerland) and branded hotels show a stronger alignment with these factors.

> The Survey Results: AI Technology Adoption

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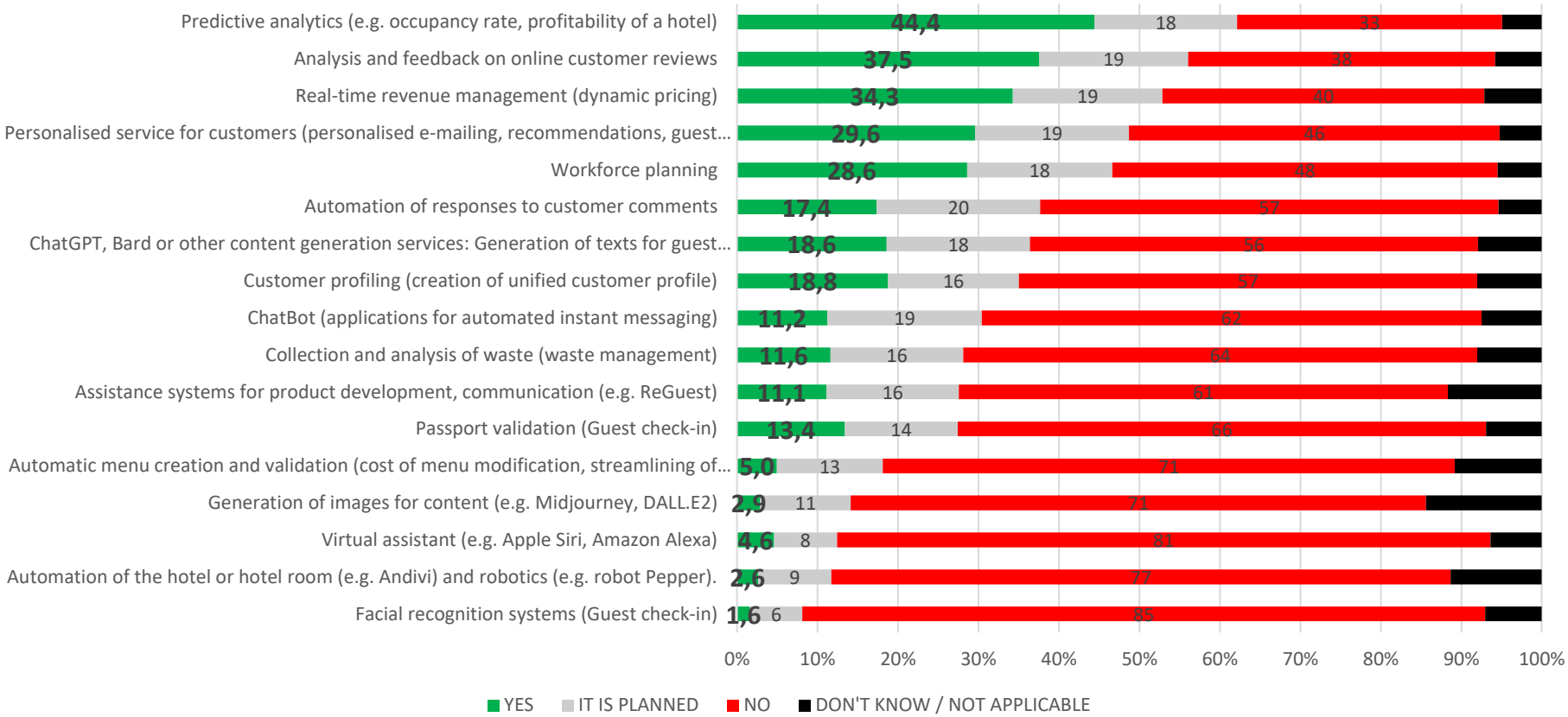
Adoption of AI technologies (overall sample)



Adoption of AI technologies

Most Adopted Technologies:

- **Predictive Analysis** (44%): This is the most utilized technology, allowing hotels to forecast elements such as occupancy rate or profitability.
- **Analysis and Feedback on Online Customer Reviews** (38%): Hotels place significant importance on customer feedback, which is vital for service improvement.
- **Real-time Revenue Management** (34%): Dynamic pricing is crucial for maximizing revenue, especially in such a competitive sector.
- **Workforce Planning** (29%) and **Personalized Service for Customers** (30%): These technologies indicate that hotels are looking to optimize their human resources while offering a tailored experience to their guests.

Moderately Adopted Technologies:

- Technologies such as **automating responses to customer comments** (17%), creating **unified customer profiles** (19%), and using **ChatGPT or other content generation services** (19%) are adopted at a moderate level. This indicates a growing trend towards automating and personalizing communication with guests.
- **Waste management** (12%) and **assistance systems for product development and communication** (11%) show that hotels are also looking to optimize their internal operations through AI.

Adoption of AI technologies

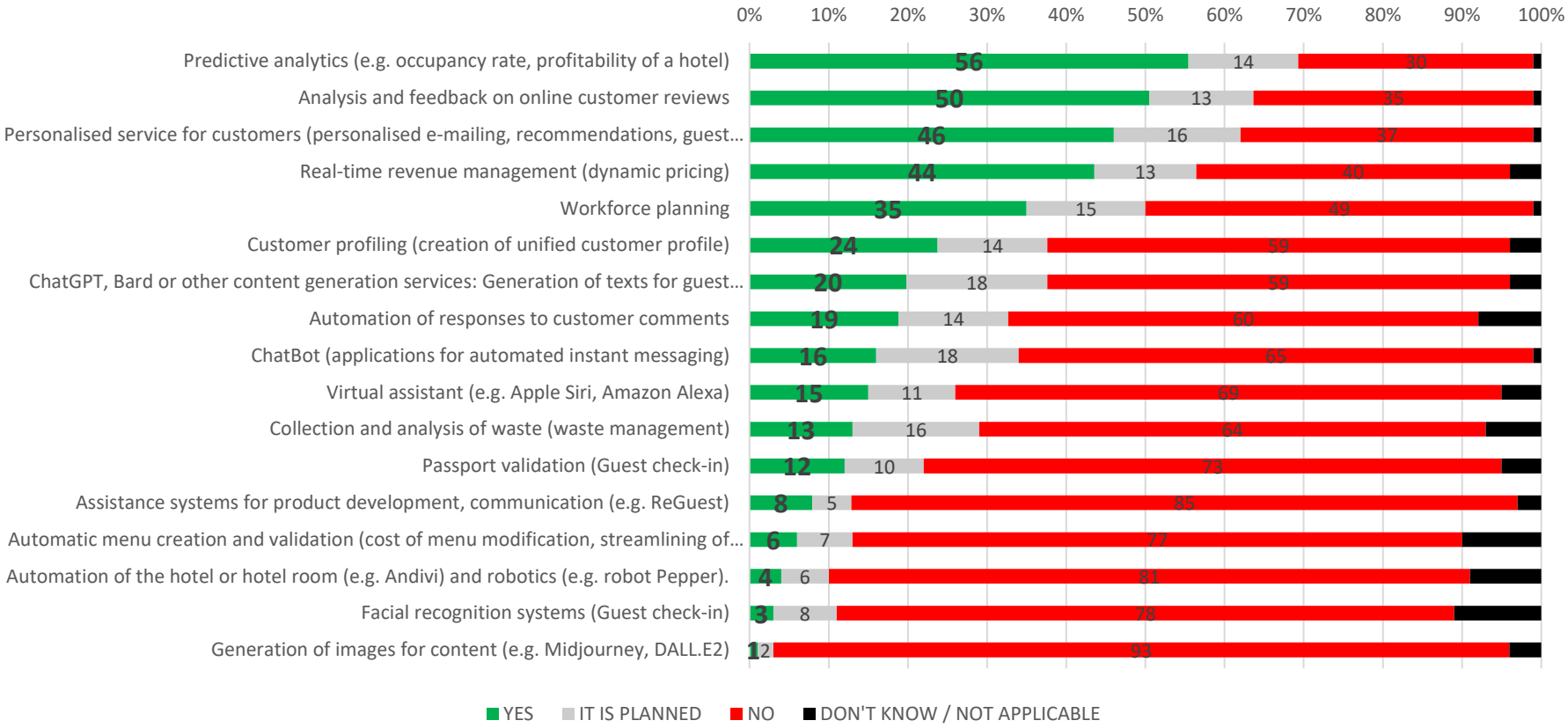
Less Adopted Technologies:

- Technologies like **facial recognition** (2%), hotel or **hotel room automation** (3%), and **image generation** for content (3%) are still sparsely adopted. This might be due to privacy concerns, costs, or integration complexity.
- **Virtual assistants** like Siri or Alexa (5%) and **automatic menu creation** (5%) are also less common, suggesting that these technologies might still be in an exploratory phase for many hotels.

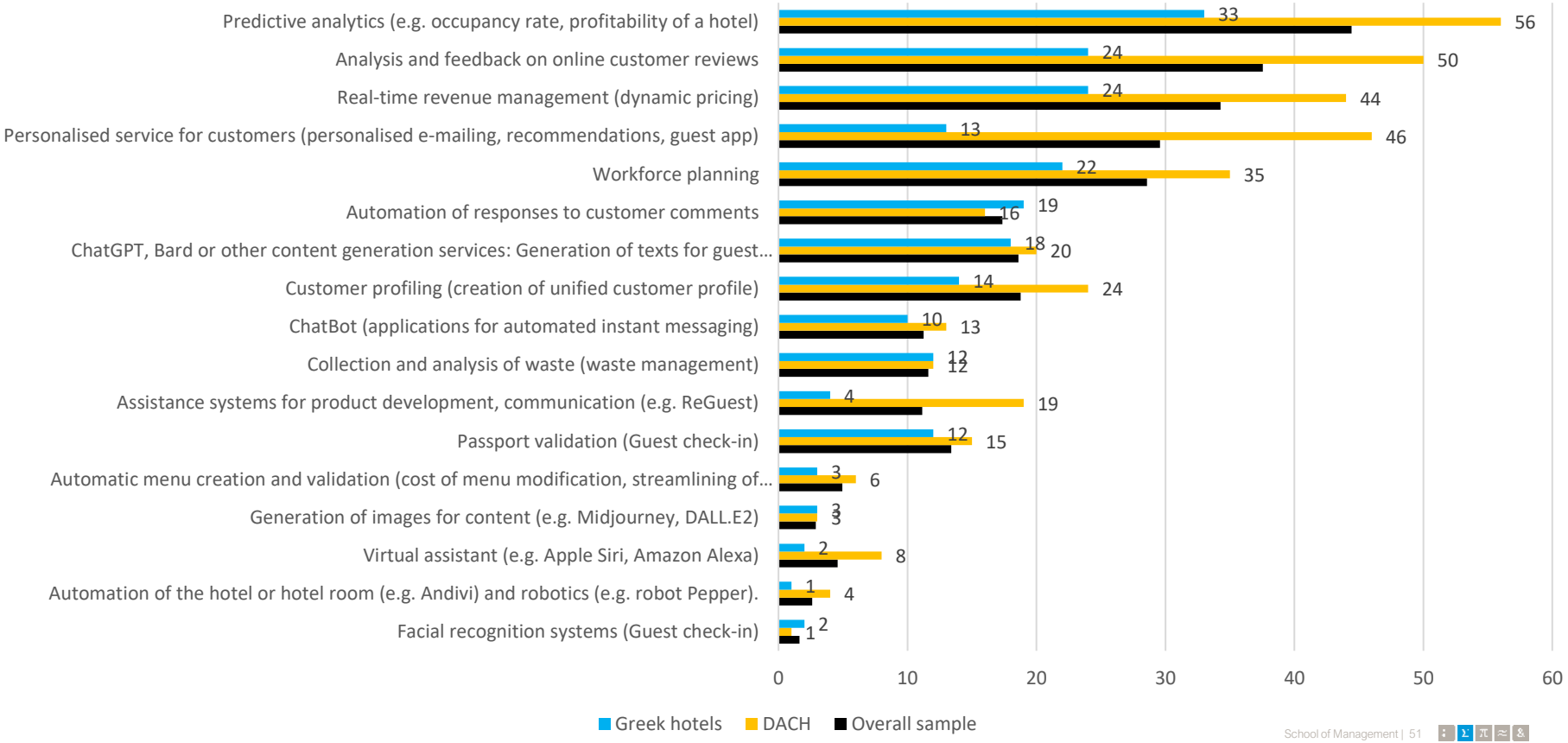
Conclusion:

- **Hotels appear to prioritize AI technologies that directly impact their revenue, operational efficiency, and enhancing the customer experience**. While some technologies are still in their early stages of adoption, their usage is likely to increase as hotels recognize their added value. It's also interesting to note that, although some technologies are innovative, their adoption is still low, suggesting some caution or barriers to their implementation.

Adoption of AI technologies (only hotels from DACH region)



Adoption of AI technologies: Comparison of adopters between hotels of the DACH region and Greece



Regional Adoption patterns of AI technologies

Upon analyzing the AI adoption rates across the overall sample, DACH region, and Greek hotels, several patterns and disparities emerge:

- **Mature Technologies**: Technologies like predictive analytics, analysis and feedback on online customer reviews, and real-time revenue management are the most adopted across all groups. The DACH region leads in adoption rates, with 56% for predictive analytics, 50% for online customer reviews, and 44% for real-time revenue management. Greek hotels, while trailing the DACH region, still show a significant uptake, especially in predictive analytics at 33%.

- **Personalization & Customer Engagement**: The DACH region places a strong emphasis on personalized services for customers, with a notable 46% adoption rate, which is significantly higher than the overall sample's 30% and Greek hotels' 13%. This suggests that hotels in the DACH region are more focused on enhancing the guest experience through personalization.

- **Operational Efficiency**: Workforce planning and assistance systems for product development are more prevalent in the DACH region, indicating a trend towards optimizing operations using AI. Greek hotels lag in adopting assistance systems, with only 4% uptake compared to the DACH's 19%.

Regional Adoption patterns of AI technologies

- **Customer Interaction Tools**: While chatbots and customer profiling tools are relatively well-adopted across the board, the DACH region again leads, especially in customer profiling at 24%. Greek hotels, however, show a closer alignment with the overall sample in adopting content generation services like ChatGPT, indicating a growing interest in automated guest communication.

- **Emerging Technologies**: Technologies like facial recognition, hotel automation, and virtual assistants have lower adoption rates across all groups. However, the DACH region shows a slightly higher inclination towards these, especially virtual assistants at 8%. Greek hotels, on the other hand, seem more cautious, with adoption rates aligning closely with or even lagging somewhat behind the overall sample.

- **Consistent Adoption**: Some technologies, like waste management and generation of images for content, show consistent adoption rates across the groups, suggesting these might be universally recognized as valuable or are in early stages of industry-wide adoption.

- **In conclusion**, while the DACH region consistently showcases higher adoption rates and a more proactive approach towards integrating AI in various facets of hotel operations and guest experience, Greek hotels, despite being a significant portion of the sample, often align with or lag somewhat behind the overall trends. This disparity underscores the regional differences in prioritizing and investing in AI technologies within the hospitality sector.

Adoption of AI technologies by hotel category

% of hotels that adopted technology	1*-2*	3*	4-5*	Overall
Predictive Analytics	23%	40%	57%	***44%***
Online Review Analysis	16%	33%	51%	***38%***
Real-time revenue management	17%	32%	44%	***34%***
Personalized Services	8%	25%	41%	***30%***
Workforce Planning	15%	28%	36%	***29%***
Customer Profiling	7%	16%	27%	***19%***
Text Generators (e.g. ChatGPT, Bard)	16%	16%	22%	***19%***
Automated Customer Responses	16%	15%	22%	***17%***
Passport validation	5%	9%	22%	***13%***
Waste Analysis	3%	11%	17%	***12%***
Product Dev. Assist (e.g. ReGuest)	3%	6%	17%	***11%***
ChatBot	8%	10%	14%	***11%***
Menu Automation	1%	4%	8%	***5%***
Virtual Assistant (e.g. Siri, Alexa)	3%	6%	3%	***5%***
Image Generators (e.g. DALL.E2)	2%	2%	3%	***3%***
Hotel Automation (e.g.Pepper Robot)	2%	2%	3%	***3%***
Facial recognition system	2%	2%	1%	***2%***

The color-coded table illustrates the adoption of AI across hotel categories, with blue indicating values significantly above the population average and red denoting values below. It's evident that 1-2* hotels lag behind their 4-5* counterparts in AI adoption, particularly in areas like event management, e-reputation, HR, and personalization. Technologies highlighted in gray represent areas where hotels can proactively decide on AI adoption, as opposed to other areas where the decision is primarily driven by the technology provider. We can clearly see the technology providers push more for AI adoption.

Adoption of AI technologies by hotel type

% of hotels that adopted technology	SME hotel	Hotel Cooperation	Hotel Chain	Overall
Predictive Analytics	40%	62%	68%	***44%***
Online Review Analysis	32%	59%	64%	***38%***
Real-time revenue management	30%	53%	57%	***34%***
Personalized Services	25%	48%	51%	***30%***
Workforce Planning	25%	38%	48%	***29%***
Customer Profiling	16%	29%	36%	***19%***
Text Generators (e.g. ChatGPT, Bard)	18%	20%	22%	***19%***
Automated Customer Responses	16%	12%	32%	***17%***
Passport validation	11%	17%	26%	***13%***
Waste Analysis	9%	12%	27%	***12%***
Product Dev. Assist (e.g. ReGuest)	10%	15%	18%	***11%***
ChatBot	10%	9%	19%	***11%***
Menu Automation	4%	8%	11%	***5%***
Virtual Assistant (e.g. Siri, Alexa)	4%	5%	6%	***5%***
Image Generators (e.g. DALL.E2)	3%	3%	4%	***3%***
Hotel Automation (e.g.Pepper Robot)	2%	2%	6%	***3%***
Facial recognition system	2%	3%	1%	***2%***

The colour-coded table highlights AI adoption across different hotel types: blue indicates above-average levels, while red indicates below-average levels. SME hotels lag significantly behind hotel cooperatives and chains in AI adoption, particularly in the areas of event management, e-reputation, human resources, operational processes and personalisation. Technologies in grey indicate areas where hotels can actively choose to integrate AI, as opposed to areas that are largely driven by technology vendors who are championing AI adoption.

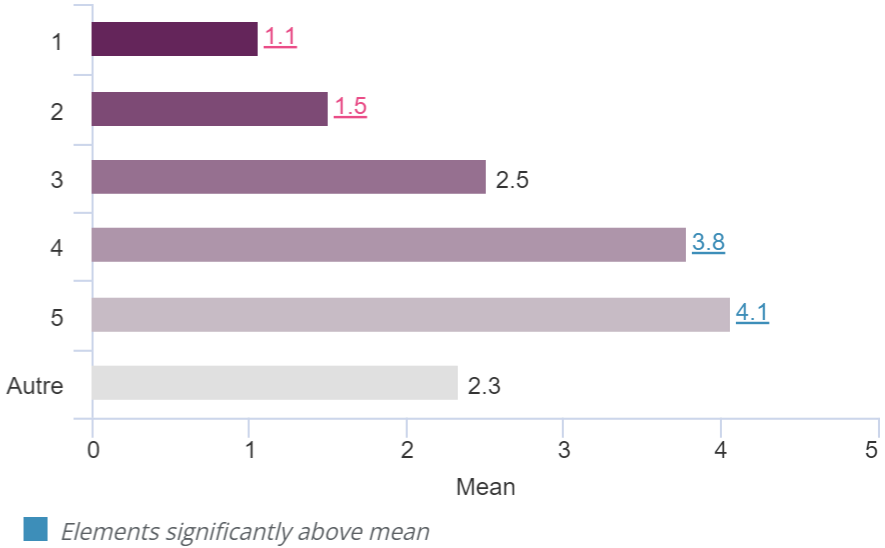
Adoption of AI technologies by country

% of hotels that adopted technology	Austria	Germany	Greece	Switzerland	Overall
Predictive Analytics	65%	46%	33%	59%	***44%***
Online Review Analysis	60%	40%	24%	54%	***38%***
Real-time revenue management	48%	34%	24%	51%	***34%***
Personalized Services	63%	35%	13%	44%	***30%***
Workforce Planning	44%	29%	22%	35%	***29%***
Customer Profiling	31%	18%	14%	25%	***19%***
Text Generators (e.g. ChatGPT, Bard)	26%	11%	18%	24%	***19%***
Automated Customer Responses	18%	13%	19%	17%	***17%***
Passport validation	20%	10%	12%	17%	***13%***
Waste Analysis	12%	7%	12%	16%	***12%***
Product Dev. Assist (e.g. ReGuest)	39%	9%	4%	13%	***11%***
ChatBot	26%	11%	10%	15%	***11%***
Menu Automation	6%	6%	3%	8%	***5%***
Virtual Assistant (e.g. Siri, Alexa)	13%	9%	2%	3%	***5%***
Image Generators (e.g. DALL.E2)	6%	0%	3%	3%	***3%***
Hotel Automation (e.g.Pepper Robot)	3%	3%	1%	5%	***3%***
Facial recognition system	2%	3%	2%	1%	***2%***

The colour-coded table shows AI adoption across different hotel types: blue indicates above-average adoption, while red indicates below-average adoption. Austrian and Swiss hotels show higher levels of AI integration compared to those in Greece and Germany, particularly in areas such as revenue management, e-reputation and personalisation.

Total number of AI technologies adopted by category

	TOTAL NUMBER OF AI TECHNOLOGIES ADOPTED
1	1.1
2	1.5
3	2.5
4	3.8
5	4.1
Autre	2.3
TOTAL	**2.9**

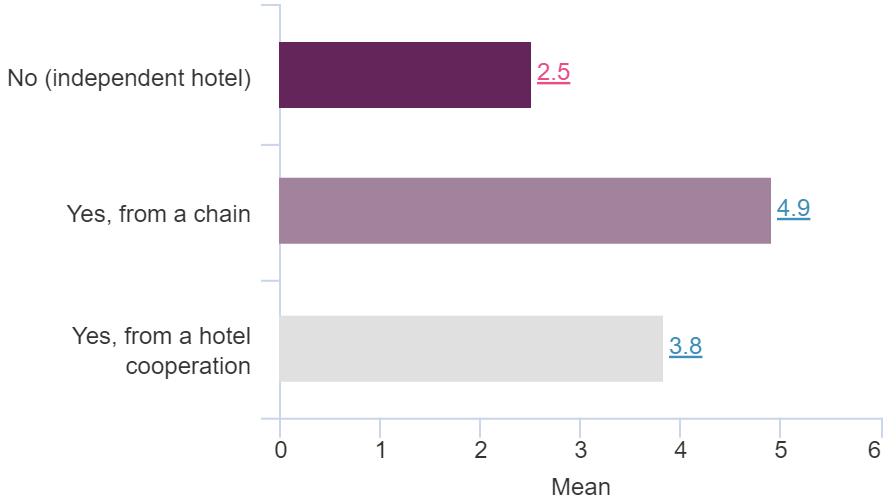


The relationship is very significant. p-value= < 0,01 ; Fisher= 21.6.
Inter variance= 172.7. Intra variance= 8.0.

Out of 17 AI-based services evaluated, the hotels in the study adopted an average of 2.9 services (17%). The graphic illustrates that the number of adopted AI technologies increases with the hotel's star rating.

Total number of AI technologies adopted by type of hotel

	TOTAL NUMBER OF AI TECHNOLOGIES ADOPTED
No (independent hotel)	2.5
Yes, from a chain	4.9
Yes, from a hotel cooperation	3.8
TOTAL	**2.9**

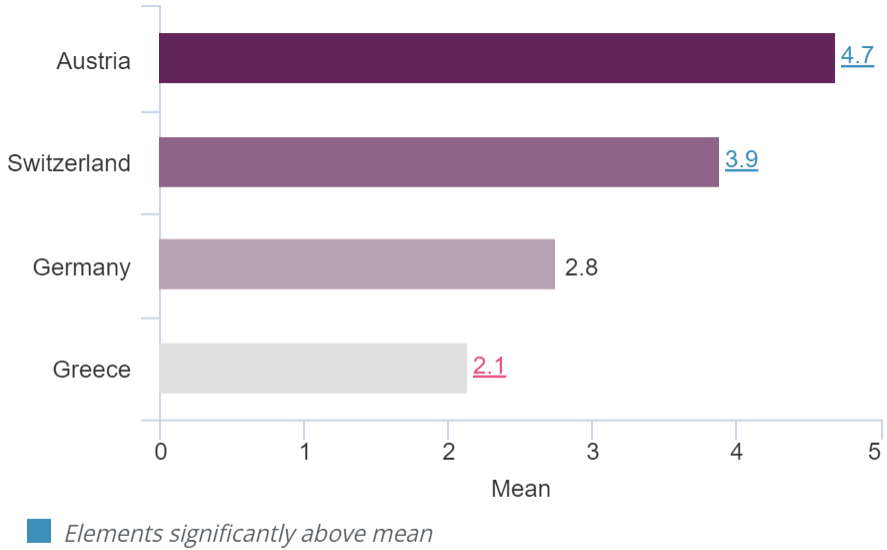


The relationship is very significant. p-value= < 0,01 ; Fisher= 42.2.
Inter variance= 351.9. Intra variance= 8.3.

Out of 17 AI-based services evaluated, the hotels in the study adopted an average of 2.9 services (17%). The graphic illustrates that the number of adopted AI technologies is significantly higher in chain hotels and those that are part of a hotel cooperation compared with SME hotels.

Total number of AI technologies adopted by country

	TOTAL NUMBER OF AI TECHNOLOGIES ADOPTED
Austria	4.7
Switzerland	3.9
Germany	2.8
Greece	2.1
TOTAL	**2.9**

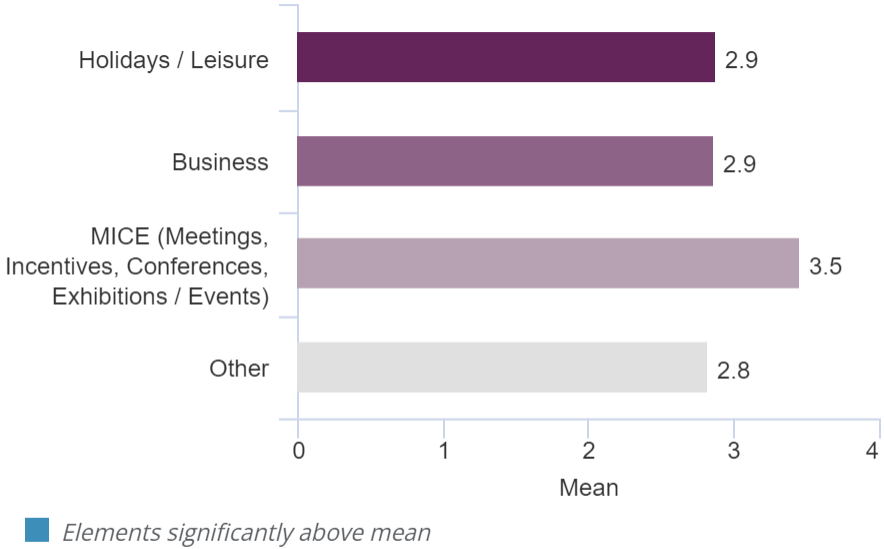


The relationship is very significant. p-value= < 0,01 ; Fisher= 29.5.
Inter variance= 239.7. Intra variance= 8.1.

Out of 17 AI-based services evaluated, the hotels in the study adopted an average of 2.9 services (17%). The graphic illustrates that the number of adopted AI technologies is significantly higher in Austria (sample dominated by 4* hotels) and Switzerland.

Total number of AI technologies adopted by most important customer segment

	TOTAL NUMBER OF AI TECHNOLOGIES ADOPTED
Holidays / Leisure	2.9
Business	2.9
MICE (Meetings, Incentives, Conferences, Exhibitions / Events)	3.5
Other	2.8
TOTAL	**2.9**

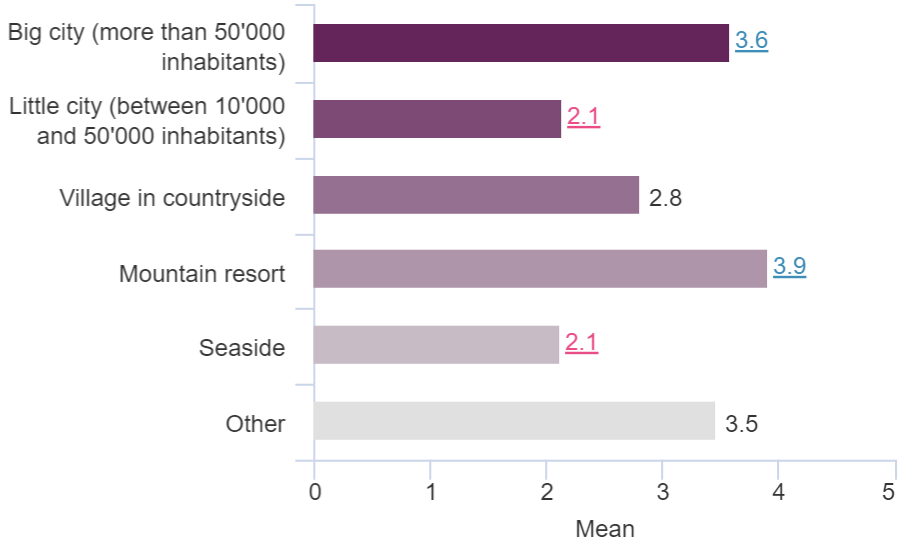


The relationship is not significant. p-value= 0.8 ; Fisher= 0.4.
Inter variance= 3.4. Intra variance= 9.0.

Out of 17 AI-based services evaluated, the hotels in the study adopted an average of 2.9 services (17%). The graphic illustrates that the number of adopted AI technologies does not appear to vary with the positioning of the hotels, as expressed by the main customer segment served.

Total number of AI technologies adopted by location

	TOTAL NUMBER OF AI TECHNOLOGIES ADOPTED
Big city (more than 50'000 inhabitants)	3.6
Little city (between 10'000 and 50'000 inhabitants)	2.1
Village in countryside	2.8
Mountain resort	3.9
Seaside	2.1
Other	3.5
TOTAL	**2.9**

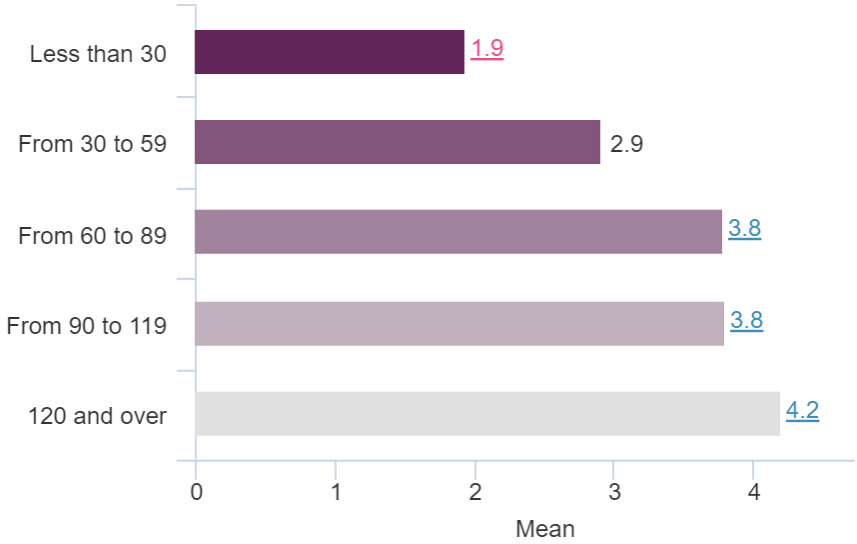


The relationship is very significant. p-value= < 0,01 ; Fisher= 12.5.
Inter variance= 106.8. Intra variance= 8.5.

Out of 17 AI-based services evaluated, the hotels in the study adopted an average of 2.9 services (17%). The graphic illustrates that the number of adopted AI technologies is significantly higher in hotels located in big cities and mountain resorts, while it is below average in hotels from small cities and seaside locations.

Total number of AI technologies adopted by size (nbe of rooms)

	TOTAL NUMBER OF AI TECHNOLOGIES ADOPTED
Less than 30	1.9
From 30 to 59	2.9
From 60 to 89	3.8
From 90 to 119	3.8
120 and over	4.2
TOTAL	**2.9**

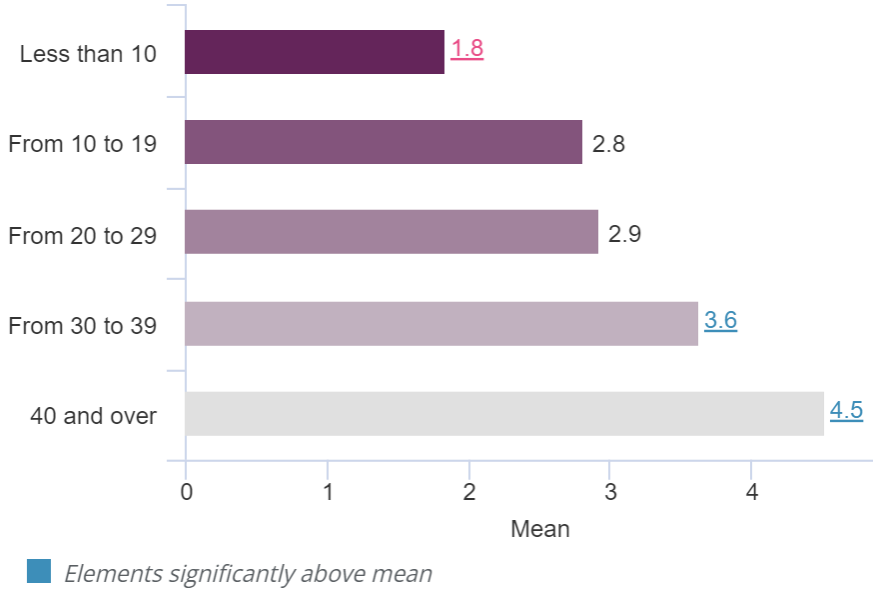


The relationship is very significant. p-value= < 0,01 ; Fisher= 21.7.
Inter variance= 179.9. Intra variance= 8.3.

Out of 17 AI-based services evaluated, the hotels in the study adopted an average of 2.9 services (17%). The graphic illustrates that the number of adopted AI technologies correlates with the size of the hotel, as measured by the number of rooms.

Total number of AI technologies adopted by size (nbe of staff)

	TOTAL NUMBER OF AI TECHNOLOGIES ADOPTED
Less than 10	1.8
From 10 to 19	2.8
From 20 to 29	2.9
From 30 to 39	3.6
40 and over	4.5
TOTAL	**2.9**



The relationship is very significant. p-value= < 0,01 ; Fisher= 35.0.
Inter variance= 279.3. Intra variance= 8.0.

Out of 17 AI-based services evaluated, the hotels in the study adopted an average of 2.9 services (17%). The graphic illustrates that the number of adopted AI technologies correlates with the size of the hotel, as measured by the number of staff members.

> The Survey Results: AI Technology Perception

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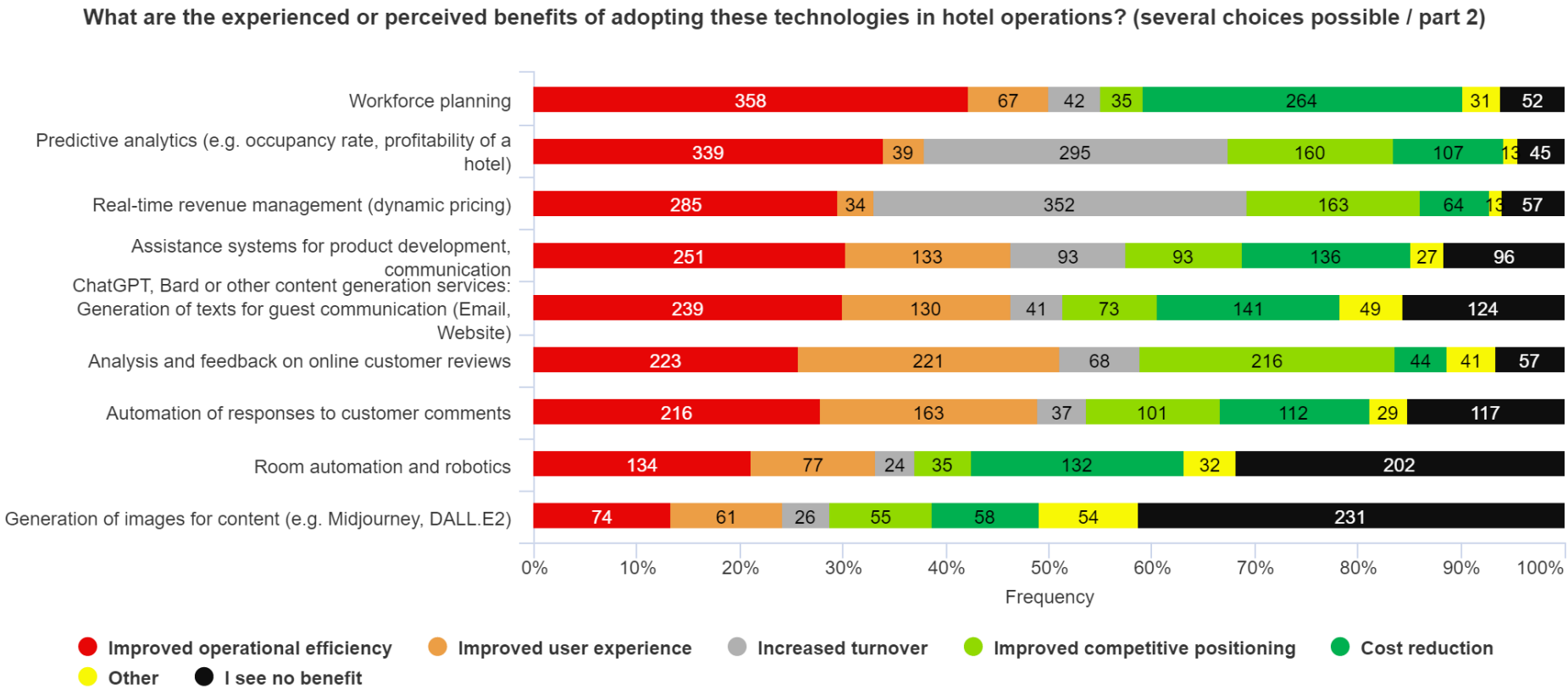
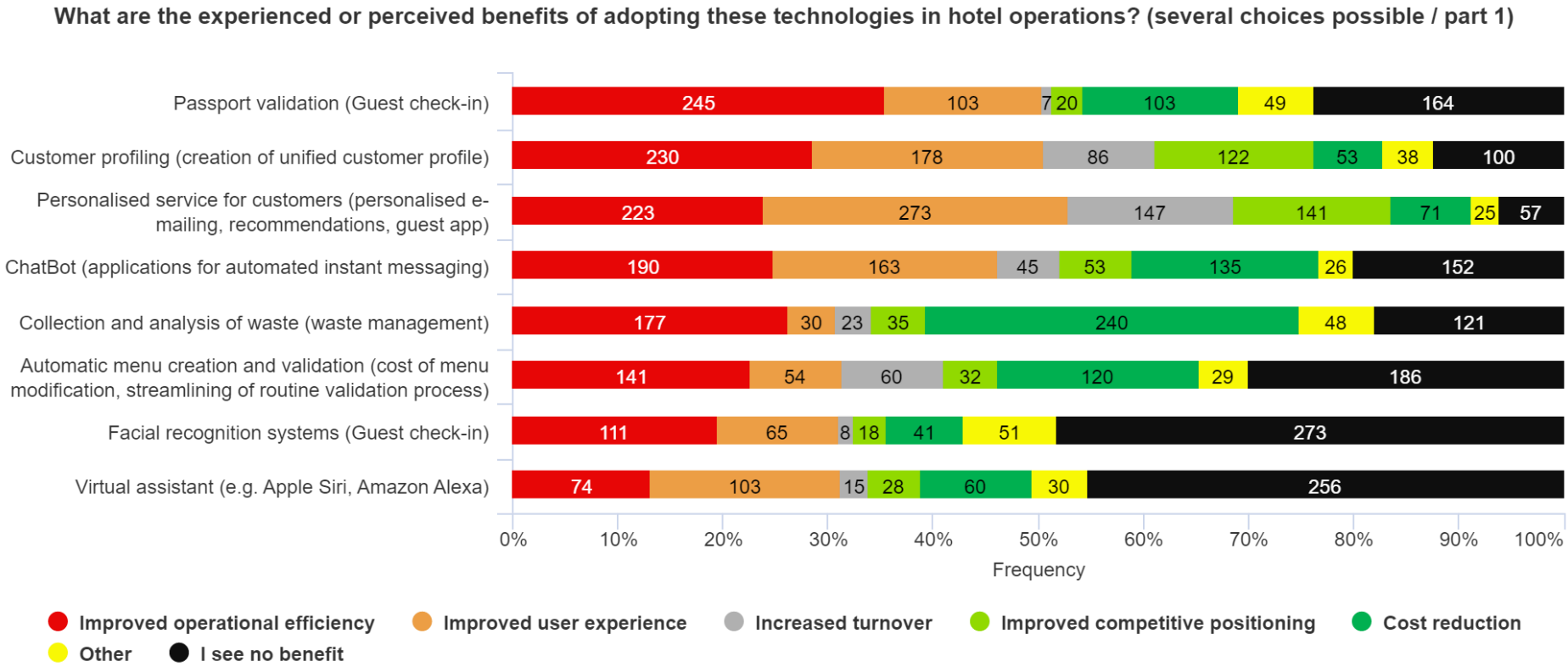
Perceived Benefits of AI technologies (I)



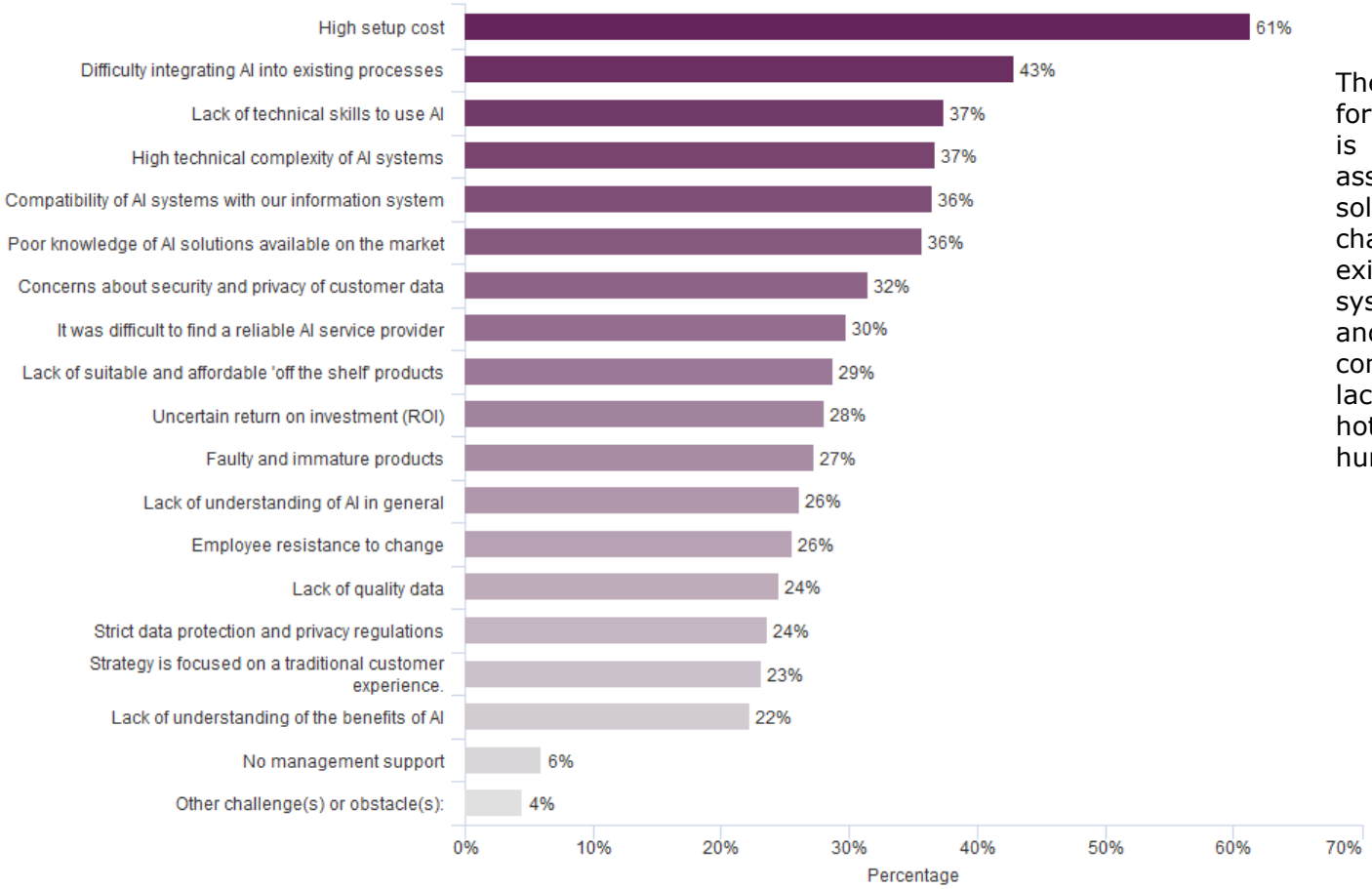
Pereived Benefits of AI technologies (I)



Perceived Benefits of AI technologies (III)

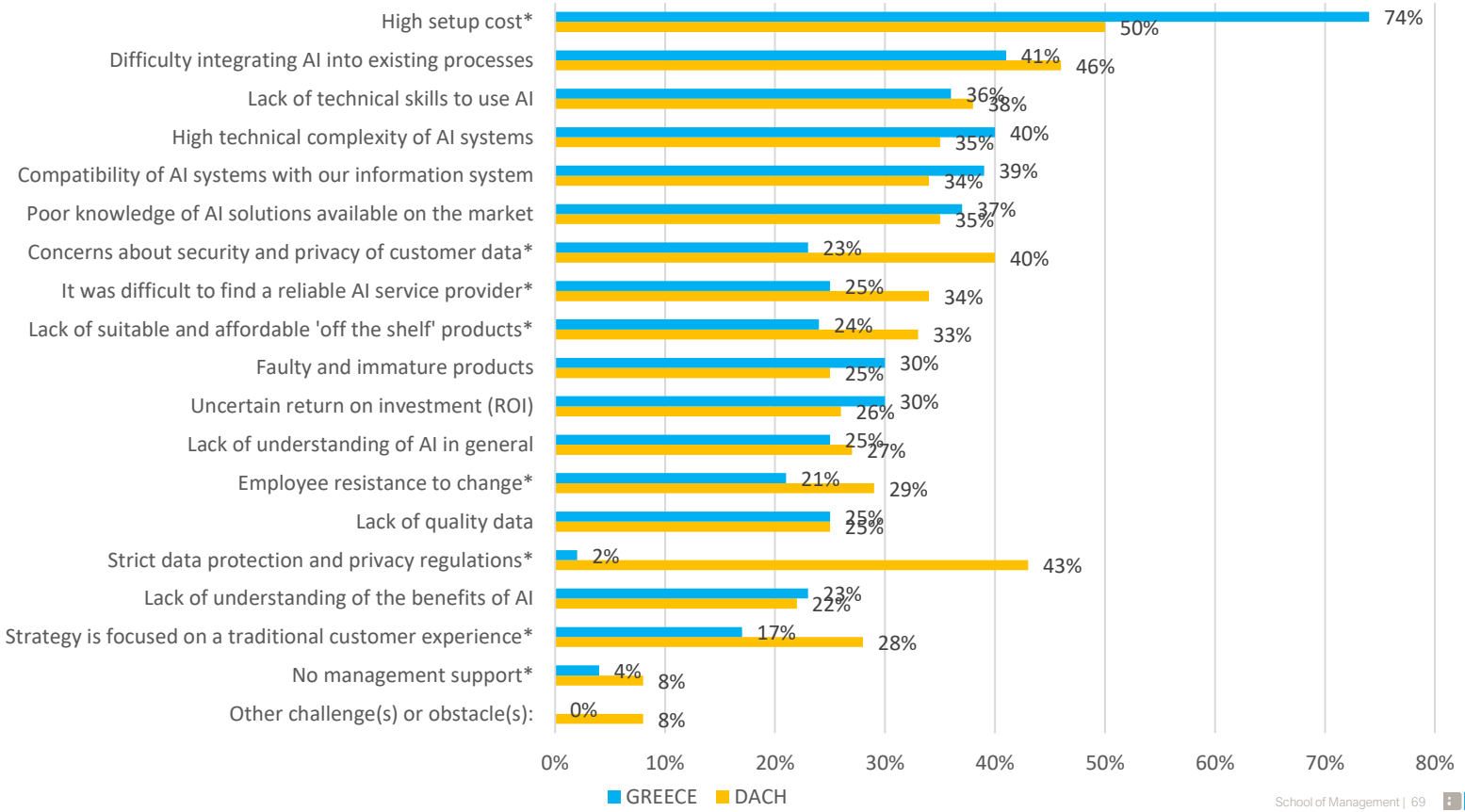
- The primary perceived benefit for almost all of the 17 AI-based technologies is enhanced operational efficiency, followed closely by improved user experience in many instances (except for back-office operations such as waste management or dynamic pricing, for example).
- Cost reduction was identified as a benefit for most technologies, but particularly for passport validation, waste management, menu creation, and workforce planning.
- Increased turnover was highlighted as a significant advantage for predictive analytics and real-time revenue management.
- Meanwhile, improved competitive positioning was predominantly associated with AI-based analysis of online reviews.

Challenges & Perceived Barriers in AI Integration for Hotel Operations (overall sample)



The primary perceived obstacle for AI adoption across all hotels is the high setup costs associated with AI-based solutions. Additionally, the challenges of integrating AI into existing processes or IT systems, compatibility issues, and the high technical complexity, compounded by a lack of technical skills within the hotels, are viewed as additional hurdles.

Challenges & Perceived Barriers in AI Integration: comparison between hotels from Greece and DACH region



Challenges & Perceived Barriers in AI Integration: comparison between hotels from Greece and DACH region

Upon analyzing the challenges and obstacles faced by hotels in the DACH region and Greece regarding the integration of artificial intelligence (AI) into their operations, several key insights emerge:

- **High Setup Cost**: This is the most significant barrier for Greek hotels, with a staggering 74% identifying it as a challenge, compared to 50% in the DACH region. This suggests that Greek hotels, possibly due to smaller budgets or different financial priorities, find the initial investment in AI more daunting.
- **Data Protection and Privacy**: A significant 43% of DACH hotels cite strict data protection and privacy regulations as a challenge, in stark contrast to only 2% in Greece. This could reflect the stringent regulatory environment in the DACH countries or a heightened awareness and concern about data protection issues.
- **Employee Resistance and Traditional Strategy**: Both regions show concerns about employee resistance to change and a strategy focused on traditional customer experience. However, these concerns are more pronounced in the DACH region, especially the preference for a traditional customer experience, which is cited by 28% of DACH hotels compared to 17% in Greece.
- **Technical Challenges**: Both regions identify a range of technical challenges, including the high technical complexity of AI systems, compatibility issues, and the difficulty of integrating AI into existing processes. These concerns are slightly more pronounced in Greece, suggesting that Greek hotels might face more technical hurdles or lack the necessary technical support.

Challenges & Perceived Barriers in AI Integration: comparison between hotels from Greece and DACH region

Knowledge and Understanding: Concerns about a lack of understanding of AI benefits, general AI knowledge, and awareness of available AI solutions are fairly consistent across both regions. This indicates a broader industry-wide need for education and awareness-raising about AI.

Product and Provider Concerns: DACH hotels express more concerns about finding reliable AI service providers (34% vs. 25% in Greece) and the availability of suitable and affordable 'off the shelf' products (33% vs. 24% in Greece). This might suggest that DACH hotels have higher standards or specific requirements when it comes to AI solutions and providers.

Security Concerns: 40% of DACH hotels express concerns about the security and privacy of customer data, compared to 23% in Greece. This again might reflect the heightened awareness or regulatory environment in the DACH region.

In conclusion, while both regions face a myriad of challenges in AI adoption, the nature and intensity of these challenges vary. Greek hotels are primarily concerned with the financial aspects of AI adoption, while DACH hotels grapple more with regulatory, strategic, and provider-related issues. This analysis underscores the importance of tailored strategies and solutions for different regions, considering their unique challenges and concerns.

Challenges & Perceived Barriers in AI Integration by Hotel Category

	1*-2*	3*	4-5*	Overall
High Setup Costs	76%	63%	59%	***61%***
Integration Difficulty into Existing Processes	33%	41%	46%	***43%***
Technical Complexity AI Systems	38%	35%	39%	***37%***
Technical Skill Deficiency	31%	37%	38%	***37%***
AI System Compatibility	38%	35%	41%	***36%***
Poor AI Market Knowledge	35%	38%	35%	***36%***
Data Security Concerns (customer data)	18%	29%	33%	***32%***
Finding Reliable Provider	22%	28%	33%	***30%***
Lack of Affordable Products	35%	28%	30%	***29%***
Uncertain ROI	24%	28%	32%	***28%***
Faulty/Immature Products	28%	25%	28%	***27%***
Employee Resistance	17%	23%	29%	***26%***
General AI Understanding	23%	24%	23%	***26%***
Data Quality Issues	21%	22%	25%	***24%***
Privacy Regulation Strictness	2%	24%	25%	***24%***
Traditional Strategy Focus	19%	21%	23%	***23%***
Understanding AI Benefits	19%	24%	23%	***22%***
No Management Support	4%	5%	6%	***6%***
Other Challenges/Obstacles	0%	4%	4%	***4%***

The primary perceived obstacle for AI adoption in 1* to 2* hotels is the high setup costs associated with AI-based solutions, with 76% of hotels in this segment citing this as a concern compared to the 61% average across all categories. Interestingly, hotels in this category express significantly fewer concerns about privacy regulations and data security, likely due to a lack of awareness of these issues. Additionally, they perceive fewer challenges in integrating AI solutions into existing processes, probably due to a simpler IT landscape and less complex processes.

Challenges & Perceived Barriers in AI Integration by Hotel Type

	SME hotel	Hotel Cooperation	Hotel Chain	Overall
High Setup Costs	63%	59%	53%	***61%***
Integration Difficulty into Existing Processes	41%	50%	49%	***43%***
Technical Complexity AI Systems	37%	41%	35%	***37%***
Technical Skill Deficiency	36%	41%	44%	***37%***
AI System Compatibility	36%	30%	44%	***36%***
Poor AI Market Knowledge	36%	45%	27%	***36%***
Data Security Concerns (customer data)	31%	31%	36%	***32%***
Finding Reliable Provider	29%	42%	27%	***30%***
Lack of Affordable Products	28%	41%	27%	***29%***
Uncertain ROI	26%	28%	39%	***28%***
Faulty/Immature Products	27%	30%	28%	***27%***
Employee Resistance	24%	23%	31%	***26%***
General AI Understanding	21%	16%	31%	***26%***
Data Quality Issues	24%	22%	27%	***24%***
Privacy Regulation Strictness	21%	52%	28%	***24%***
Traditional Strategy Focus	24%	20%	21%	***23%***
Understanding AI Benefits	21%	16%	31%	***22%***
No Management Support	5%	6%	10%	***6%***
Other Challenges/Obstacles	4%	6%	6%	***4%***

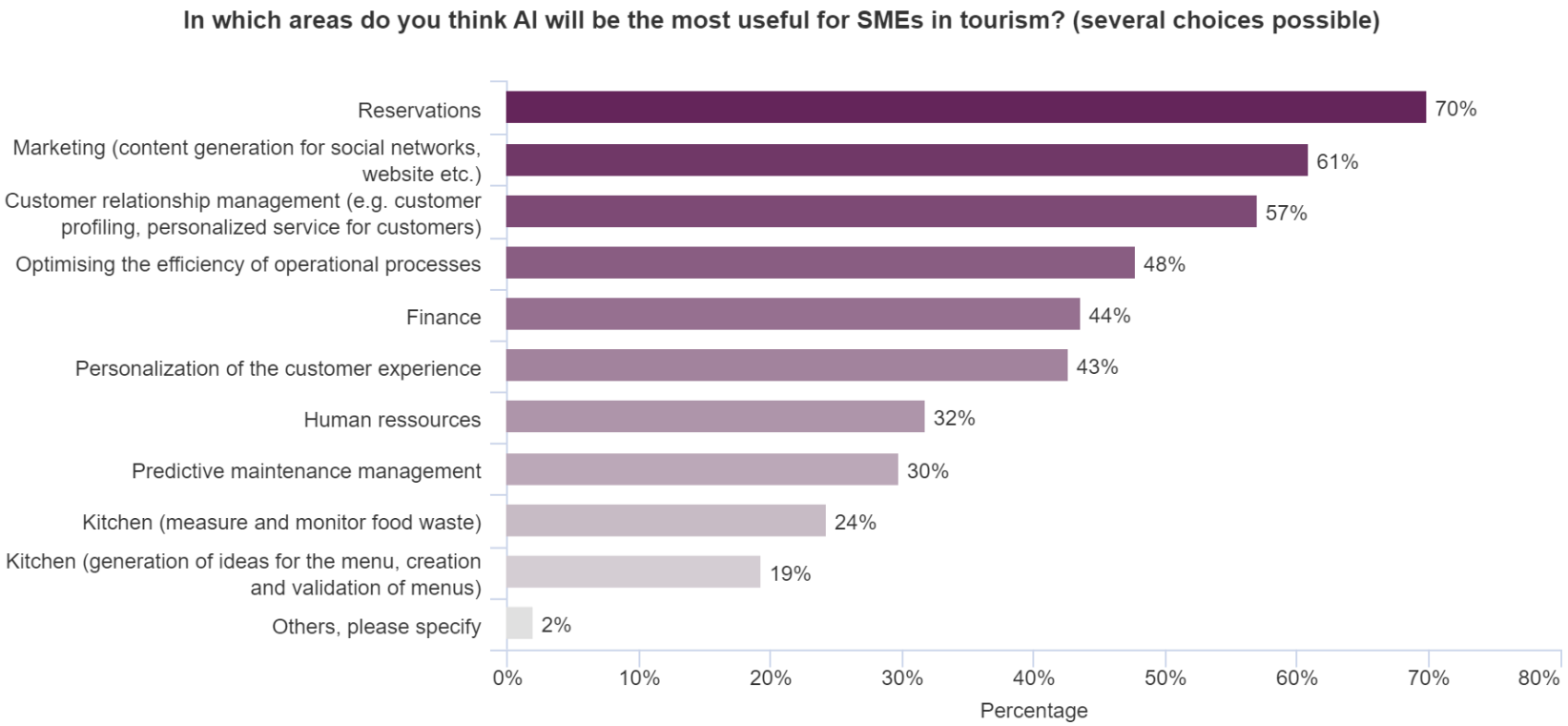
High setup costs are identified as the main hurdle by all hotel types, although this concern is slightly less pronounced for branded hotels. Hotels affiliated with hotel cooperations perceive greater challenges in finding reliable AI solution providers and affordable products compared to other hotel types. They are also particularly concerned about the strictness of privacy regulations as an adoption barrier. Chain hotels, on the other hand, are more apprehensive about the uncertain ROI of AI-based technologies compared to other hotel types, with 39% expressing this concern compared to the 28% average.

Challenges & Perceived Barriers in AI Integration by Country

	Austria	Germany	Greece	Switzerland	Overall
High Setup Costs	47%	54%	74%	49%	***61%***
Integration Difficulty into Existing Processes	42%	53%	41%	41%	***43%***
Technical Complexity AI Systems	30%	35%	40%	38%	***37%***
Technical Skill Deficiency	35%	40%	36%	39%	***37%***
AI System Compatibility	30%	32%	39%	39%	***36%***
Poor AI Market Knowledge	32%	35%	37%	37%	***36%***
Data Security Concerns (customer data)	38%	49%	23%	31%	***32%***
Finding Reliable Provider	34%	39%	25%	29%	***30%***
Lack of Affordable Products	32%	35%	24%	33%	***29%***
Uncertain ROI	27%	23%	30%	28%	***28%***
Faulty/Immature Products	27%	25%	30%	24%	***27%***
Employee Resistance	24%	36%	21%	28%	***26%***
General AI Understanding	21%	23%	25%	24%	***26%***
Data Quality Issues	26%	22%	25%	26%	***24%***
Privacy Regulation Strictness	34%	54%	2%	38%	***24%***
Traditional Strategy Focus	27%	27%	17%	30%	***23%***
Understanding AI Benefits	19%	23%	23%	24%	***22%***
No Management Support	4%	8%	4%	10%	***6%***
Other Challenges/Obstacles	11%	9%	2%	6%	***4%***

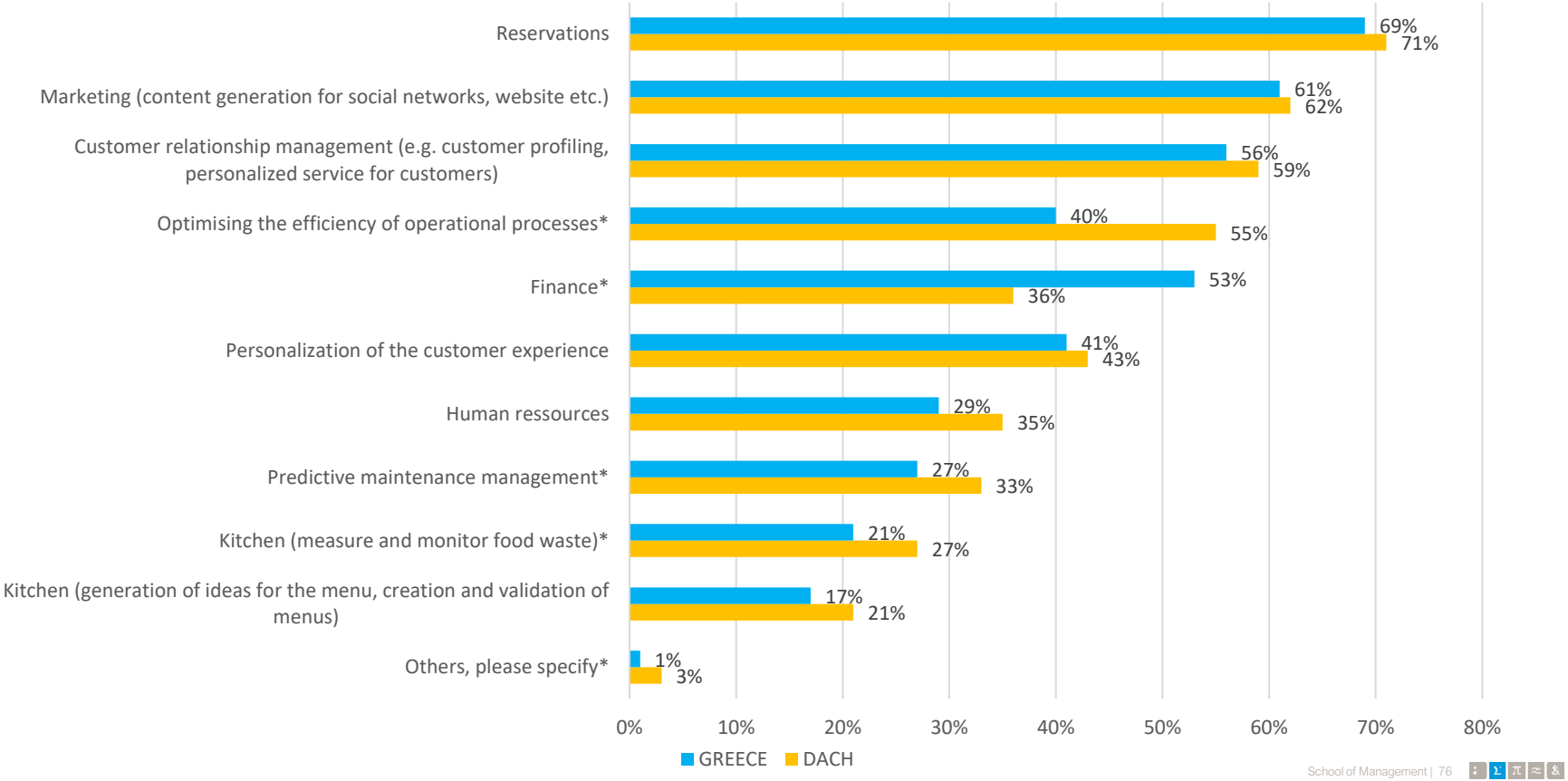
High setup costs are universally identified as the main hurdle by all hotel types, but this concern is much more pronounced in Greek hotels than in Austrian or Swiss hotels. The challenges of integrating AI solutions into existing processes (53% compared to 43% on average), data security issues (49% compared to 32% on average), and employee resistance to new AI technologies are perceived as significant problems in German hotels. Interestingly, the strictness of privacy regulations is perceived as a real issue in Germany (54%), Switzerland (38%), and Austria (34%), but it is almost completely disregarded as a concern in Greek hotels (2%).

Potential AI Impact Areas for SMEs in Tourism



Hotels perceive the primary benefits of AI technologies to be in the domains of reservation (70%), marketing (61%), and CRM (57%). In the back-office, the optimization of operational processes (48%) and finance (44%) are also seen as important application areas, whereas in the front office, the personalization of the customer experience (43%) appears to have considerable potential.

Potential AI Impact Areas for SMEs in Tourism: comparison between hotels from Greece and DACH region



Potential AI Impact Areas for SMEs in Tourism: comparison between hotels from Greece and DACH region

The data provides insights into the perceived utility of AI for SMEs in the tourism sector across the DACH region and Greece. Here's an interpretation:

- **Reservations**: Both regions see AI as highly beneficial in the reservations domain, with 71% of DACH hotels and 69% of Greek hotels acknowledging its potential. This suggests that automating and optimizing booking processes is a priority across the board.
- **Marketing**: AI's role in marketing, especially in content generation for platforms like social networks and websites, is also recognized by a significant majority in both regions (62% in DACH and 61% in Greece).
- **Customer Relationship Management** (CRM): Over half of the hotels in both regions (59% in DACH and 56% in Greece) believe that AI can play a pivotal role in CRM, emphasizing areas like customer profiling and personalized services.
- **Operational Efficiency**: The DACH region places a higher emphasis on AI's potential to optimize operational processes, with 55% acknowledging its importance, compared to 40% in Greece. This indicates a stronger inclination in the DACH region to leverage AI for streamlining internal workflows.

Potential AI Impact Areas for SMEs in Tourism: comparison between hotels from Greece and DACH region

- **Finance**: Interestingly, Greek hotels (53%) see more potential in the use of AI in finance than their DACH counterparts (36%). This could indicate that Greek tourism SMEs are looking for AI-driven solutions to optimise their financial situation.
- **Predictive Maintenance**: While both regions see the value in AI for predictive maintenance, the DACH region (33%) slightly edges out Greece (27%) in recognizing its potential.
- **Kitchen Operations**: Both regions see limited potential for AI in kitchen operations, whether it's for menu ideation or food waste monitoring. However, it's worth noting that the DACH region (27%) places a slightly higher emphasis on AI's role in monitoring food waste compared to Greece (21%).
- **Human Resources**: The perception of AI's utility in human resources is relatively balanced between the two regions, with 35% in DACH and 29% in Greece.

In summary, while there are shared perceptions of AI's utility across reservations, marketing, and CRM in both regions, there are marked differences in areas like finance, operational efficiency, and predictive maintenance. The DACH region seems more inclined to explore AI's potential across a broader spectrum of operations, while Greek hotels have specific areas of focus, particularly in finance.

Potential AI Impact Areas for SMEs in Tourism by Hotel Category

	1*-2*	3*	4-5*	Overall
Reservations	71%	73%	67%	***70%***
Marketing	53%	60%	65%	***61%***
Customer relationship management	53%	52%	62%	***57%***
Optimising operational processes	38%	47%	52%	***48%***
Finance	49%	43%	45%	***44%***
Personalization of the customer experience	37%	40%	50%	***43%***
Human ressources	20%	30%	40%	***32%***
Predictive maintenance management	19%	28%	35%	***30%***
Kitchen (food waste)	11%	22%	31%	***24%***
Kitchen (menu)	14%	21%	20%	***19%***
Others	1%	2%	2%	***2%***

The top three impact areas for AI solutions—reservations, marketing, CRM—are consistent across all hotel categories. However, the survey results indicate that 1* and 2* hotels find AI technologies considerably less useful than other hotel categories in more specialized areas such as food waste management, human resources, or optimization of operational processes. This is most likely because such tasks are less prevalent or structured in these hotels.

Potential AI Impact Areas for SMEs in Tourism by Hotel Type

	SME hotel	Hotel Cooperation	Hotel Chain	Overall
Reservations	70%	72%	67%	***70%***
Marketing	60%	67%	65%	***61%***
Customer relationship management	55%	72%	61%	***57%***
Optimising operational processes	47%	57%	47%	***48%***
Finance	45%	28%	46%	***44%***
Personalization of the customer experience	40%	57%	56%	***43%***
Human ressources	30%	46%	36%	***32%***
Predictive maintenance management	27%	26%	50%	***30%***
Kitchen (food waste)	21%	28%	39%	***24%***
Kitchen (menu)	19%	18%	20%	***19%***
Others	2%	2%	2%	***2%***

The top three impact areas for AI solutions—reservations, marketing, CRM—are consistent across all hotel categories. However, the survey results indicate that 1* and 2* hotels find AI technologies considerably less useful than other hotel categories in more specialized areas such as food waste management, human resources, or optimization of operational processes. This is most likely because such tasks are less prevalent or structured in these hotels.

Potential AI Impact Areas for SMEs in Tourism by Hotel Country

	Austria	Germany	Greece	Switzerland	Overall
Reservations	74%	70%	69%	70%	***70%***
Marketing	71%	58%	61%	59%	***61%***
Customer relationship management	63%	50%	56%	64%	***57%***
Optimising operational processes	63%	46%	40%	56%	***48%***
Finance	38%	36%	53%	35%	***44%***
Personalization of the customer experience	42%	37%	41%	51%	***43%***
Human ressources	40%	30%	29%	35%	***32%***
Predictive maintenance management	40%	32%	27%	28%	***30%***
Kitchen (food waste)	32%	23%	21%	27%	***24%***
Kitchen (menu)	29%	21%	17%	16%	***19%***
Others	3%	3%	1%	3%	***2%***

The top three impact areas for AI solutions—reservations, marketing, and CRM—are consistent across all countries. However, the survey results indicate distinct preferences among different countries. Austrian hotels, for instance, show a strong inclination towards content generation (71%) and operational process optimization (63%) as particularly valuable applications of AI. In contrast, Greek hotels prioritize AI technology utilization in the finance sector (53%). Swiss hotels, on the other hand, emphasize the importance of personalizing the customer experience. Furthermore, Austrian hotels perceive specialized areas such as human resources, predictive maintenance management, and automation of menu creation as more useful.

> Conclusions

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General Summary: The Integration of AI in the Hospitality Sector (I)

The hospitality industry is on the edge of a major transformation, thanks to the growing adoption of artificial intelligence (AI). This in-depth study explores the nuances of this adoption, from the **potential benefits to the challenges, as well as the driving factors trends**. The survey provides a comprehensive insight into the adoption of artificial intelligence (AI) technologies in the **hotel industry across Austria, Germany, France, Switzerland, and Greece**. The findings underscore the transformative potential of AI, but also highlight the challenges and disparities in its adoption.

Management and Data Storage:

- A significant number of hotels manage their IT systems in-house, with owners or directors often at the forefront, especially in small SME hotels. This contrasts with more upscale and chain hotels, which either have dedicated IT departments or outsource these tasks. The majority of hotels still rely on on-site physical servers for data storage, but cloud services are gaining traction, especially among chain hotels and those in Austria and Switzerland.

General Summary: The Integration of AI in the Hospitality Sector (II)

AI Adoption : leading technologies

- **Mature Technologies**: Predictive analytics, online customer review analysis, and real-time revenue management are leading the AI adoption race across all regions. The DACH region, with its larger hotels, is at the forefront, especially in predictive analytics (56%). Greek hotels, despite their smaller size, are also making strides, particularly in predictive analytics (33%).
- **Personalization & Customer Engagement**: The DACH region's emphasis on personalized services (46%) significantly outpaces the overall sample and Greek hotels. This trend underscores the DACH hotels' commitment to enhancing guest experiences through AI-driven personalization.
- **Operational Efficiency**: The DACH region's focus on workforce planning and product development assistance systems highlights their drive for operational optimization via AI. In contrast, Greek hotels show a notable lag, especially in adopting assistance systems.

General Summary: The Integration of AI in the Hospitality Sector (III

AI Adoption : Emerging Technologies:

- **Customer Interaction Tools**: Chatbots and customer profiling tools see decent adoption across regions. The DACH region leads in customer profiling (24%). Interestingly, Greek hotels align closely with the broader sample in tools like ChatGPT, indicating a shared interest in automated guest communication.
- **Niche Technologies**: While facial recognition, hotel automation, and virtual assistants are still in nascent stages of adoption, the DACH region exhibits a slightly higher inclination, especially towards virtual assistants (8%). Greek hotels, however, remain cautious, often aligning with or trailing the overall sample. Technologies like waste management and image content generation witness consistent adoption rates across regions, hinting at their early stages of universal acceptance or their universally recognized value.

General Summary: The Integration of AI in the Hospitality Sector (III

AI Adoption : Size matters

- Hotel size, gauged by room numbers and often correlated with hotel category, plays an important role in AI adoption dynamics.
- Larger establishments, predominantly in Switzerland and Austria, likely possess the resources and infrastructure to champion AI integration. This could elucidate their higher AI adoption rates and diverse tool utilization.
- Conversely, smaller establishments, such as those in Greece, might grapple with budgetary constraints or other operational priorities, explaining their more cautious approach to AI.

Ultimately, the magnitude and category of a hotel provide valuable perspectives on its approach to AI, revealing regional adoption nuances.

General Summary: The Integration of AI in the Hospitality Sector (II)

Challenges and Barriers:

- **Financial vs. Regulatory Concerns**: Greek hotels are primarily deterred by AI's high setup costs, with 74% citing it as a significant barrier, compared to 50% in the DACH region. In contrast, 43% of DACH hotels are apprehensive about strict data protection and privacy regulations.
- **Cultural and Technical Barriers**: Both regions acknowledge employee resistance and a preference for traditional customer experiences. However, Greek hotels express slightly more concerns over the technical complexities of AI integration.
- **Awareness and Vendor Challenges**: A consistent need for better AI understanding is evident across both regions. Yet, DACH hotels are more vocal about challenges in identifying reliable AI vendors and suitable solutions.
- **In summary**: The AI adoption journey in the hotel industry reveals distinct regional challenges. This highlights the importance of region-specific strategies in AI integration.

General Summary: The Integration of AI in the Hospitality Sector (III)

Potential Impact Areas:

- The areas where AI is perceived to have the most transformative impact include reservations, marketing, and CRM. However, there's a discernible difference in the perceived utility of AI in specialized areas. For instance, while upscale hotels see potential in AI-driven niche areas, budget hotels appear more cautious.

Reflection (I)

- The survey paints a picture of an industry on the cusp of a technological revolution. While there's enthusiasm for the potential of AI, there's also caution, driven by cost concerns, integration challenges, and varying perceptions of the benefits. The disparities in adoption and perception across hotel types and countries suggest that there's no one-size-fits-all approach to AI in the hotel industry. Instead, the journey will be shaped by individual hotel needs, resources, and the specific challenges and opportunities of their respective markets.

General Summary: The Integration of AI in the Hospitality Sector (IV)

Reflection (II)

- In moving forward, it's crucial for the hotel industry to strike a balance between embracing AI-driven innovation and ensuring that the human touch, which is central to hospitality, remains intact. The industry must also navigate the challenges of integrating AI into existing systems, ensuring data security, and addressing concerns related to privacy regulations. Collaboration between technology providers, hoteliers, and regulatory bodies will be key to realizing the full potential of AI in the hotel industry.

> Recommendations

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Recommendations for Stakeholders of the Hotel Sector on AI Adoption (I)

Foundational AI Education for Hoteliers:

- **Develop AI Workshops**: Organize regular workshops and training sessions to educate hoteliers, especially those from older generations, about the fundamentals of AI, its applications, and benefits.
- **Case Studies**: **Share success stories and case studies** of hotels that have effectively integrated AI to enhance their operations and customer experience. This will provide tangible examples of AI's potential benefits.

Comprehensive Understanding of AI Costs and Benefits:

- **Cost-Benefit Analysis**: Provide hoteliers with a detailed cost-benefit analysis of AI adoption, covering financial, human resources, and technological aspects.
- **ROI Estimation**: Offer tools or consultancy services to help hoteliers estimate the potential return on investment (ROI) from AI adoption, considering both short-term and long-term gains.

Recommendations for Stakeholders of the Hotel Sector on AI Adoption (II)

Strategic and Operational AI Education:

- **Strategic Workshops**: Organize sessions that delve into the strategic implications of AI, helping hoteliers align AI adoption with their broader business strategy.
- **Operational Training**: Offer hands-on training on the operational aspects of AI, ensuring hoteliers understand how to integrate AI into their day-to-day processes seamlessly.

Addressing Resistance to Change:

- **Change Management Programs**: Implement change management strategies tailored to the hospitality sector, focusing on addressing concerns, dispelling myths, and fostering a positive attitude towards AI.
- **Peer-to-Peer Learning**: Encourage interactions between early AI adopters and those hesitant about the technology. Peer testimonials can be more persuasive than expert opinions in some cases.

Recommendations for Stakeholders of the Hotel Sector on AI Adoption (III)

Collaboration with Technology Providers:

- **Driving Innovation**: Recognize that technology providers often spearhead innovation in the industry. Their expertise and exposure to various sectors equip them with insights that can be transformative for the hospitality industry. Hoteliers should be open to their recommendations and be willing to explore novel solutions they propose.
- **Tailored Solutions**: Technology providers should work hand-in-hand with hoteliers to develop AI solutions that cater to the specific needs and challenges of individual hotels. Their deep understanding of AI's capabilities can be instrumental in crafting solutions that are both innovative and relevant to hotel operations.
- **Ongoing Support**: Ensure that technology providers offer continuous support, updates, and training post-implementation. Their commitment to the success of their solutions is vital for hoteliers to maximize the benefits of AI technologies.

Recommendations for Stakeholders of the Hotel Sector on AI Adoption (IV)

Feedback Mechanism:

- **Regular Feedback**: Establish a mechanism for hoteliers to provide regular feedback on AI tools and solutions. This will help technology providers refine their offerings and address any emerging challenges.
- **Community Forums**: Create forums or platforms where hoteliers can discuss their experiences, challenges, and successes with AI, fostering a community of learning and collaboration.

➢ In essence, the journey to AI adoption in the hospitality sector requires a holistic approach, **addressing both the technological and human aspects**. By focusing on education, collaboration, and tailored solutions, the industry can harness the full potential of AI, driving efficiency, enhancing customer experiences, and ensuring a competitive edge in the market.

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Bachelor of Science HES-SO in Tourism in German, French and English

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> Annex 1: Questionnaire

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Annex 1: The Questionnaire (1)

Potential of Artificial Intelligence (AI) for hotels

Dear hoteliers,

Thank you very much for your interest in our survey "The potential of Artificial Intelligence (AI) for SMEs in the hotel sector". We realise that your time is valuable, but we strongly believe that your contribution to this study would not only benefit you and your company, but also the entire hotel sector.

It will take you approximately 5-10 minutes to complete this questionnaire.

Your answers will be treated confidentially and no hotel will be identified in our reports or in the survey results, in accordance with the principle of data protection.

Please note:

- You can navigate between the pages using the arrows;

- Please do not forget to save your answers by clicking on the "save" button

Alesia Khlusevich and Prof. Roland Schegg (roland.schegg@hevs.ch)

HES-SO University of Applied Sciences Western Switzerland

Annex 1: The Questionnaire (2)

General information about your hotel

In which country is your hotel located?

Switzerland	France	Germany	Austria	Autre

What is the location of your hotel?

Big city (more than 50'000 inhabitants)	Little city (between 10'000 and 50'000 inhabitants)	Village in countryside	Mountain resort	Seaside	Other

The most important part of your customer base?

Holidays / Leisure	Business	MICE (Meetings, Incentives, Conferences, Exhibitions / Events)	Other

Is your hotel star rated?

Yes	No

Annex 1: The Questionnaire (3)

The size of the hotel (number of rooms)

How many people work in your hotel (average number of full-time employees)?

Is your hotel part of a hotel chain or a hotel cooperation?

- No (independent hotel)
- Yes, from a chain
- Yes, from a hotel cooperation

Annex 1: The Questionnaire (4)

Organization

How do you manage the administrative aspect of information/IT systems (installing software, creating user accounts, managing access to data, etc.)?

By our IT department	By an internal person with professional IT skills	By the owner, director, boss
External (Outsourced)	Other	

Where is your data stored?

physical server in hotel (internally managed)	physical server in hotel (externally managed)	cloud service (internally managed)
external server (managed by IT service provider)	Other	

Annex 1: The Questionnaire (5)

To what extent do you agree with the following statements regarding the evolution of your hotel? (Technological factors)

	Totally agree	Agree	Neutral	Disagree	Totally disagree	Do not know
Our hotel uses and operates state-of-the-art information systems and infrastructure						
The adoption of new technologies is a priority for our hotel						
Our hotel has a clear strategy to digitize processes and adopt new technologies						
Our hotel has a separate budget specifically for digitalisation in addition to the IT budget						

Annex 1: The Questionnaire (6)

To what extent do you agree with the following statements regarding the evolution of your hotel ? (Organizational factors)

	Totally agree	Agree	Neutral	Disagree	Totally disagree	Do not know
There is a culture of innovation and experimentation within our hotel						
Generally speaking, our hotel financial resources are sufficient to adopt new technologies						
We analyze the data generated by the digital technologies we use (e.g. website, social networks, PMS, CRM, etc.)						
We develop new services for our customers or integrate new services by analyzing their needs						

Annex 1: The Questionnaire (7)

To what extent do you agree with the following statements regarding the evolution of your hotel? (Environmental factors)

	Totally agree	Agree	Neutral	Disagree	Totally disagree	Do not know
The regulatory and legal environment is favorable for the adoption of Artificial Intelligence (AI)						
Our hotel faces strong competition						
Adopting AI can provide a competitive advantage for our hotel						
Our customers are more and more experienced in IT (more digitized)						
Our customers have high expectations for personalized and efficient service						

Annex 1: The Questionnaire (8)

Hes·so VALAIS WALLIS

Artificial intelligence (AI)

Does your hotel use technologies that incorporate or are based on artificial intelligence (AI)?

	Yes	It is planned	No	Don't know / Not applicable
ChatBot (applications for automated instant messaging)	○	○	○	○
Virtual assistant (e.g. Apple Siri, Amazon Alexa)	○	○	○	○
Passport validation (Guest check-in)	○	○	○	○
Facial recognition systems (Guest check-in)	○	○	○	○
Customer profiling (creation of unified customer profile)	○	○	○	○
Personalised service for customers (personalised e-mailing, recommendations, guest app)	○	○	○	○
Automatic menu creation and validation (cost of menu modification, streamlining of routine validation process)	○	○	○	○
Collection and analysis of waste (waste management)	○	○	○	○
Real-time revenue management (dynamic pricing)	○	○	○	○
Predictive analytics (e.g. occupancy rate, profitability of a hotel)	○	○	○	○
Workforce planning	○	○	○	○
Analysis and feedback on online customer reviews	○	○	○	○
Automation of responses to customer comments	○	○	○	○
ChatGPT, Bard or other content generation services: Generation of texts for guest communication (Email, Website))	○	○	○	○
Generation of images for content (e.g. Midjourney, DALL.E2)	○	○	○	○
Automation of the hotel or hotel room (e.g. Andivi) and robotics (e.g. robot Pepper).	○	○	○	○
Assistance systems for product development, communication (e.g. ReGuest)	○	○	○	○

Annex 1: The Questionnaire (9)

If you use or plan to use other AI-based technologies or tools, please specify:

Enter your text here

What are the experienced or perceived benefits of adopting these technologies in hotel operations? (several choices possible / part 1)

"Experienced advantage": for hotels that already have experience with AI tools

	Improved operational efficiency	Improved user experience	Increased turnover	Improved competitive positioning	Cost reduction	Other	I see no benefit
ChatBot (applications for automated instant messaging)							
Virtual assistant (e.g. Apple Siri, Amazon Alexa)							
Passport validation (Guest check-in)							
Facial recognition systems (Guest check-in)							
Customer profiling (creation of unified customer profile)							
Personalised service for customers (personalised e-mailing, recommendations, guest app)							
Automatic menu creation and validation (cost of menu modification, streamlining of routine validation process)							
Collection and analysis of waste (waste management)							

Annex 1: The Questionnaire (10)

What are the experienced or perceived benefits of adopting these technologies in hotel operations? (several choices possible / part 2)

	Improved operational efficiency	Improved user experience	Increased turnover	Improved competitive positioning	Cost reduction	Other	I see no benefit
Real-time revenue management (dynamic pricing)							
Predictive analytics (e.g. occupancy rate, profitability of a hotel)							
Workforce planning							
Analysis and feedback on online customer reviews							
Automation of responses to customer comments							
ChatGPT, Bard or other content generation services: Generation of texts for guest communication (Email, Website)							
Generation of images for content (e.g. Midjourney, DALL.E2)							
Room automation and robotics							
Assistance systems for product development, communication							

In the case of other perceived benefits, please specify:

Enter your text here

Annex 1: The Questionnaire (11)

What specific challenges or obstacles have you encountered in integrating artificial intelligence into your hotel's operations, if you have already adopted it? If you have not yet adopted AI, what potential barriers do you perceive? (multiple choices possible)

- High setup cost
- Lack of quality data
- Compatibility of AI systems with our information system
- High technical complexity of AI systems
- Difficulty integrating AI into existing processes
- It was difficult to find a reliable AI service provider
- Lack of technical skills to use AI
- Employee resistance to change
- No management support
- Strategy is focused on a traditional customer experience.
- Poor knowledge of AI solutions available on the market
- Lack of understanding of AI in general
- Lack of understanding of the benefits of AI
- Uncertain return on investment (ROI)
- Lack of suitable and affordable 'off the shelf' products
- Faulty and immature products
- Concerns about security and privacy of customer data
- Strict data protection and privacy regulations
- Other challenge(s) or obstacle(s):

Annex 1: The Questionnaire (12)

In which areas do you think AI will be the most useful for SMEs in tourism? (several choices possible)

- Finance
- Human ressources
- Reservations
- Customer relationship management (e.g. customer profiling, personalized service for customers)
- Personalization of the customer experience
- Predictive maintenance management
- Optimising the efficiency of operational processes
- Marketing (content generation for social networks, website etc.)
- Kitchen (generation of ideas for the menu, creation and validation of menus)
- Kitchen (measure and monitor food waste)
- Others, please specify

Do you have any general comments on AI in the hospitality industry?

Enter your text here

Annex 1: The Questionnaire (12)

If you wish to receive a summary of the study, please indicate your e-mail address:

Enter your text here

Merci pour votre collaboration!

> Annex: Sample

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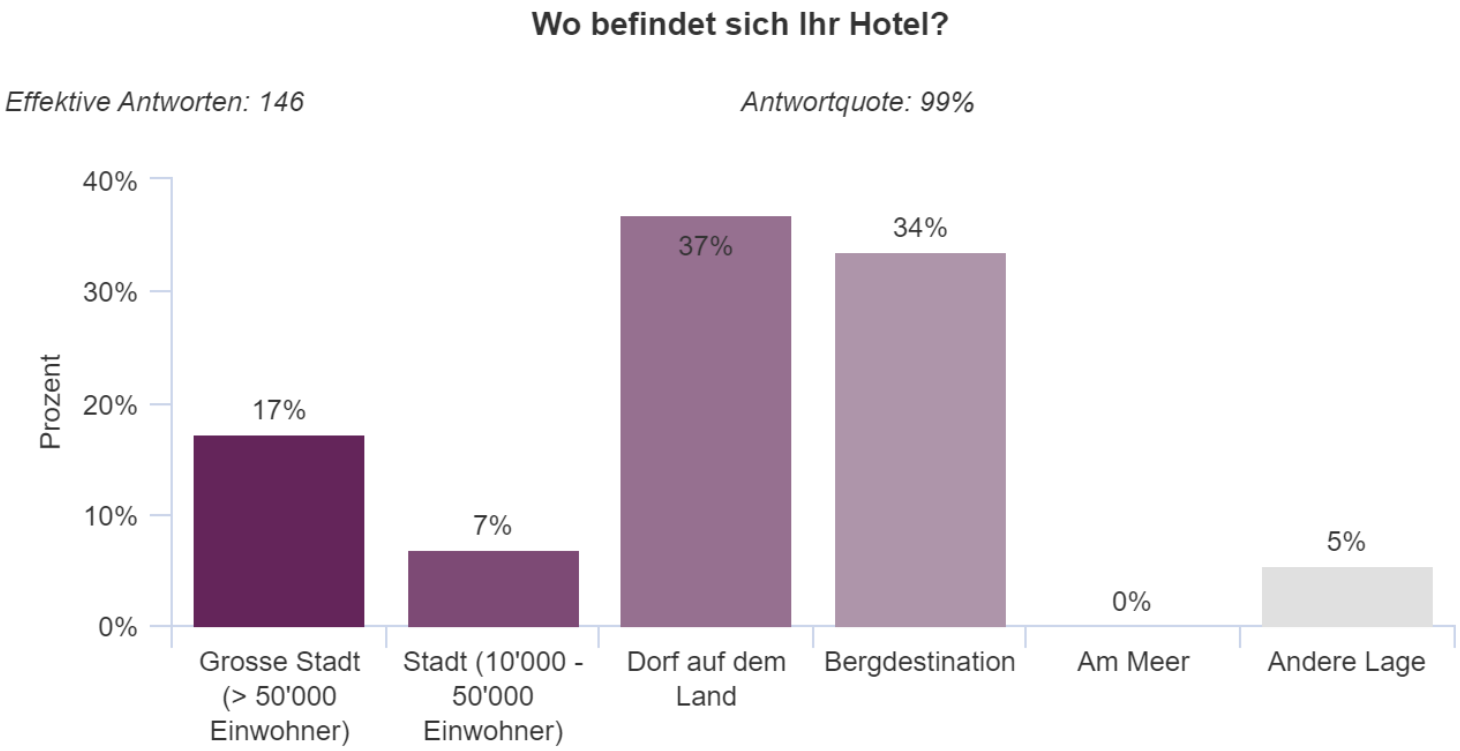
Annex 2: Sample Characteristics Austria

Annex 2: Sample Characteristics Austria (I): location

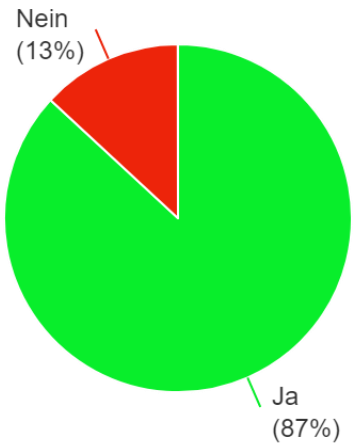


Annex 2: Sample Characteristics Austria (II): customer segments

Annex 2: Sample Characteristics Austria (III): classification

Ist Ihr Hotel klassifiziert (Sterne-Kategorie) ?

Effektive Antworten: 145 *Antwortquote: 99%*



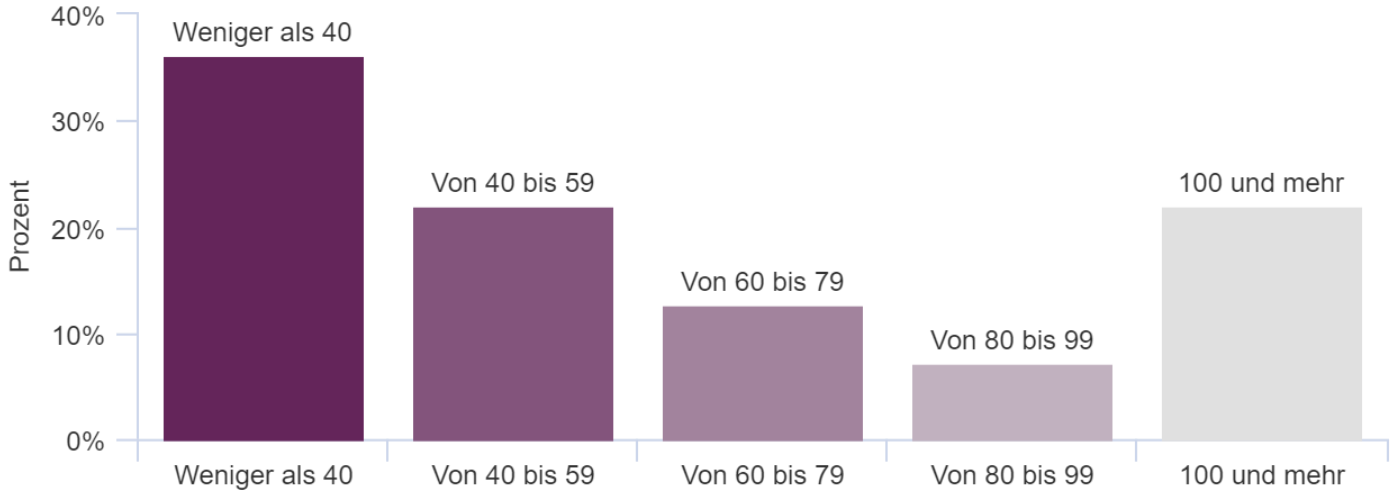
Annex 2: Sample Characteristics Austria (IV): star rating

Annex 2: Sample Characteristics Austria (V): size of hotels

Die Größe des Hotels (Anzahl der Zimmer)

Effektive Antworten: 141
Mittelwert: 68,8
Min - Max : 10,0 - 341,0

Antwortquote: 96%
Median: 50,0

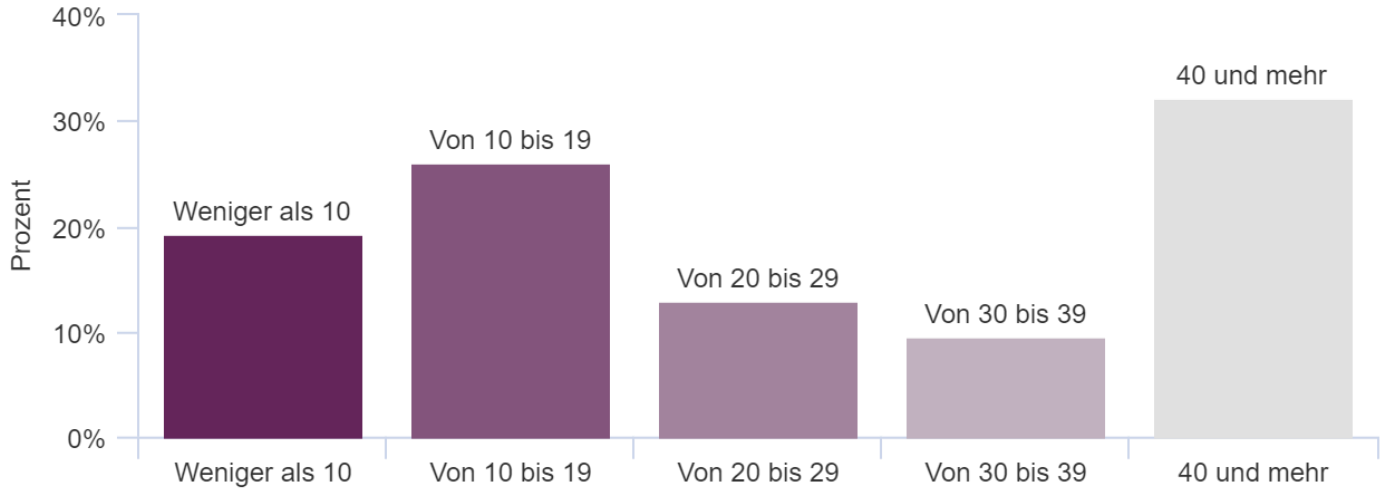


Annex 2: Sample Characteristics Austria (VI): number of staff

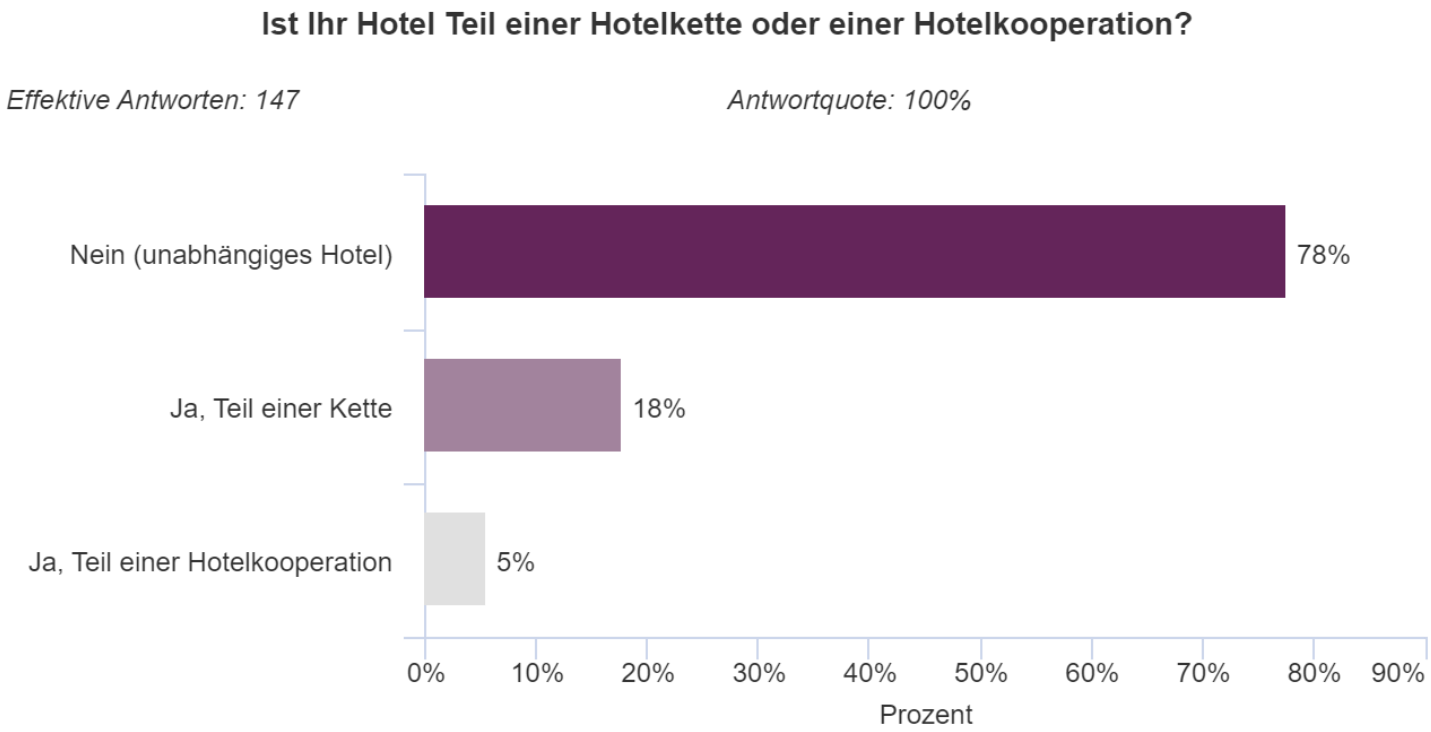
Wie viele Personen arbeiten in Ihrem Hotel (durchschnittliche Anzahl von Vollzeitbeschäftigten)?

Effektive Antworten: 146
Mittelwert: 36,5
Min - Max : 1,0 - 320,0

Antwortquote: 99%
Median: 20,0

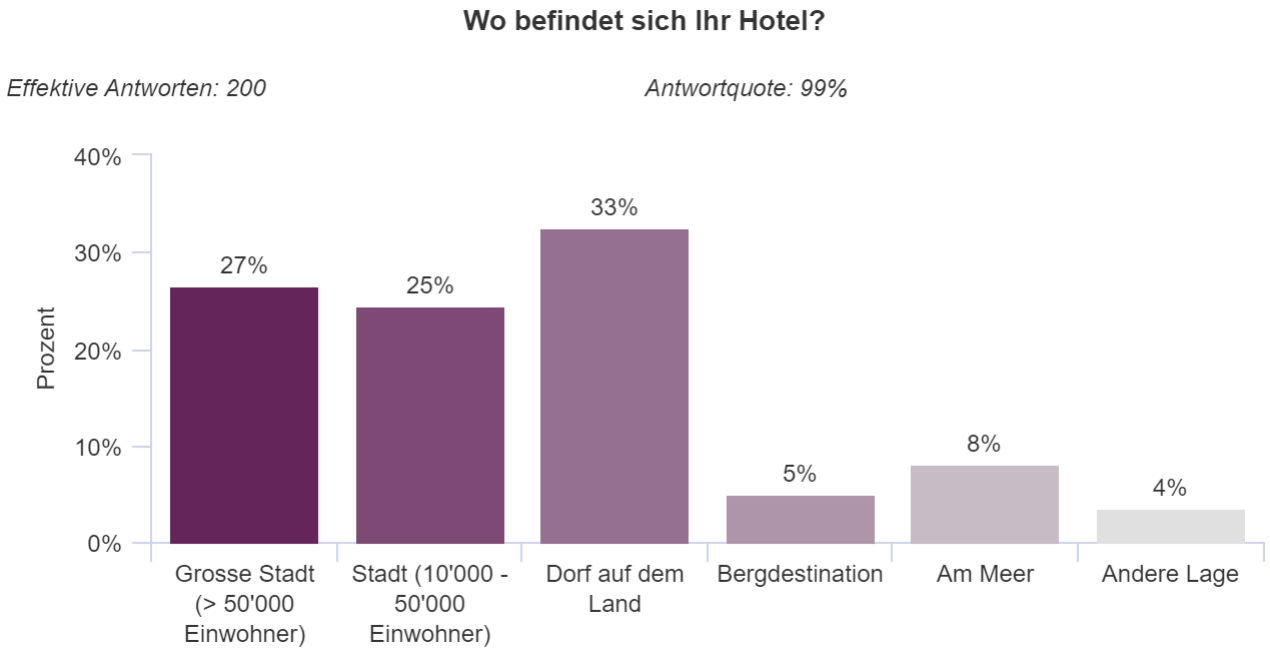


Annex 2: Sample Characteristics Austria (VII): type of hotel

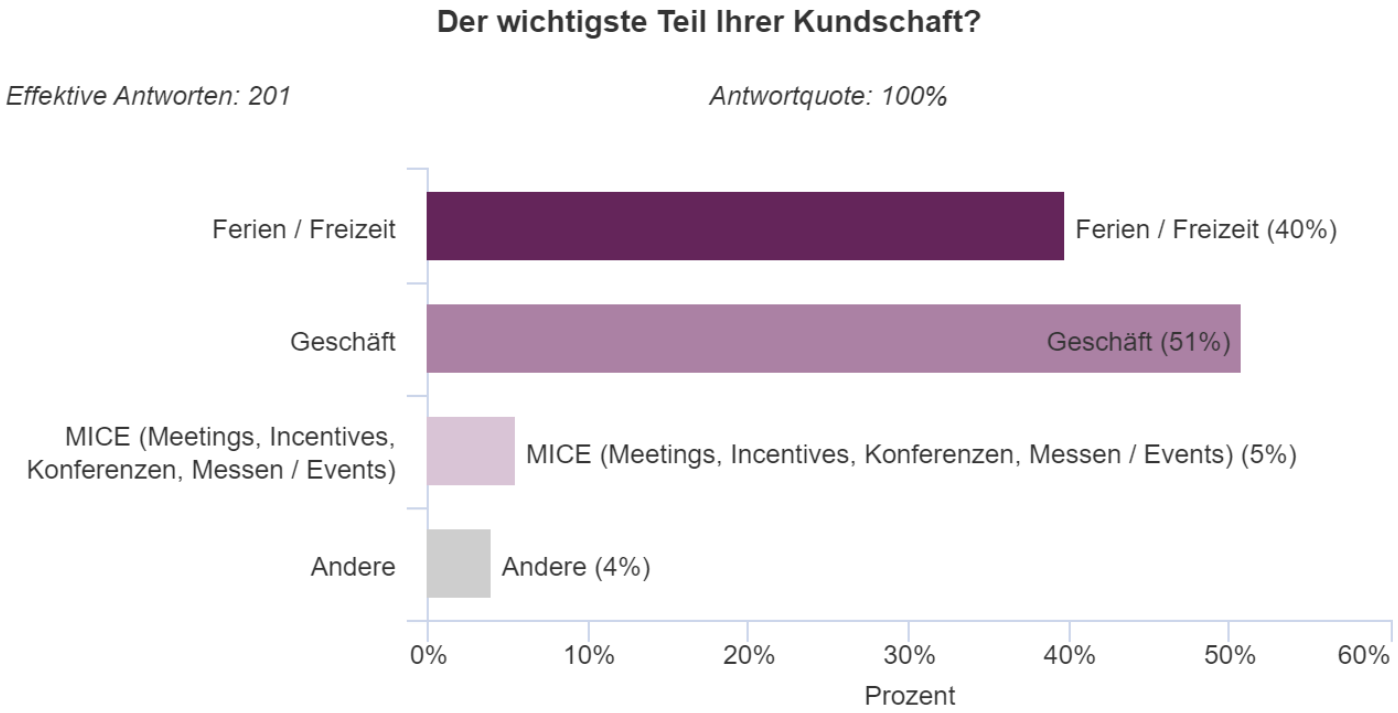


Annex 2: Sample Characteristics Germany

Annex 2: Sample Characteristics Germany (I): location



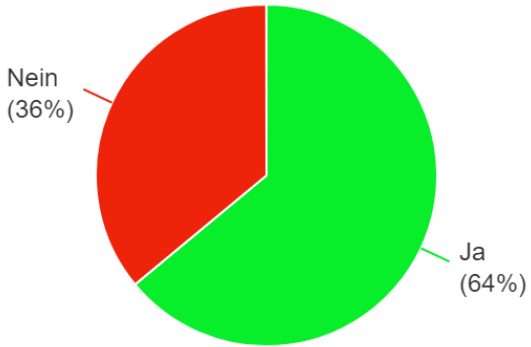
Annex 2: Sample Characteristics Germany (II): customer segments



Annex 2: Sample Characteristics Germany (III): classification

Ist Ihr Hotel klassifiziert (Sterne-Kategorie) ?

Effektive Antworten: 200 *Antwortquote: 99%*



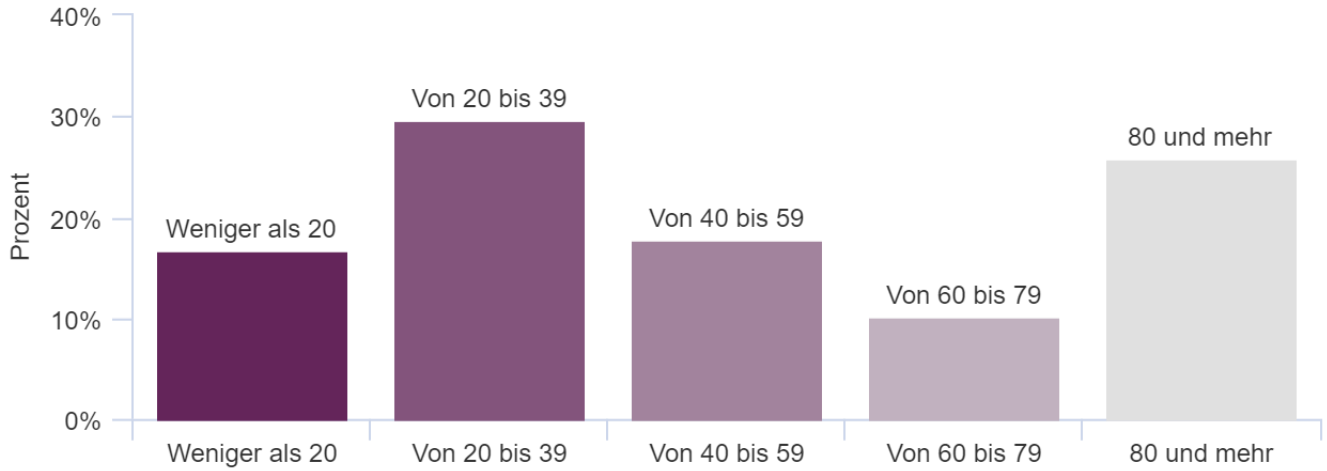
Annex 2: Sample Characteristics Germany (IV): star rating

Annex 2: Sample Characteristics Germany (V): size of hotels

Die Größe des Hotels (Anzahl der Zimmer)

Effektive Antworten: 186
Mittelwert: 65,4
Min - Max : 10,0 - 500,0

Antwortquote: 92%
Median: 43,5

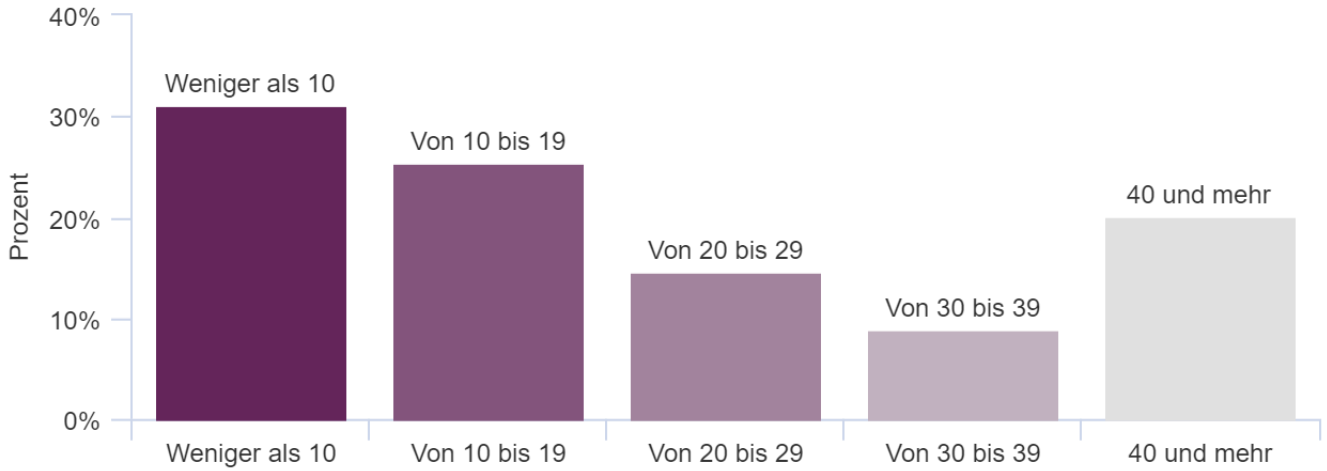


Annex 2: Sample Characteristics Germany (VI): number of staff

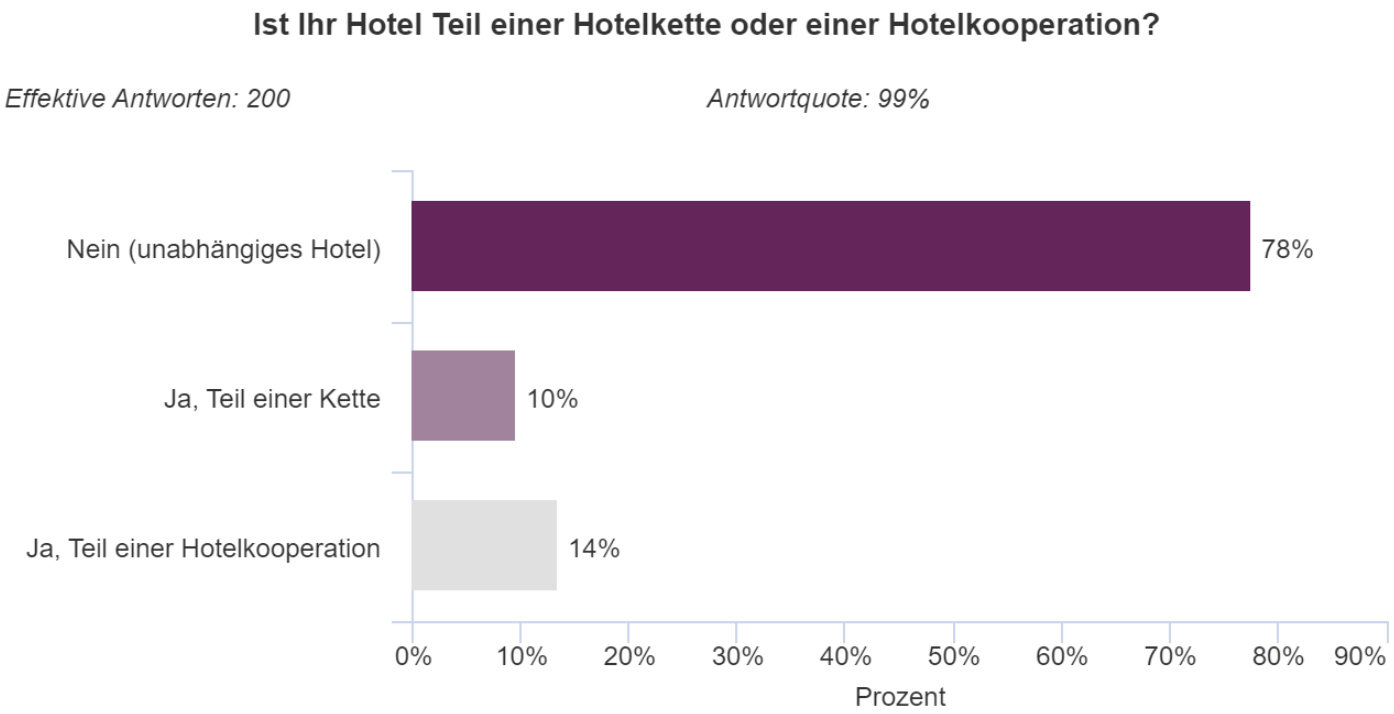
Wie viele Personen arbeiten in Ihrem Hotel (durchschnittliche Anzahl von Vollzeitbeschäftigten)?

Effektive Antworten: 193
Mittelwert: 25,5
Min - Max : 0,0 - 175,0

Antwortquote: 96%
Median: 15,0

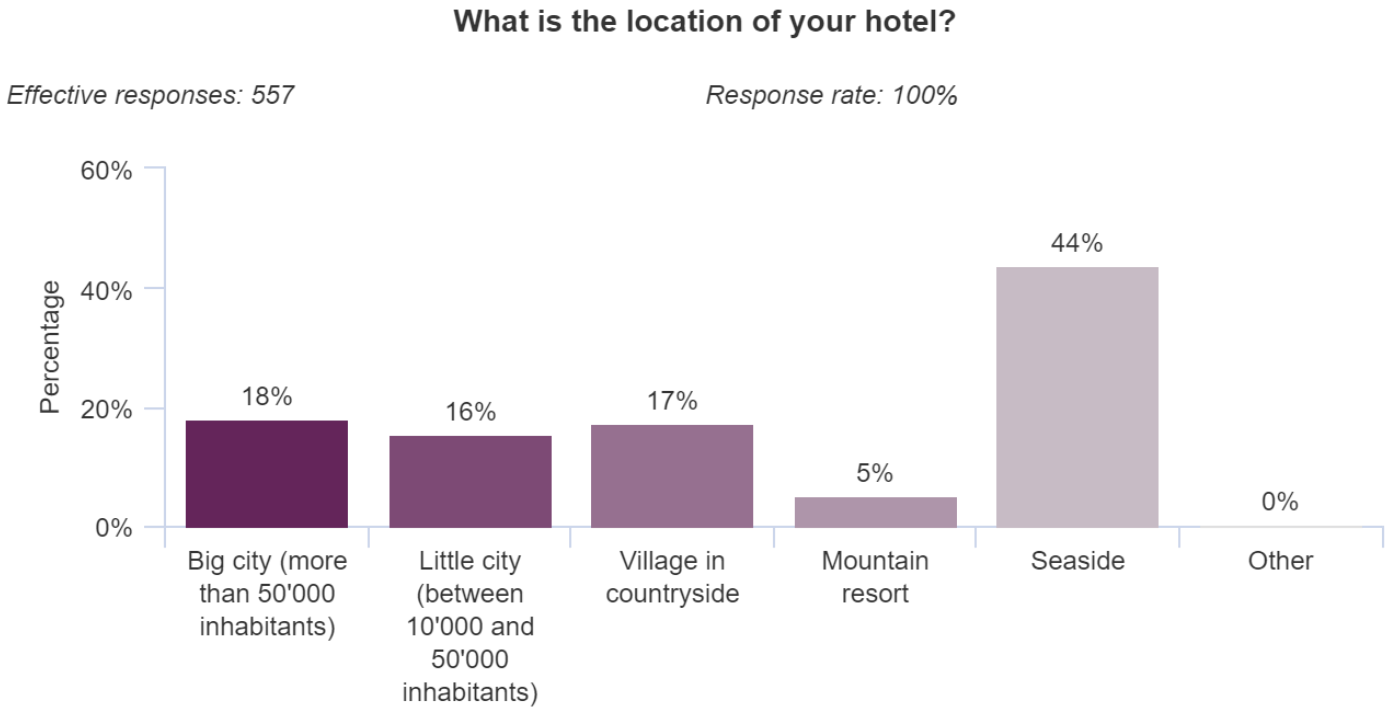


Annex 2: Sample Characteristics Germany (VII): type of hotel

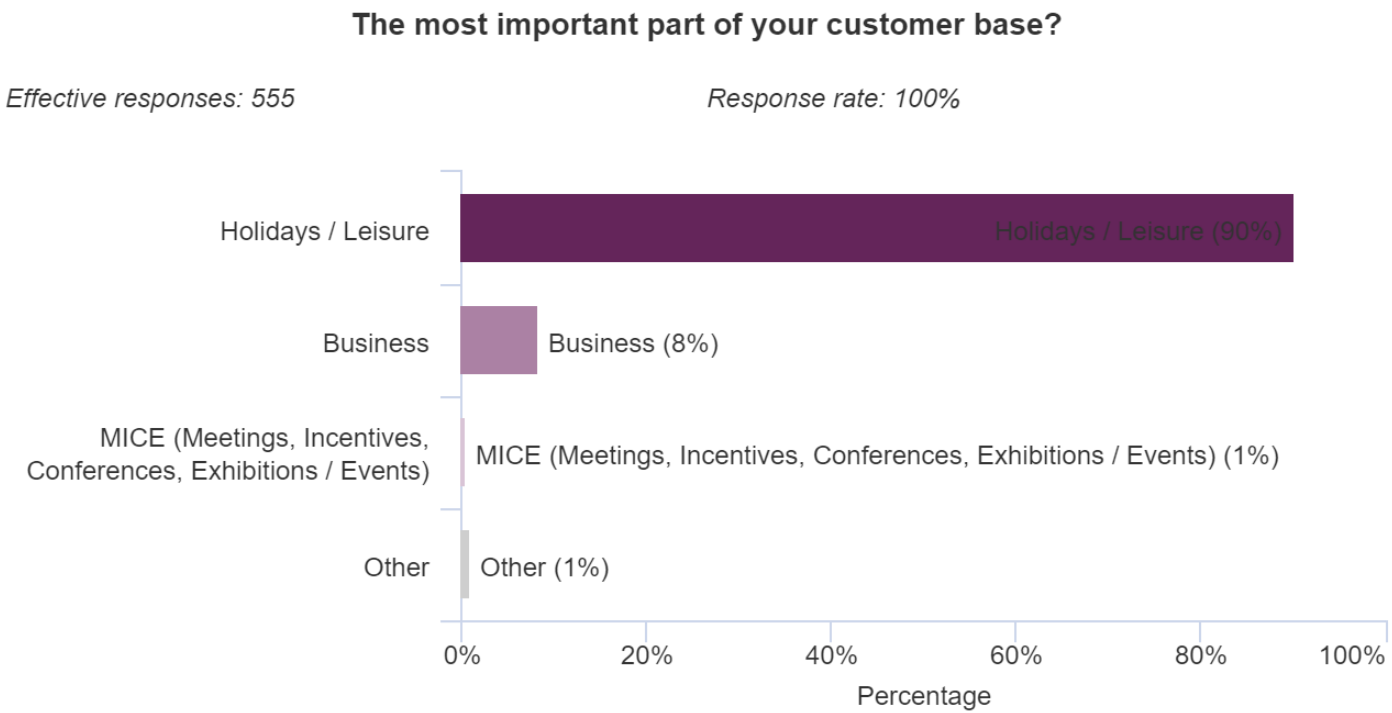


Annex 2: Sample Characteristics Greece

Annex 2: Sample Characteristics Greece (I): location



Annex 2: Sample Characteristics Greece (II): customer segments

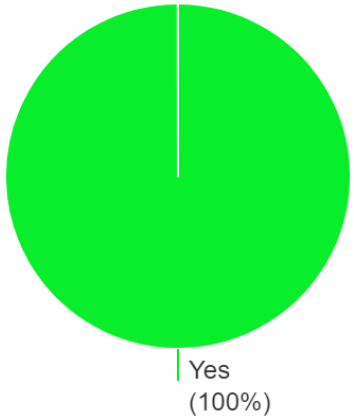


Annex 2: Sample Characteristics Greece (III): classification

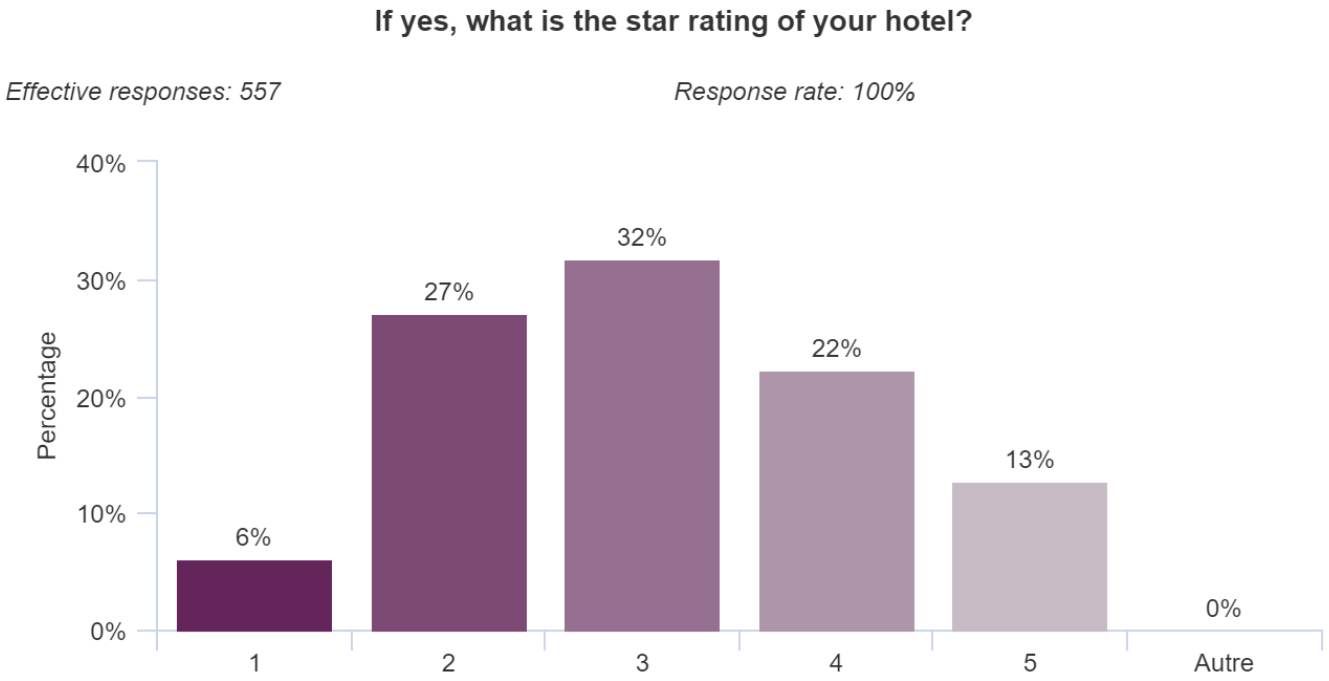
Is your hotel star rated?

Effective responses: 557

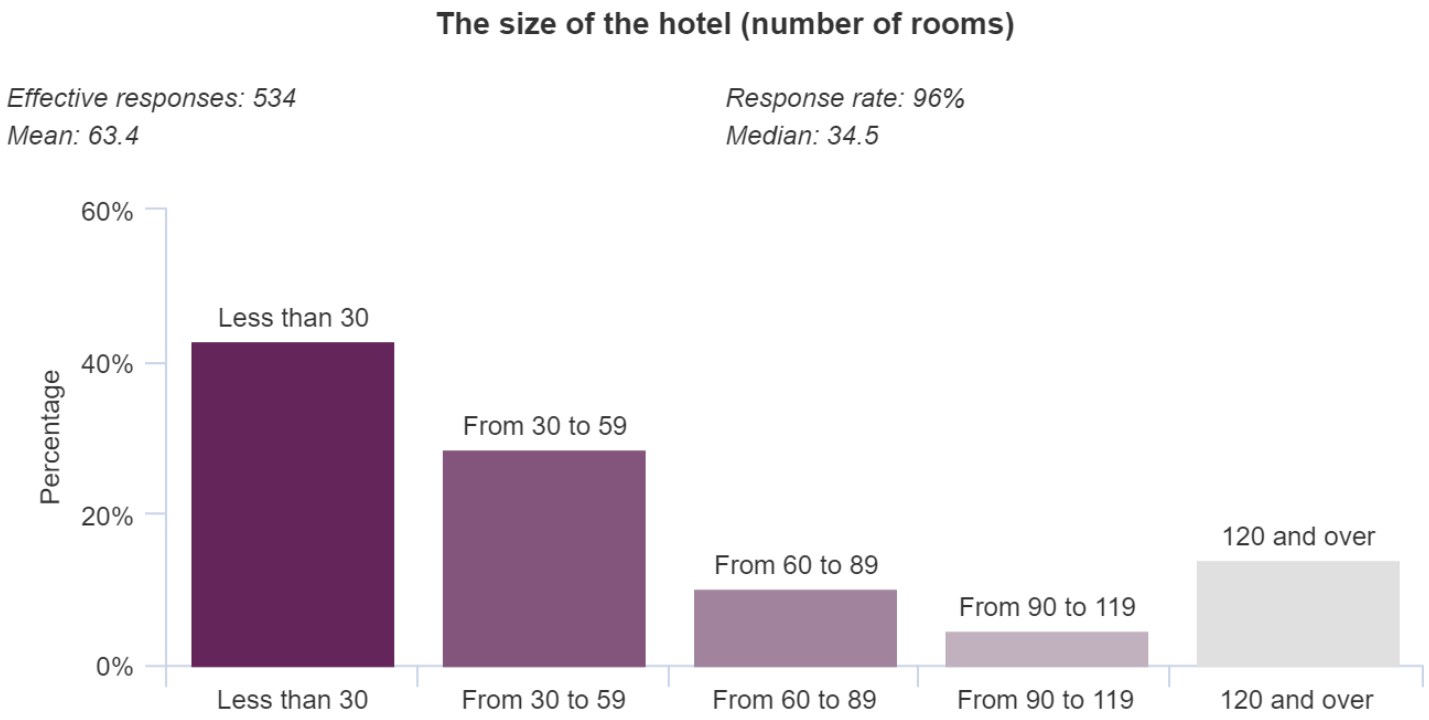
Response rate: 100%



Annex 2: Sample Characteristics Greece (IV): star rating



Annex 2: Sample Characteristics Greece (V): size of hotels

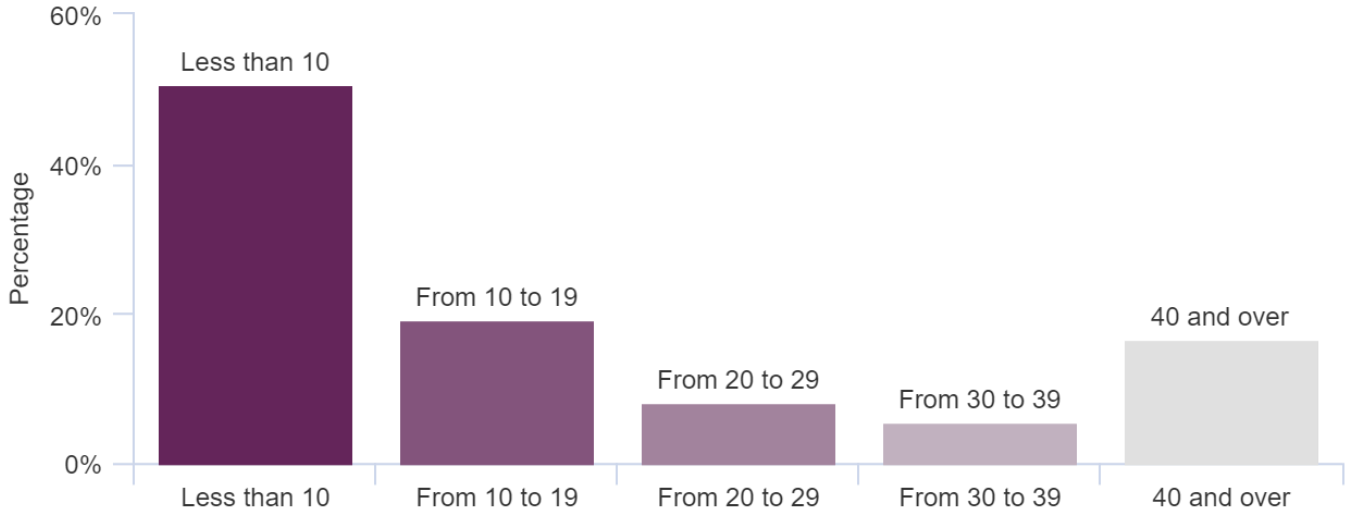


Annex 2: Sample Characteristics Greece (VI): number of staff

How many people work in your hotel (average number of full-time employees)?

Effective responses: 549
Mean: 26.3

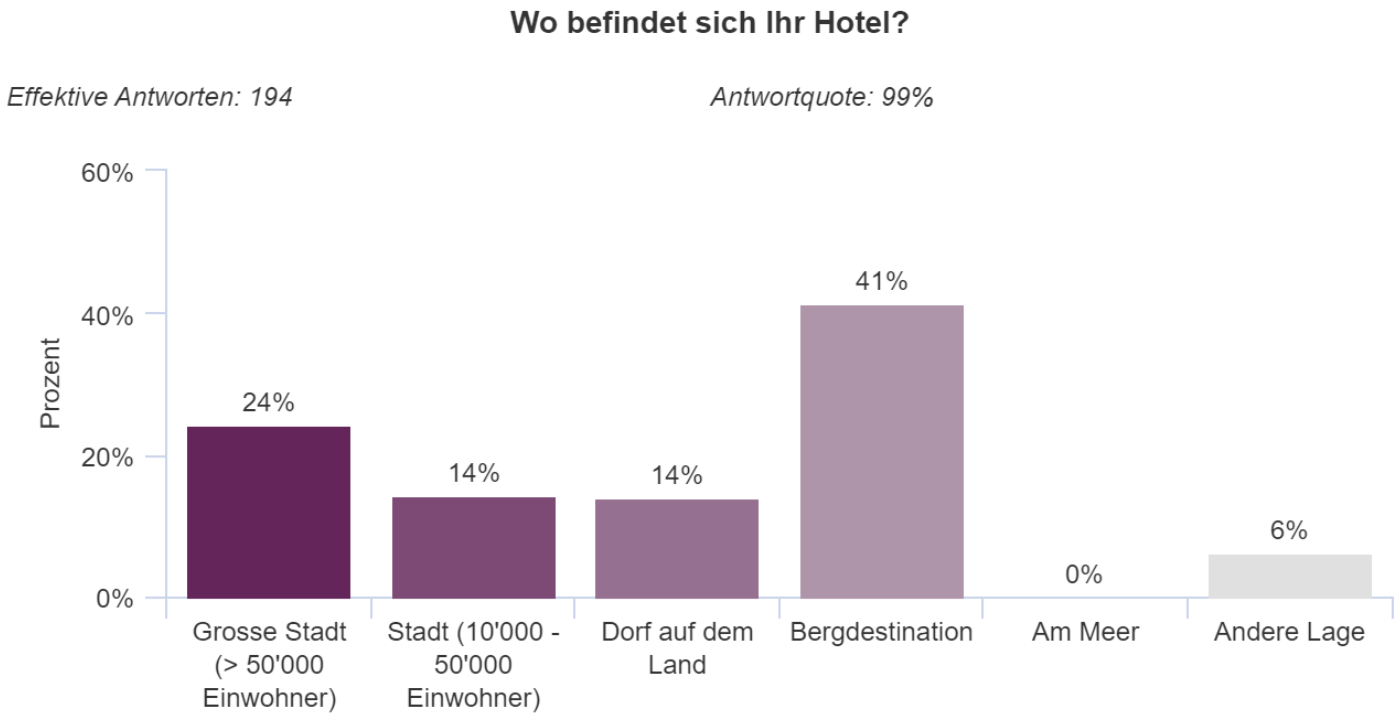
Response rate: 99%
Median: 9.0



Annex 2: Sample Characteristics Greece (VII): type of hotel

Annex 2: Sample Characteristics Switzerland

Annex 2: Sample Characteristics Switzerland (I): location



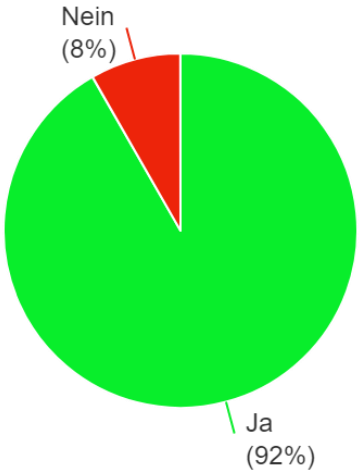
Annex 2: Sample Characteristics Switzerland (II): customer segments

Annex 2: Sample Characteristics Switzerland (III): classification

Ist Ihr Hotel klassifiziert (Sterne-Kategorie) ?

Effektive Antworten: 193

Antwortquote: 99%



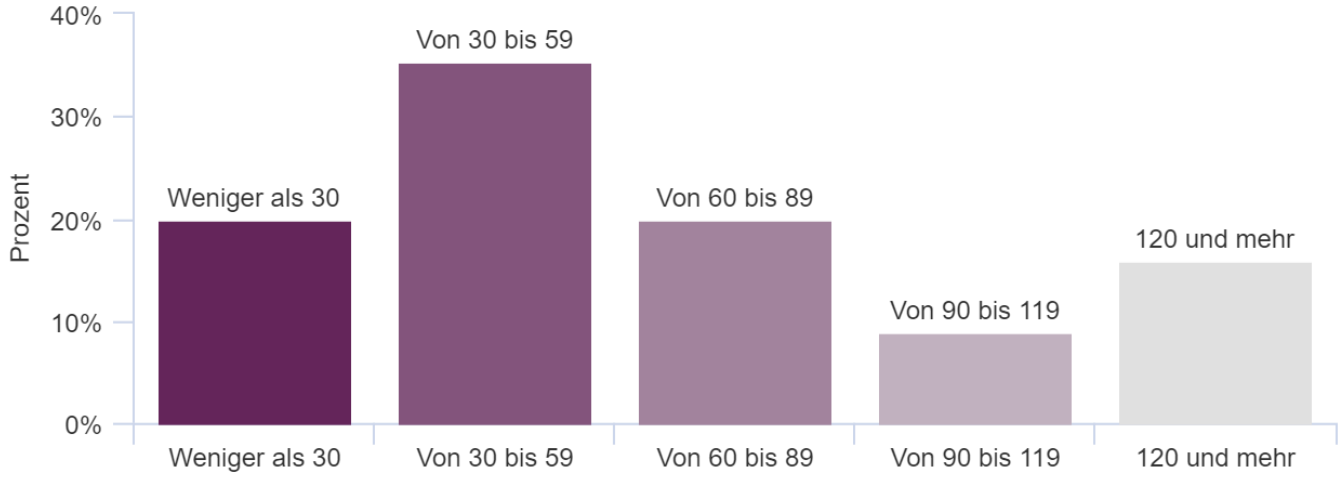
Annex 2: Sample Characteristics Switzerland (IV): star rating

Annex 2: Sample Characteristics Switzerland (V): size of hotels

Die Größe des Hotels (Anzahl der Zimmer)

Effektive Antworten: 190
Mittelwert: 85,3
Min - Max : 10,0 - 1.600,0

Antwortquote: 97%
Median: 54,5

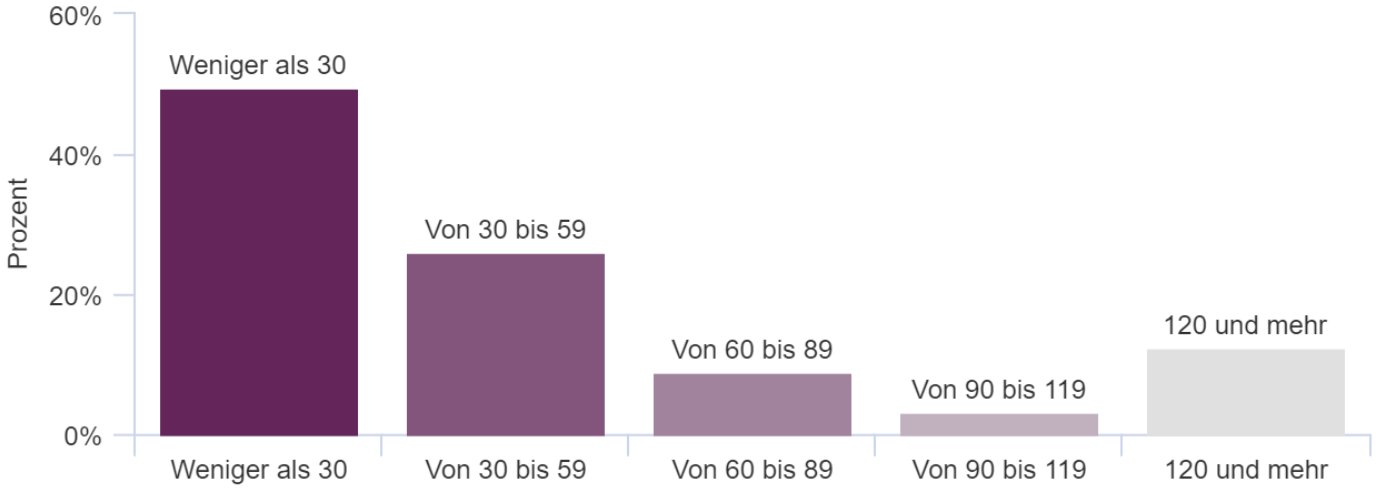


Annex 2: Sample Characteristics Switzerland (VI): number of staff

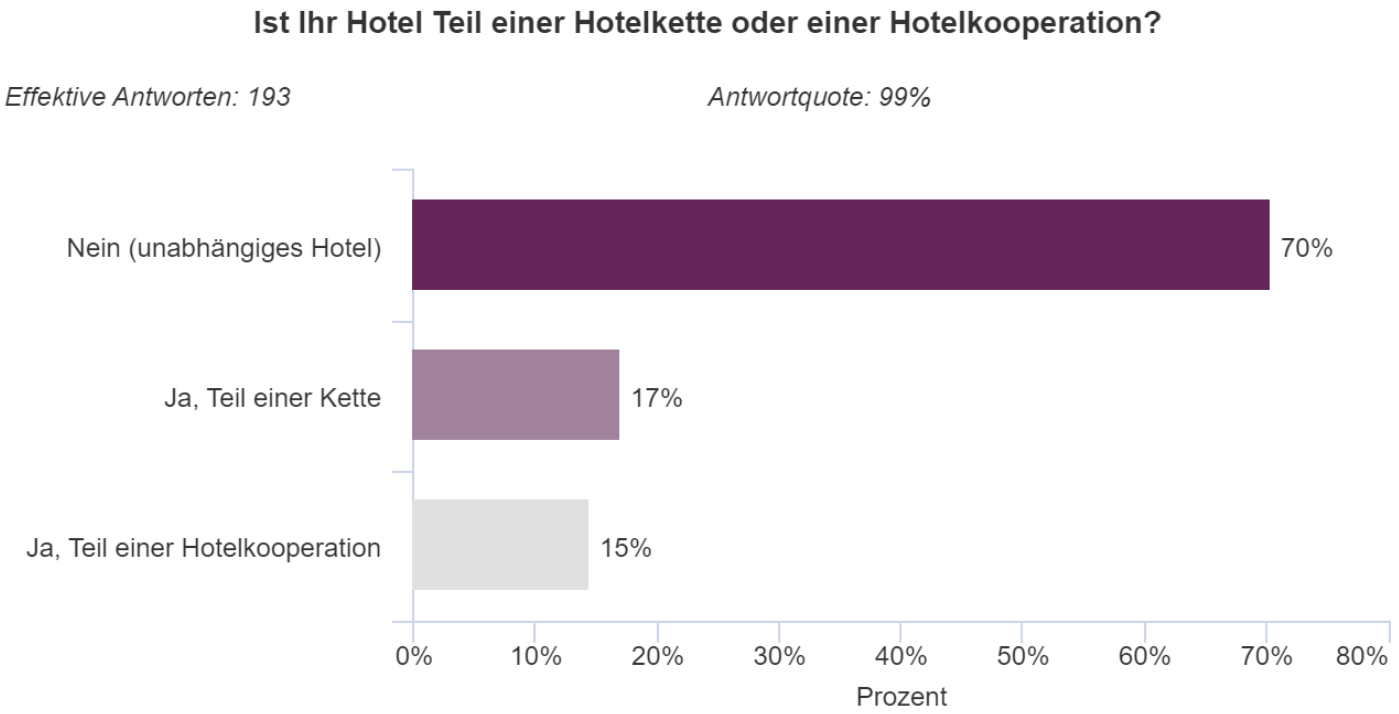
Wie viele Personen arbeiten in Ihrem Hotel (durchschnittliche Anzahl von Vollzeitbeschäftigten)?

Effektive Antworten: 192
Mittelwert: 58,4
Min - Max : 1,0 - 600,0

Antwortquote: 98%
Median: 30,0



Annex 2: Sample Characteristics Switzerland (VII): type of hotel



> Annex 3: IT and data management

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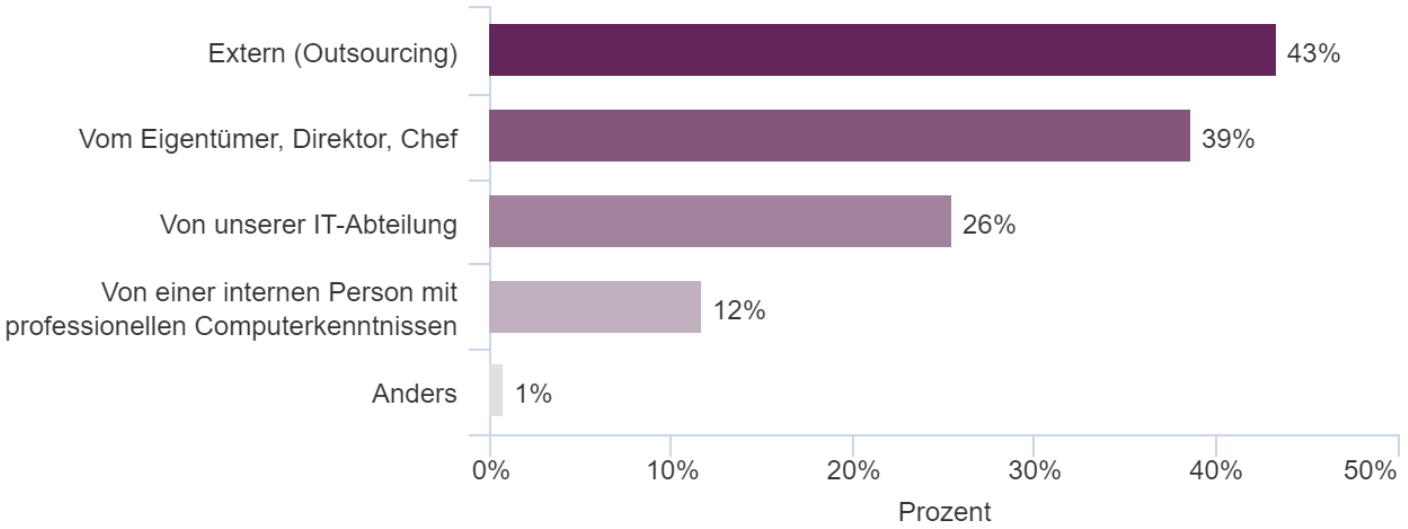
Annexe 3: IT and data management Austria

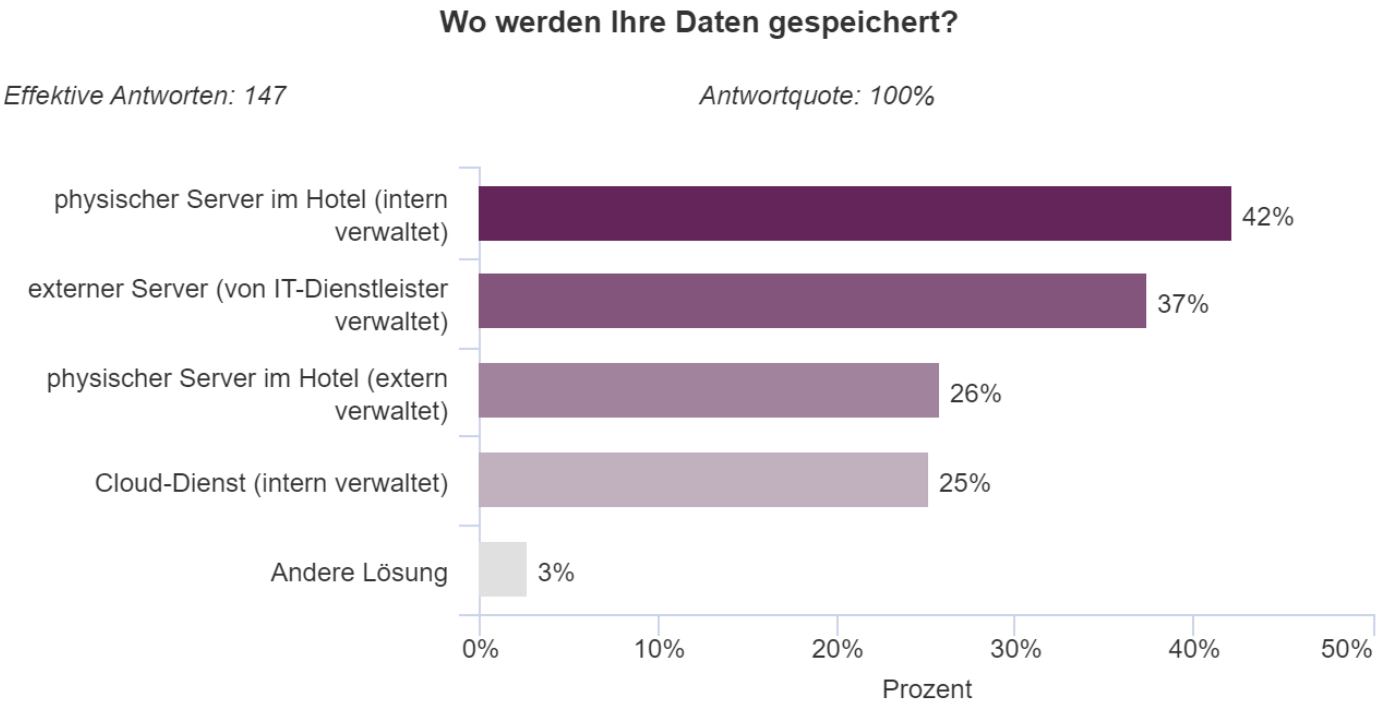
Annex 3: IT and data management Austria (I)

Wie werden die administrativen Aspekte der Informationssysteme gehandhabt (Software Installation, Einrichtung von User Konten, Verwaltung des Datenzugriffs usw.)?

Effektive Antworten: 145 *Antwortquote: 99%*



Annex 3: IT and data management Austria (II)

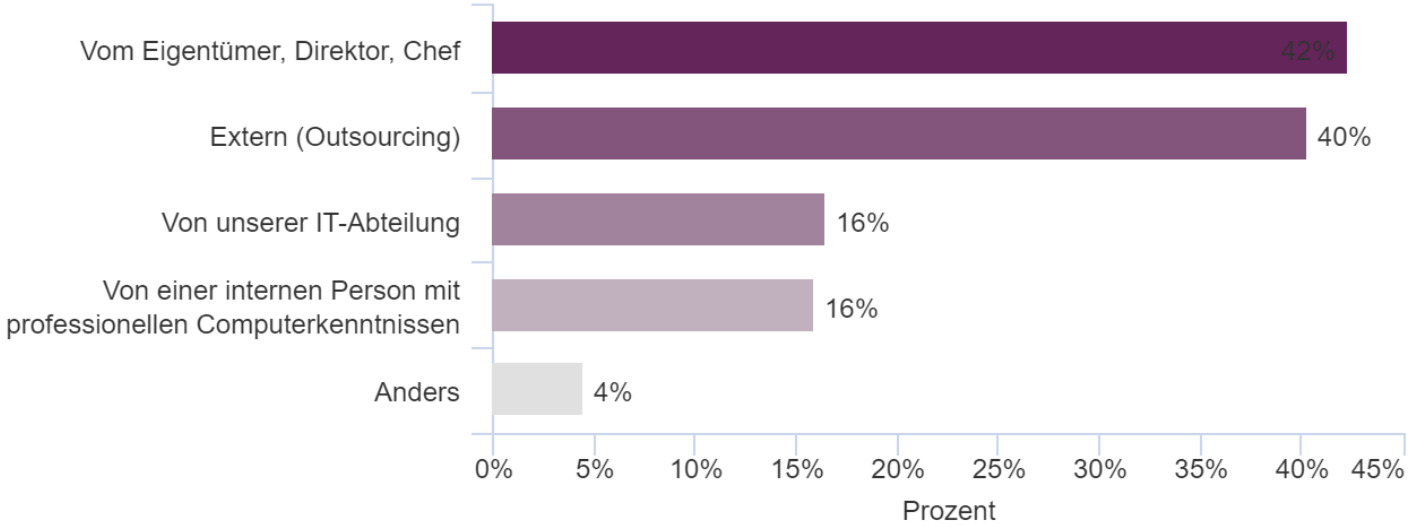


Annex 3: IT and data management Germany

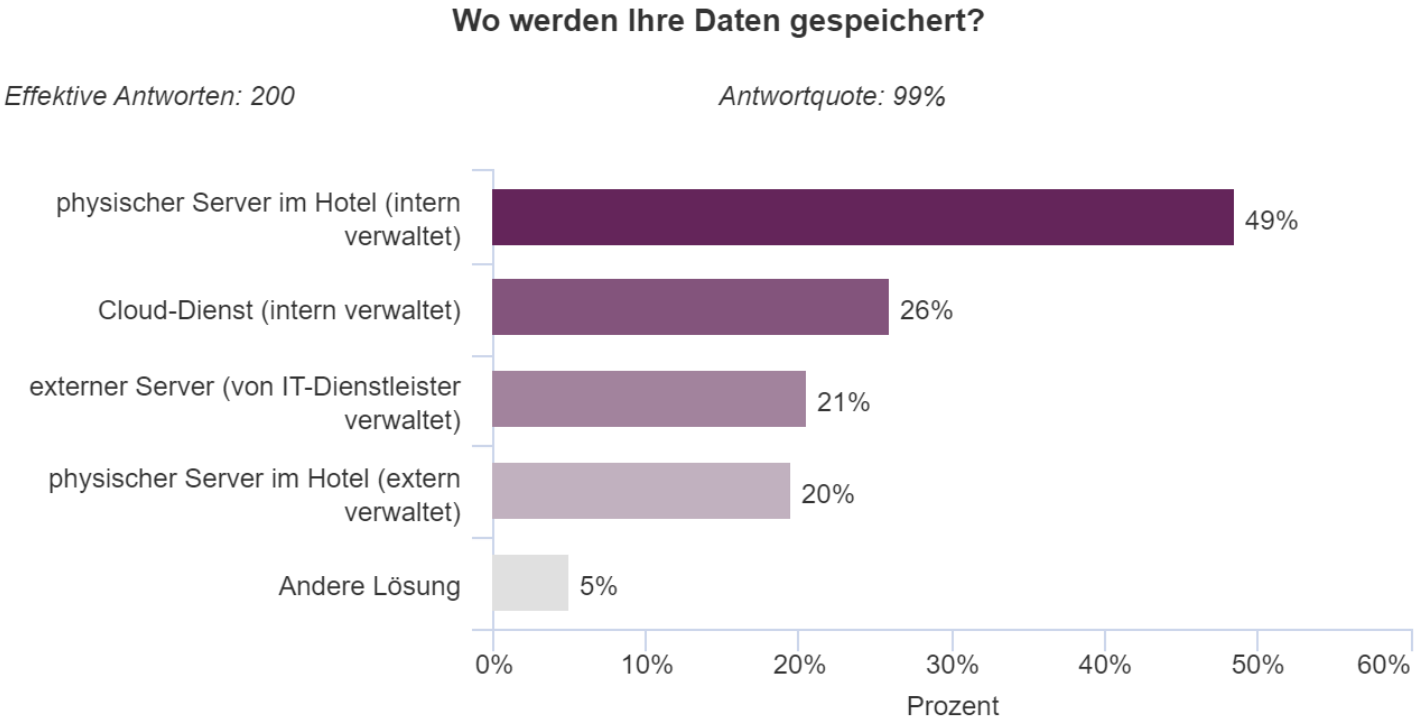
Annex 3: IT and data management Germany (I)

Wie werden die administrativen Aspekte der Informationssysteme gehandhabt (Software Installation, Einrichtung von User Konten, Verwaltung des Datenzugriffs usw.)?

Effektive Antworten: 201 *Antwortquote: 100%*



Annex 2: IT and data management Germany (II)

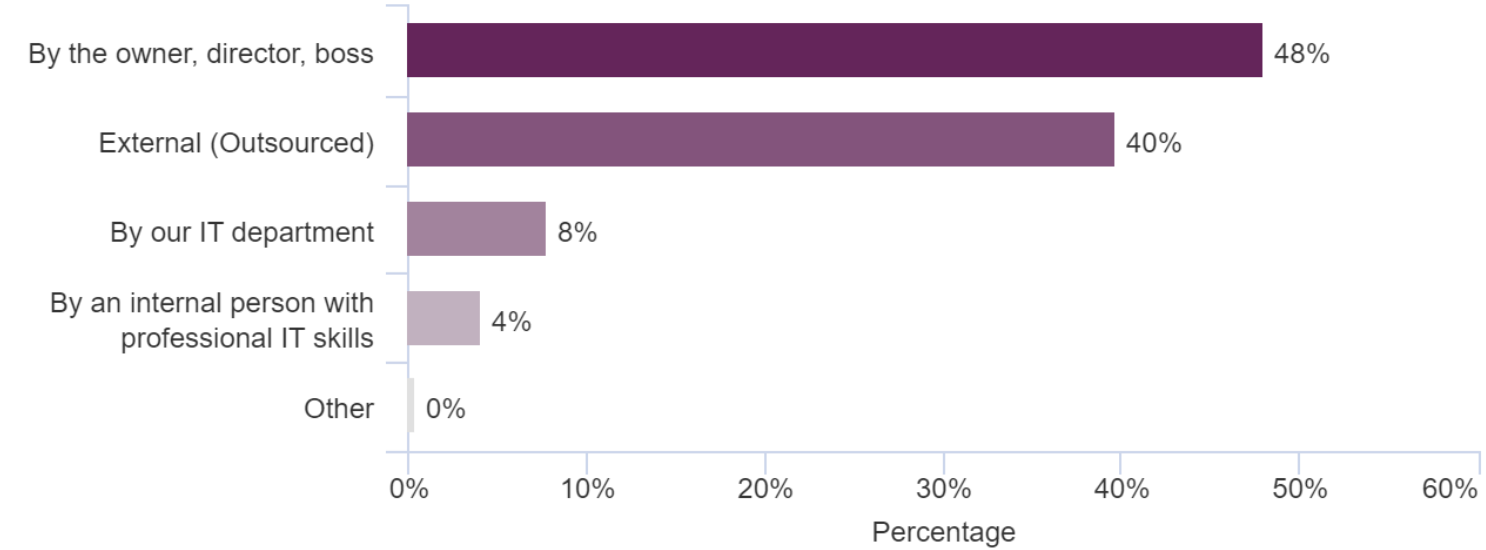


Annex 3: IT and data management Greece

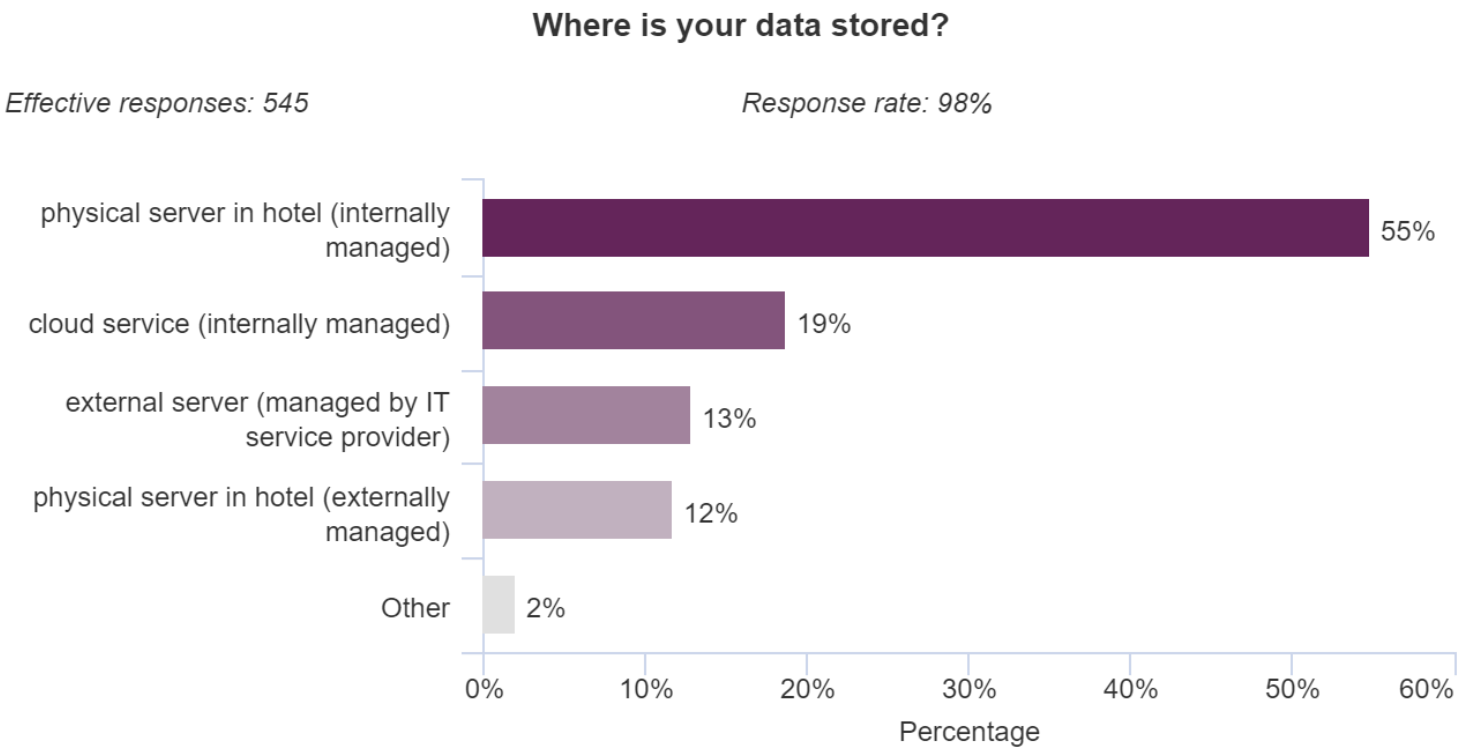
Annex 3: IT and data management Greece (I)

How do you manage the administrative aspect of information/IT systems (installing software, creating user accounts, managing access to data, etc.)?

Effective responses: 554 *Response rate: 99%*



Annex 3: IT and data management Greece (II)

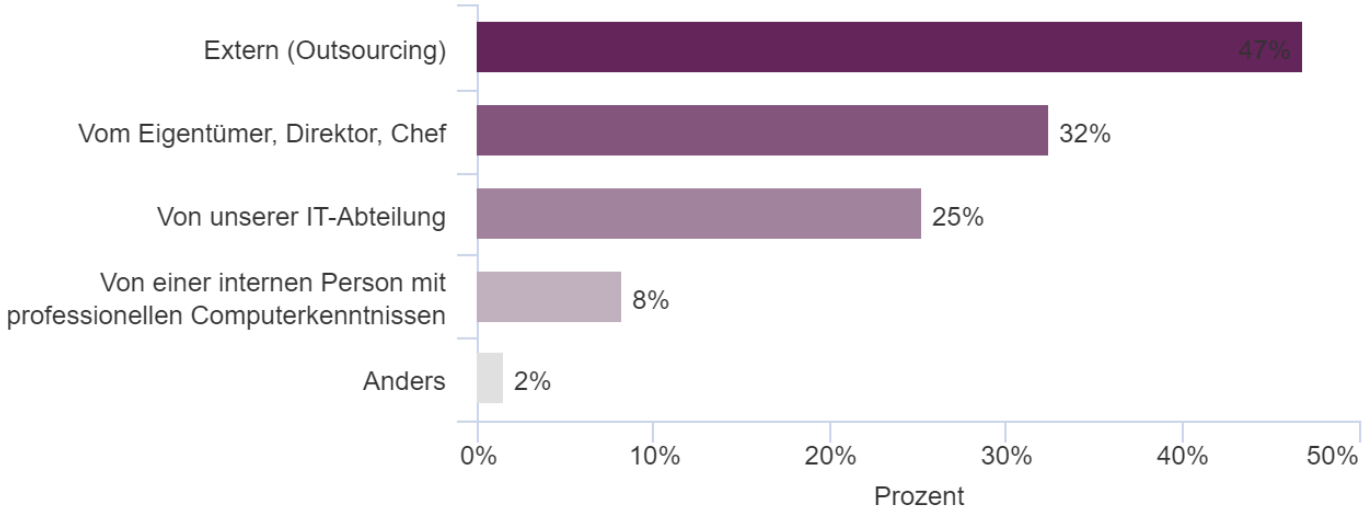


Annex 3: IT and data management Switzerland

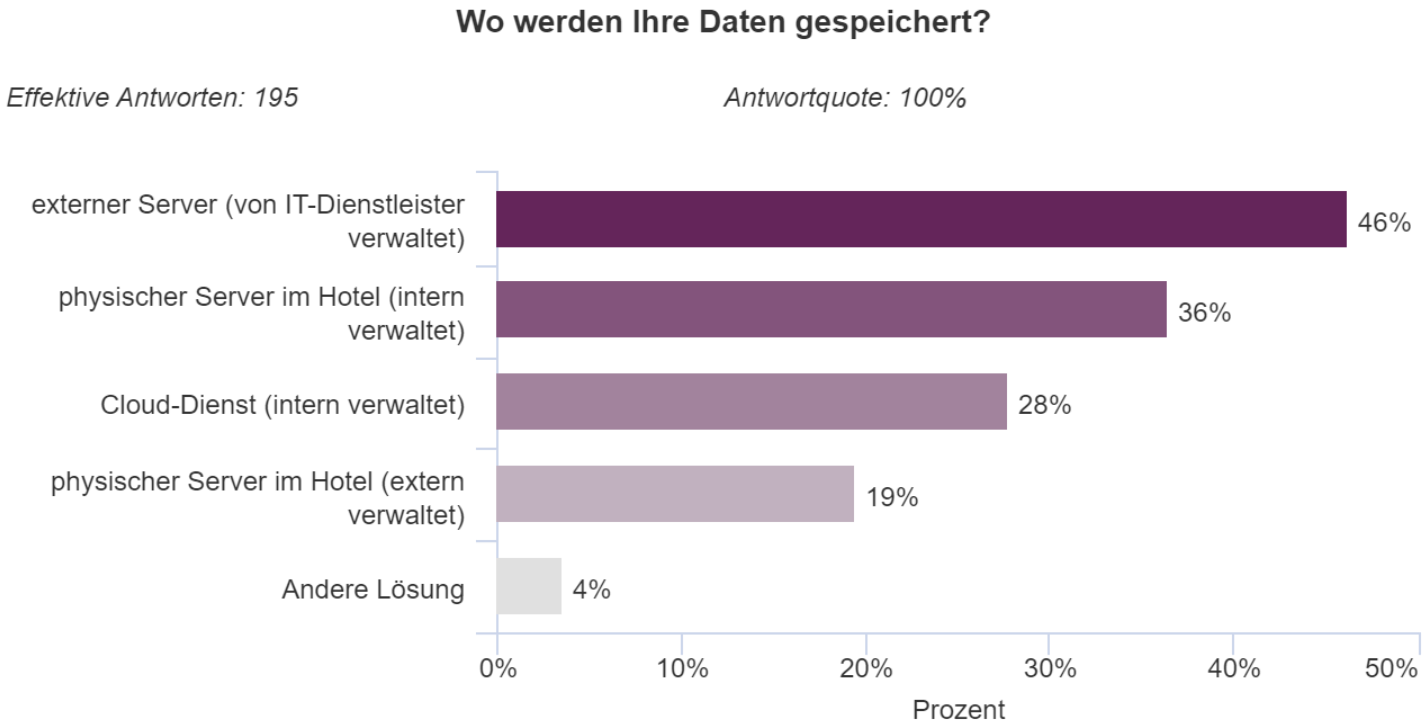
Annex 3: IT and data management Switzerland (I)

Wie werden die administrativen Aspekte der Informationssysteme gehandhabt (Software Installation, Einrichtung von User Konten, Verwaltung des Datenzugriffs usw.)?

Effektive Antworten: 194 *Antwortquote: 99%*



Annex 3: IT and data management Switzerland (II)



> Annex 4: TOE (Technology-Organization-Environment) framework

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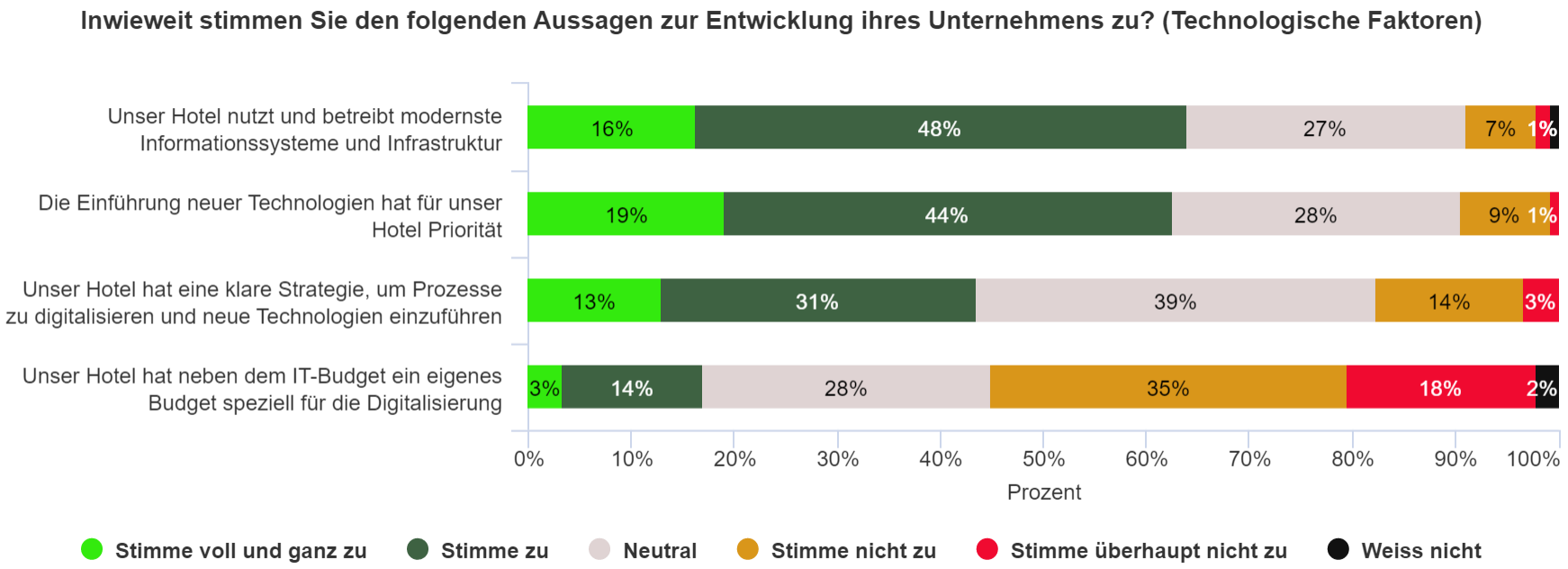
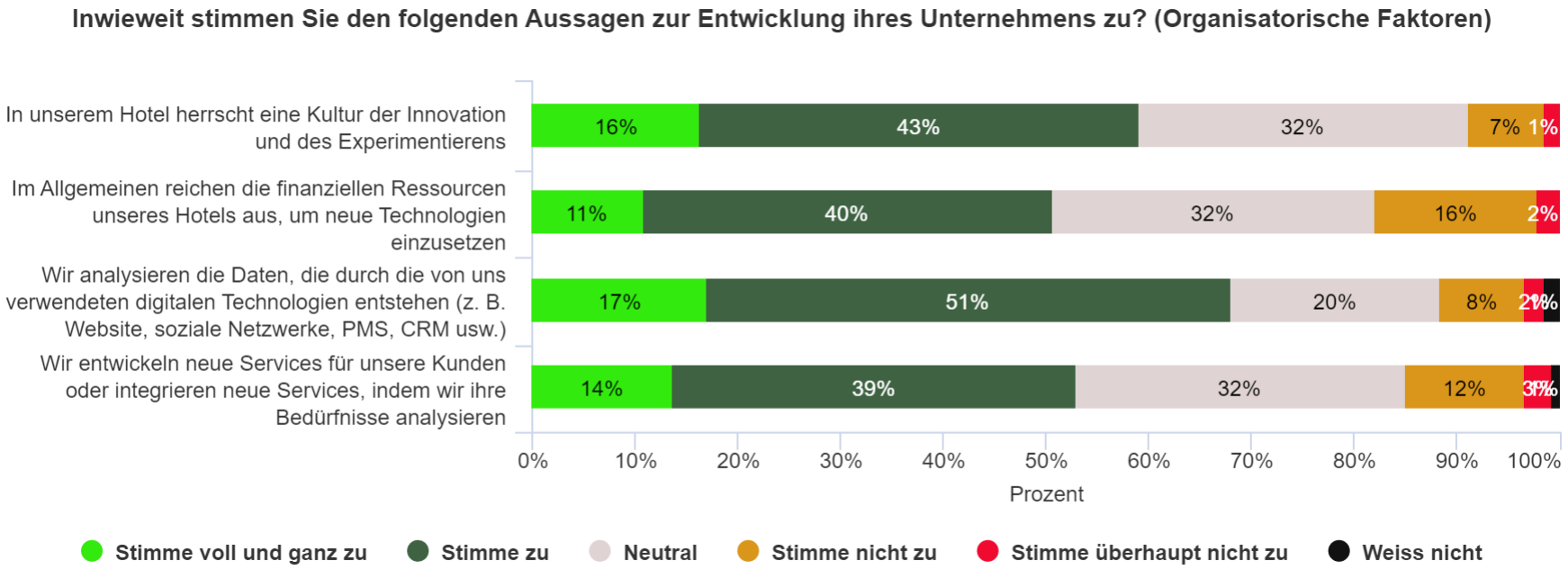
Annex 4: TOE (Technology-Organization-Environment) framework Austria

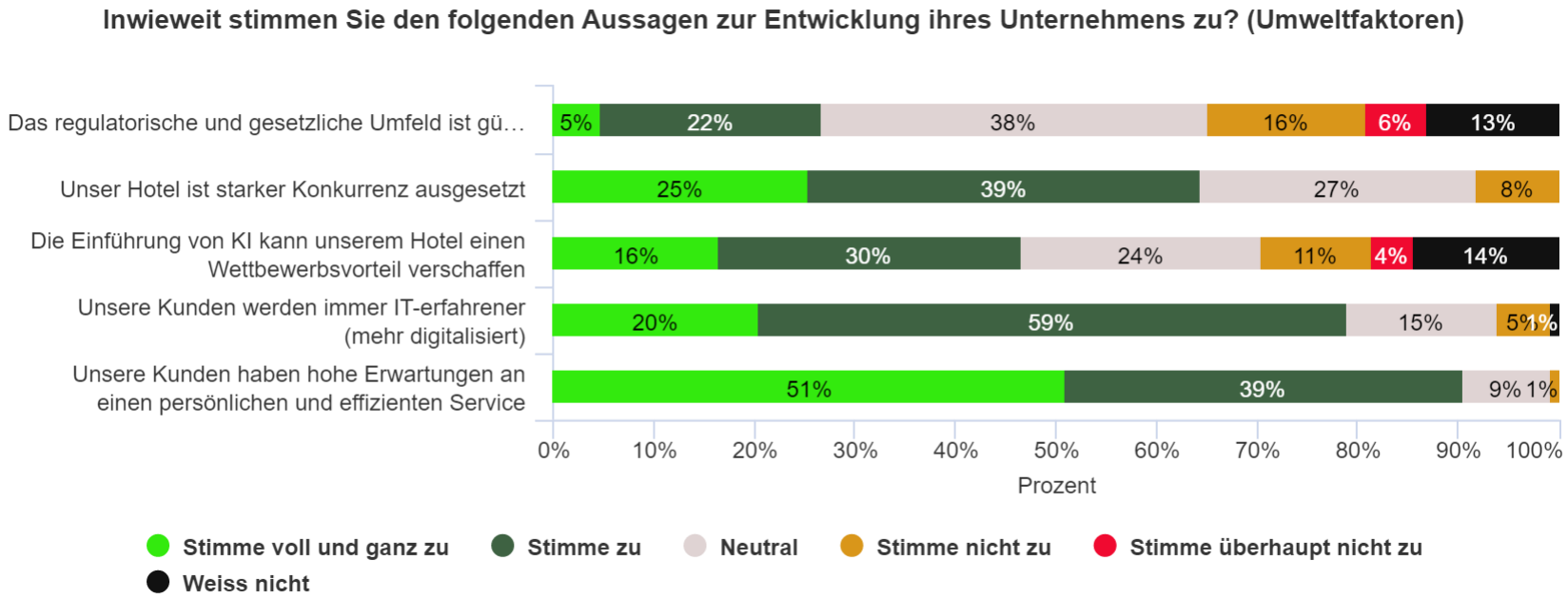
Annex 4: TOE (Technology-Organization-Environment) framework Austria (I): Technological factors



Annex 4: TOE (Technology-Organization-Environment) framework Austria (II): Organisational factors

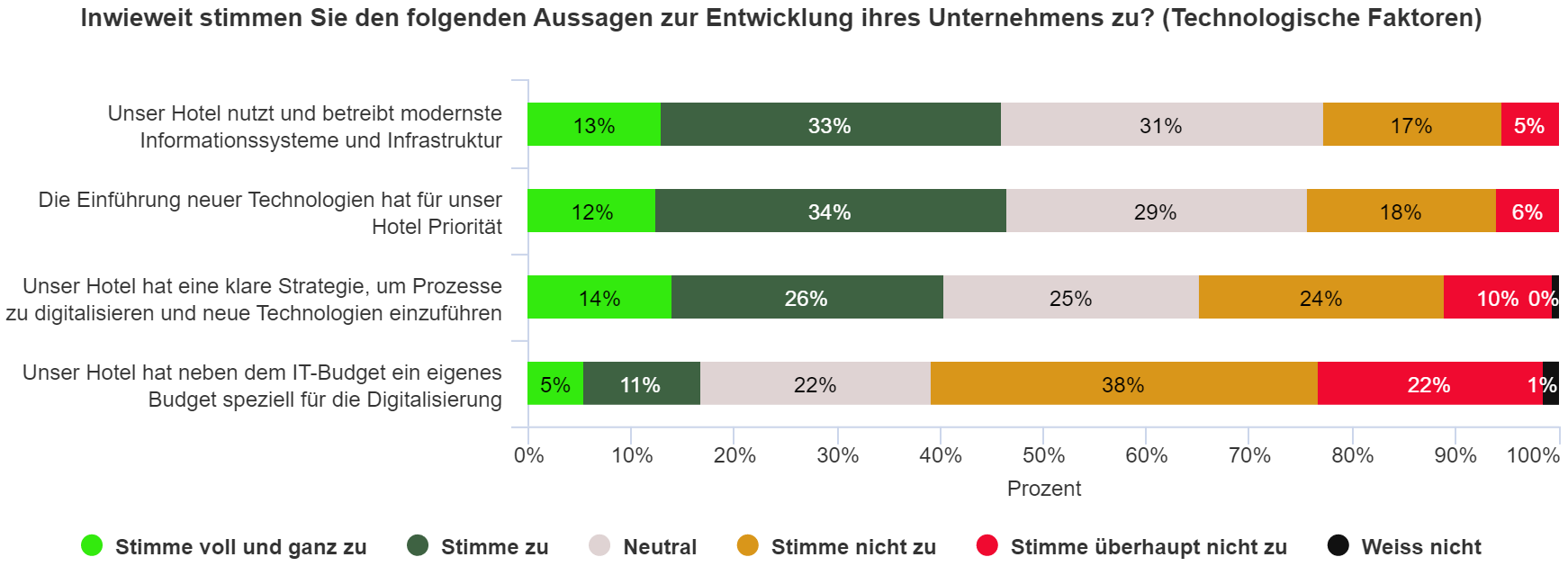


Annex 4: TOE (Technology-Organization-Environment) framework Austria (III): Environmental factors



Annex 4: TOE (Technology-Organization-Environment) framework Germany

Annex 4: TOE (Technology-Organization-Environment) framework Germany (I): Technological factors



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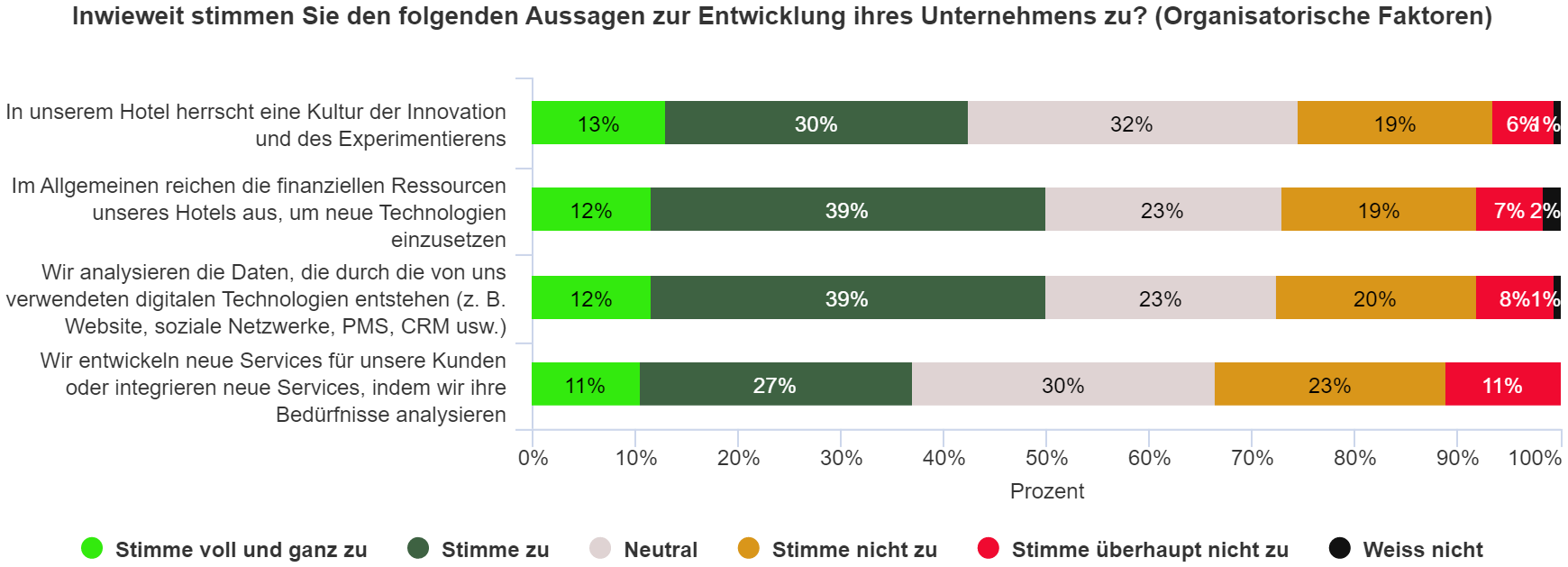
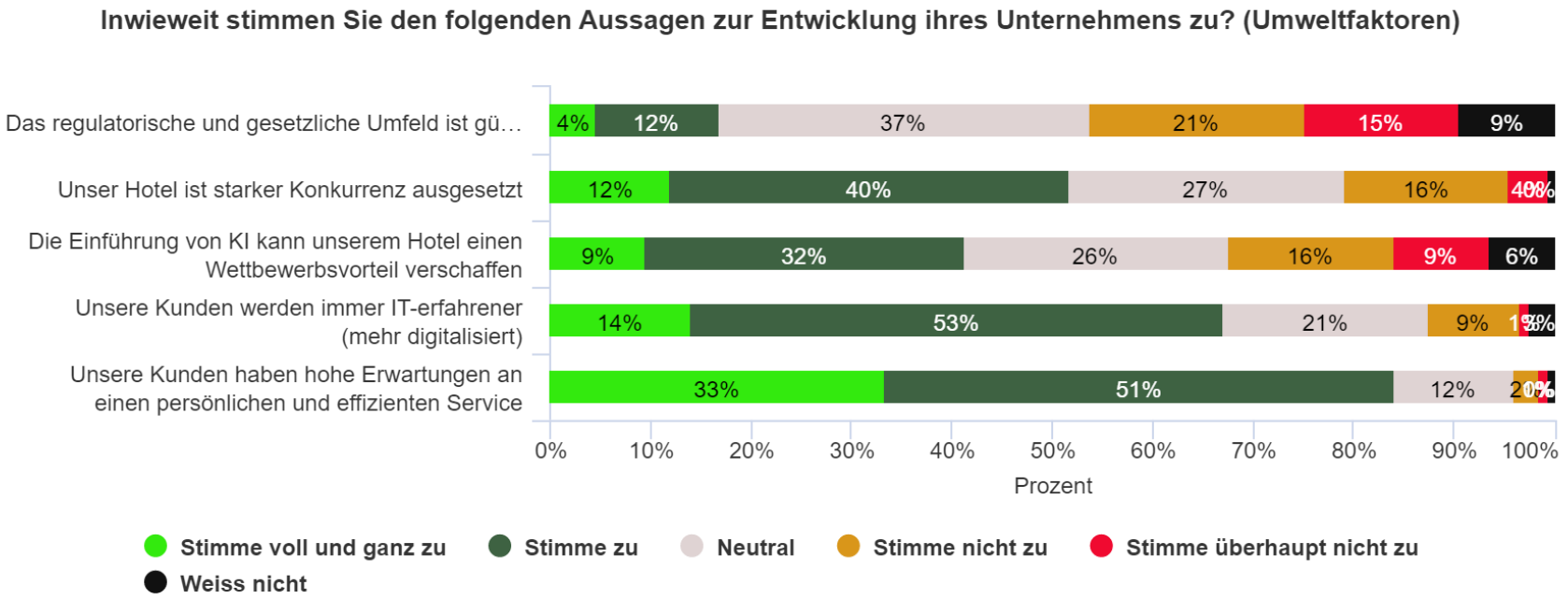
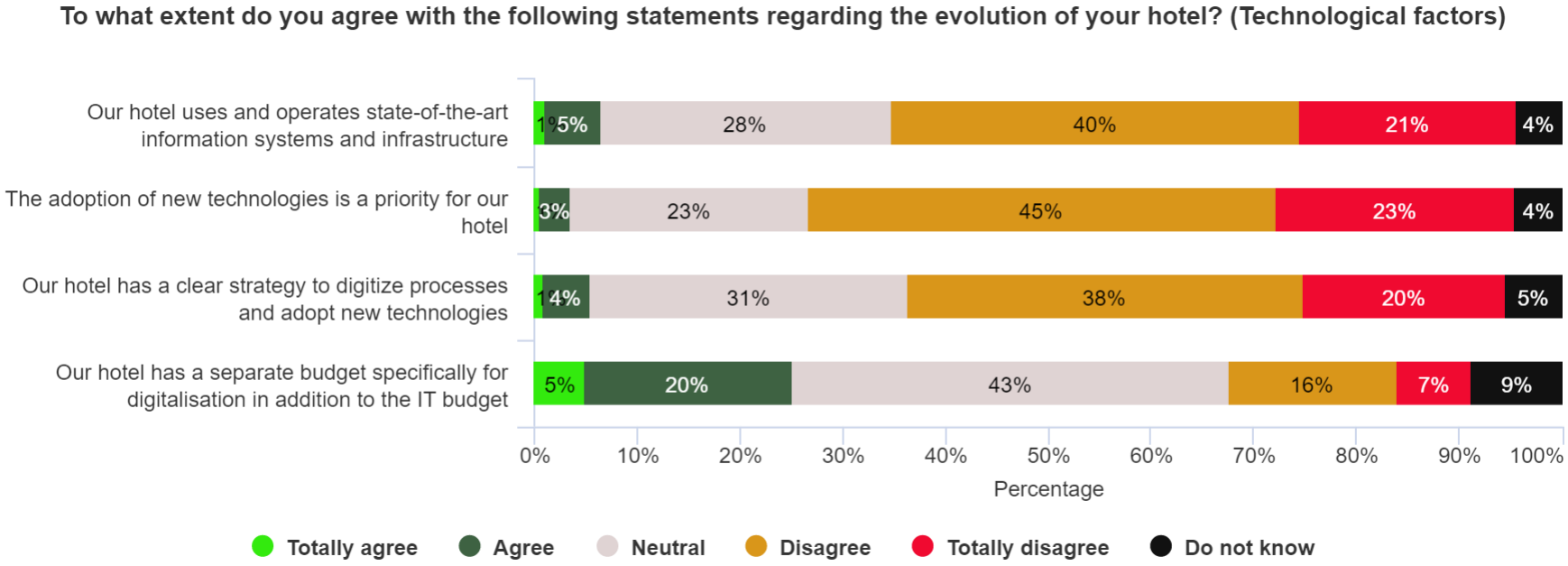


Annex 4: TOE (Technology-Organization-Environment) framework Germany (III): Environmental factors

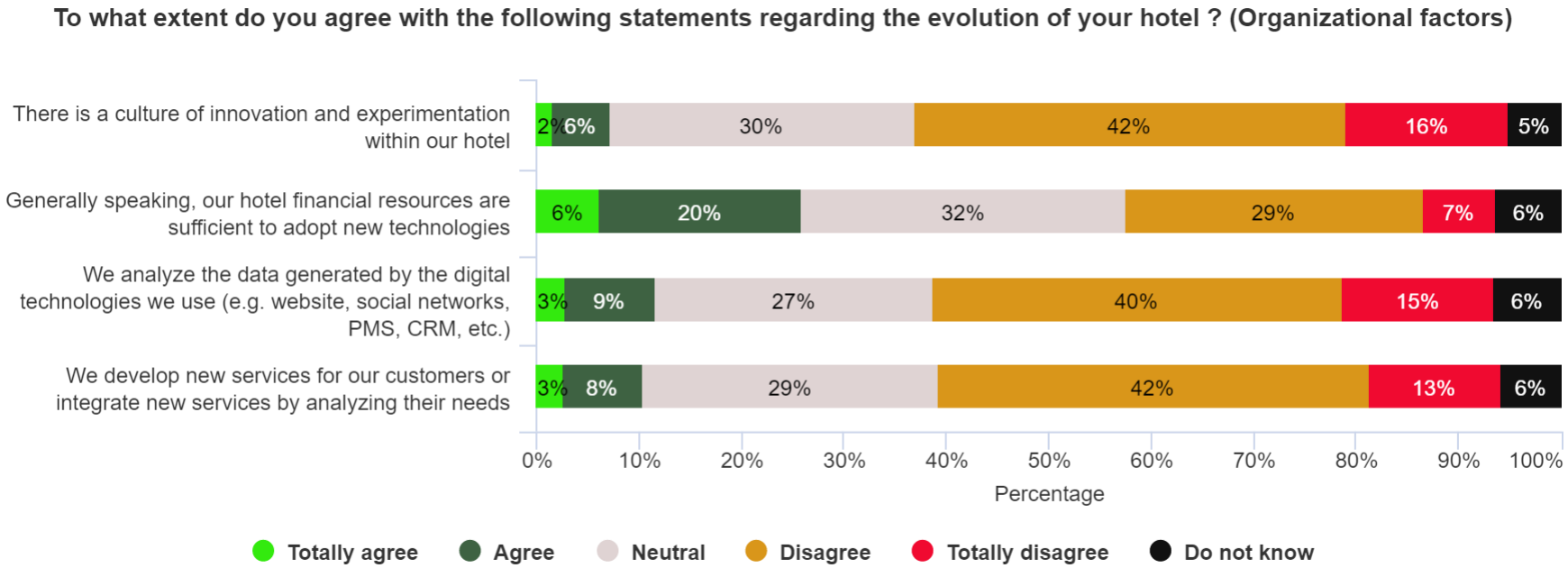


Annex 4: TOE (Technology-Organization-Environment) framework Greece

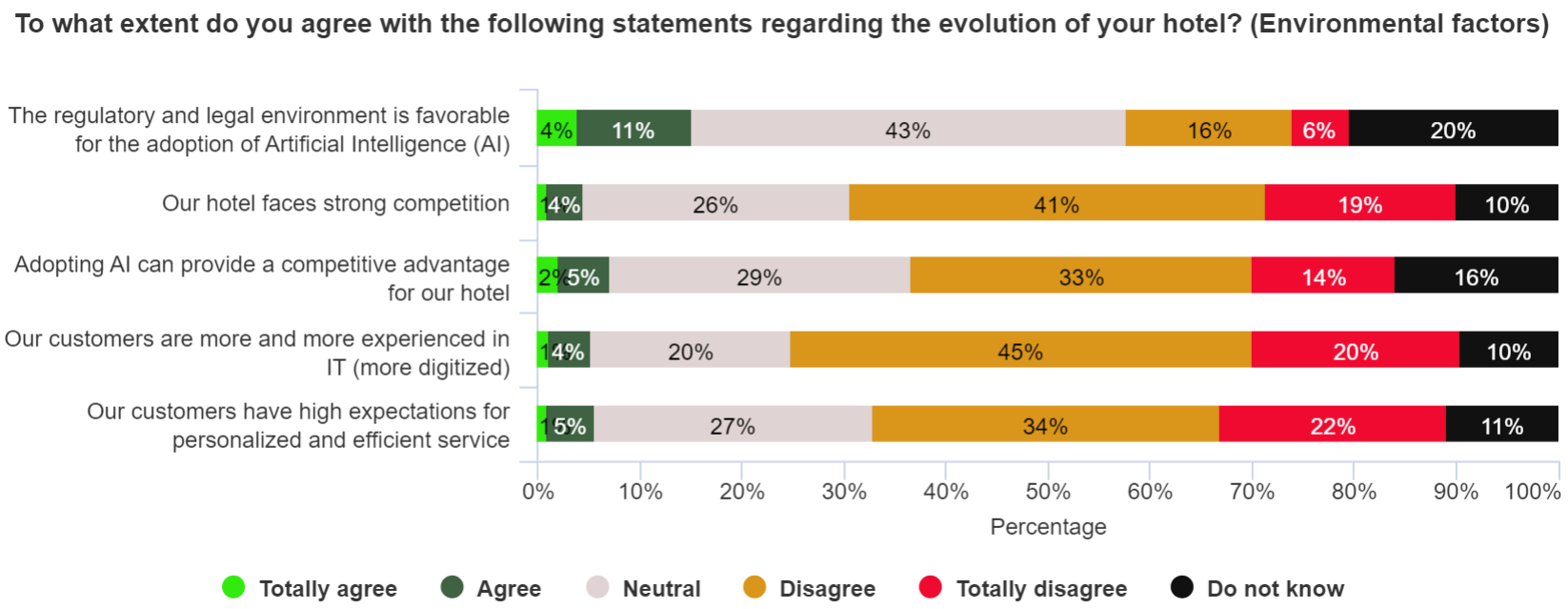
Annex 4: TOE (Technology-Organization-Environment) framework Greece (I): Technological factors



Annex 4: TOE (Technology-Organization-Environment) framework Greece (II): Organisational factors

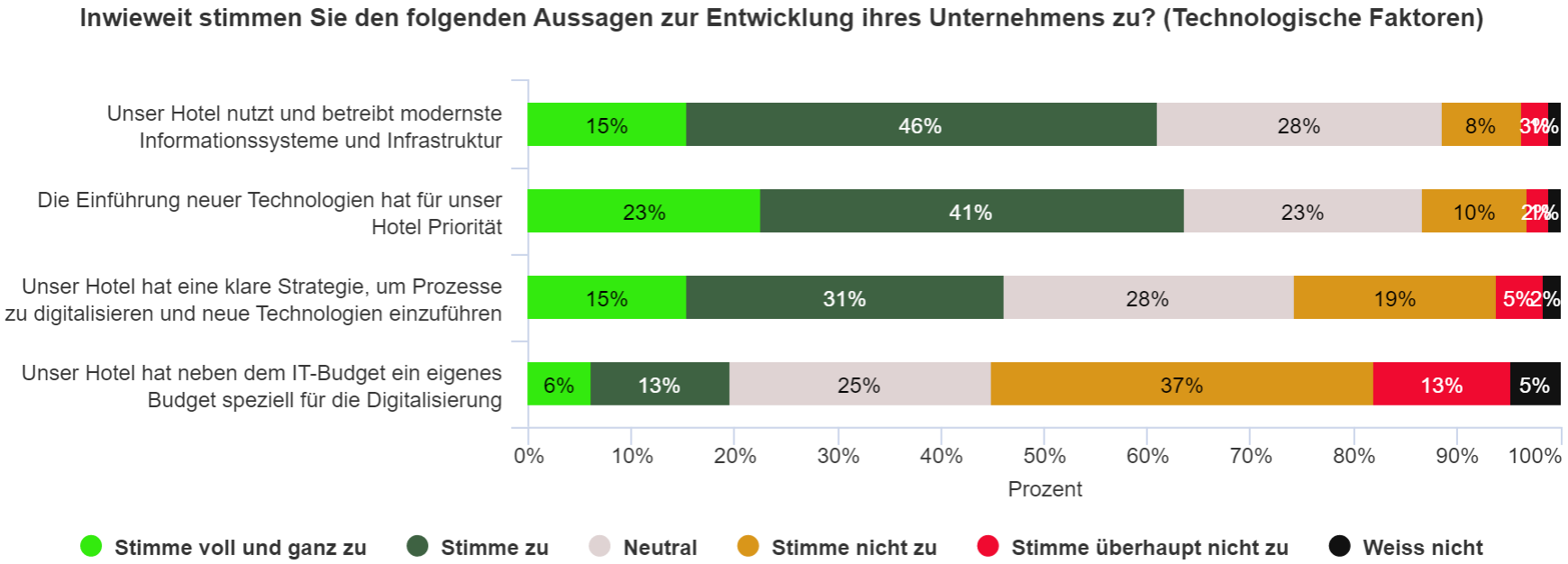


Annex 4: TOE (Technology-Organization-Environment) framework Greece (III): Environmental factors

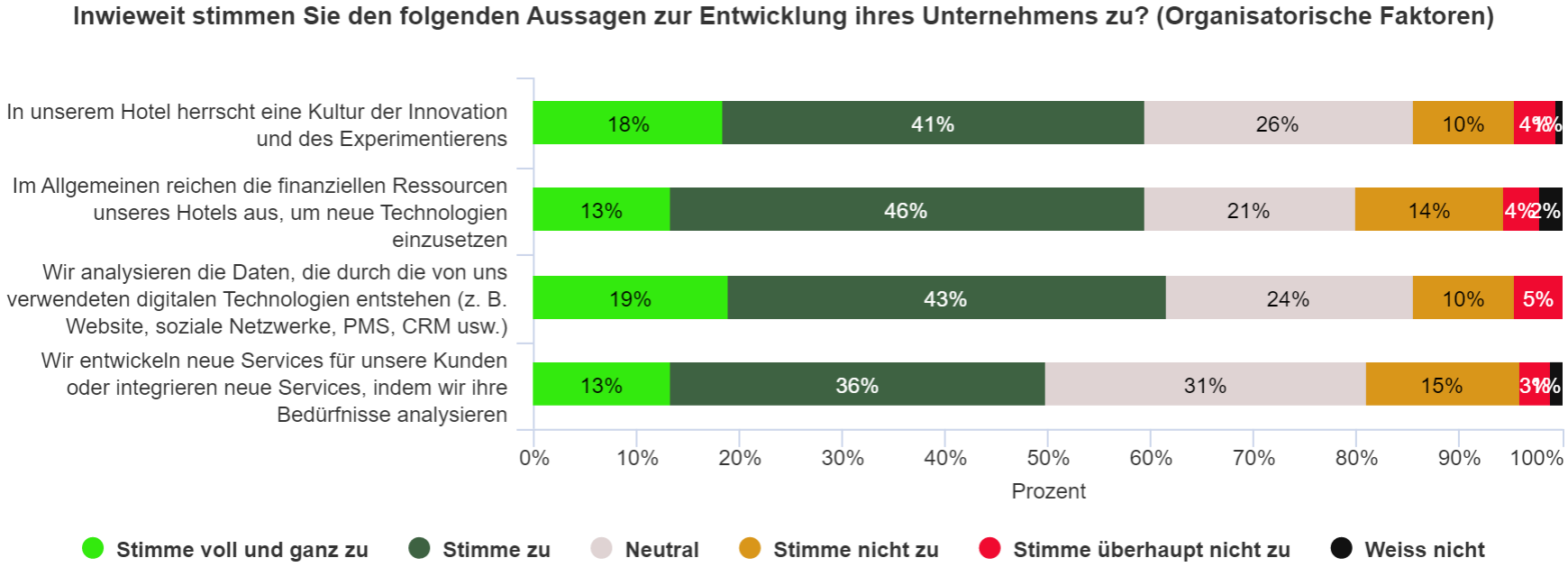


Annex 4: TOE (Technology-Organization-Environment) framework Switzerland

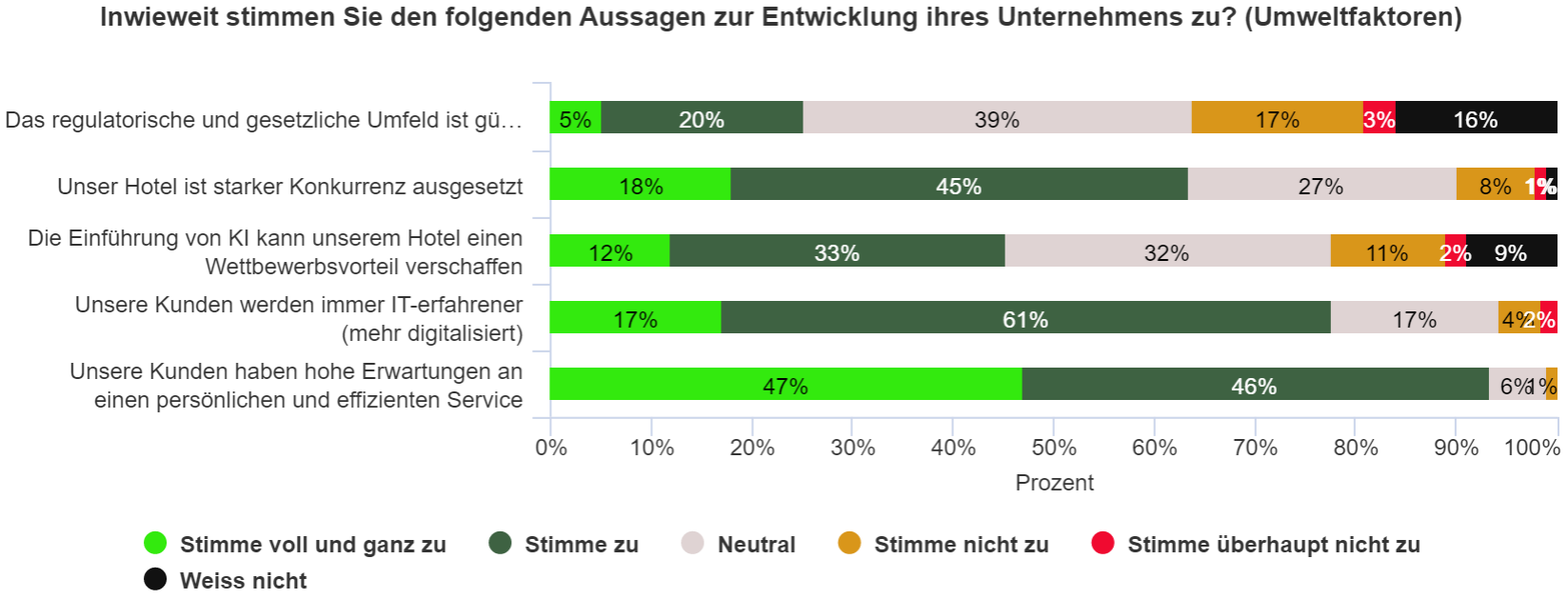
Annex 4: TOE (Technology-Organization-Environment) framework Switzerland (I): Technological factors



Annex 4: TOE (Technology-Organization-Environment) framework Switzerland (II): Organisational factors



Annex 4: TOE (Technology-Organization-Environment) framework Switzerland (III): Environmental factors



> Annex 5: AI Technologies adopted

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Annex 5: AI Technologies adopted in Austria

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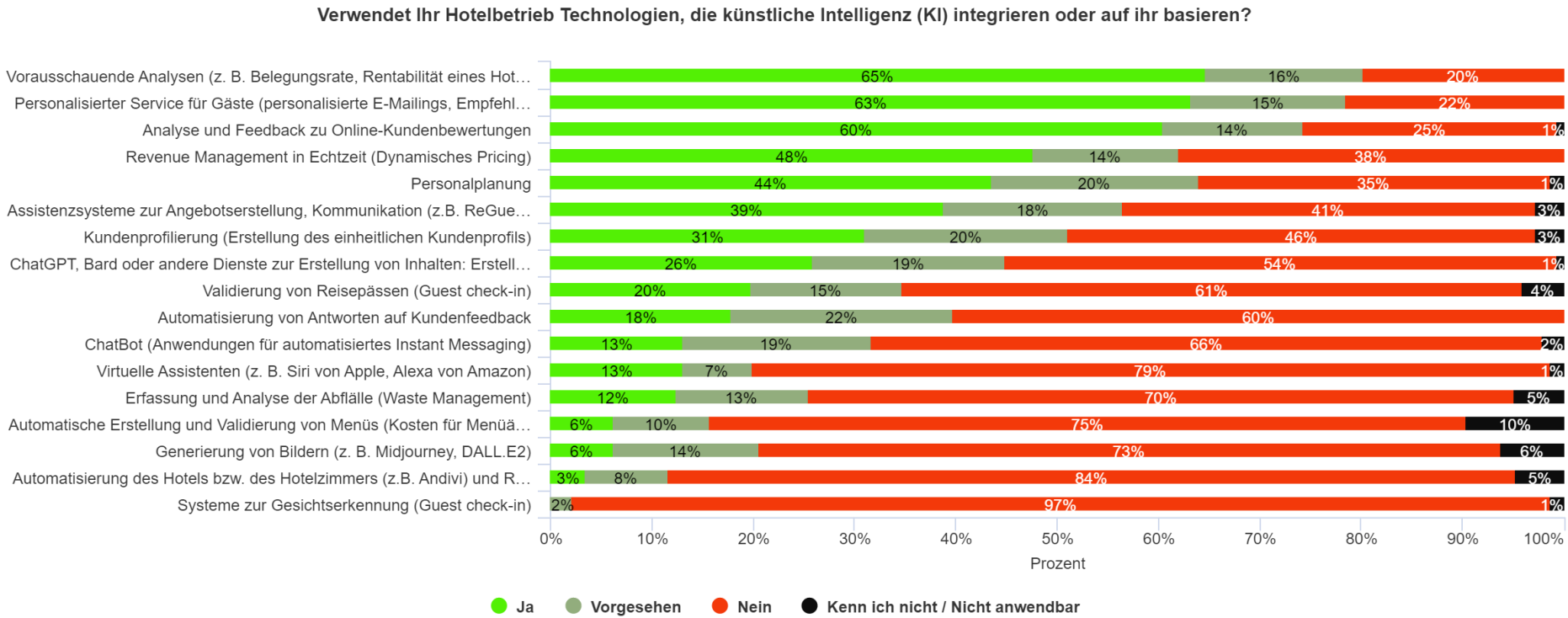

Annex 5: AI Technologies adopted in Germany

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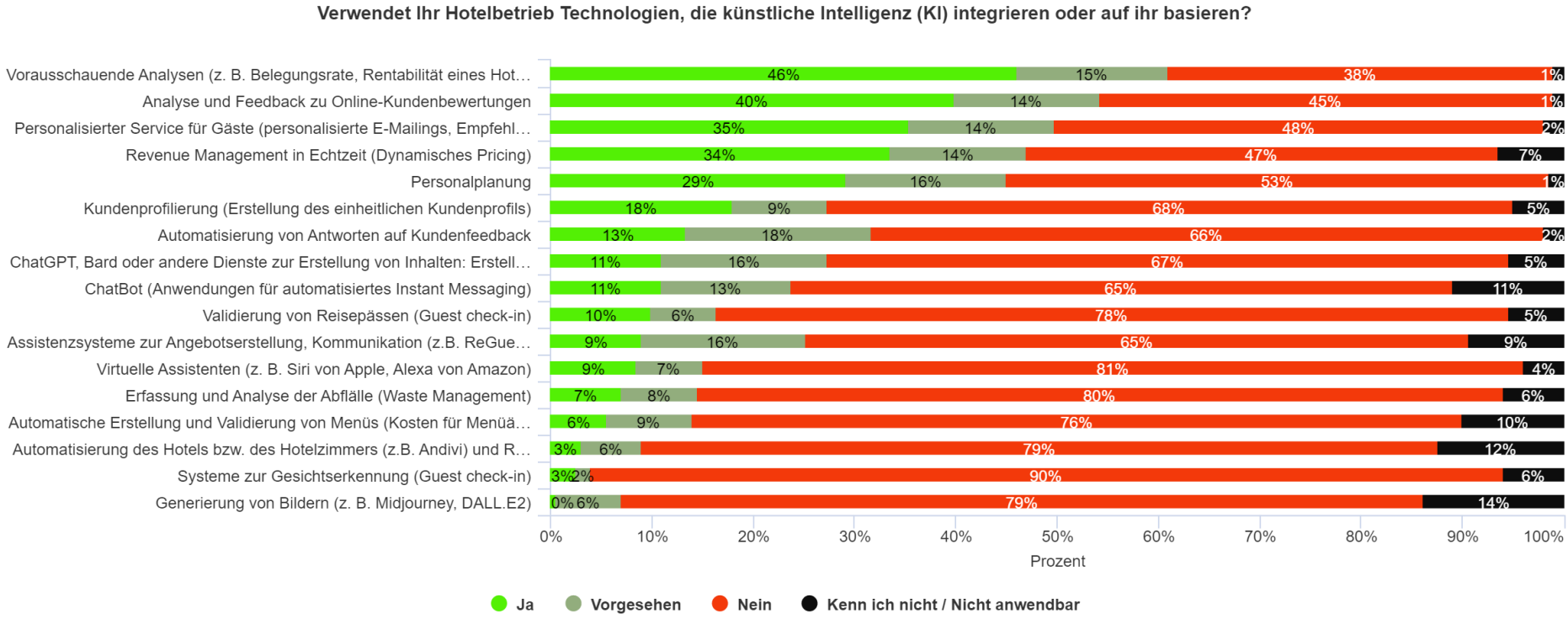

Annex 5: AI Technologies adopted in Greece

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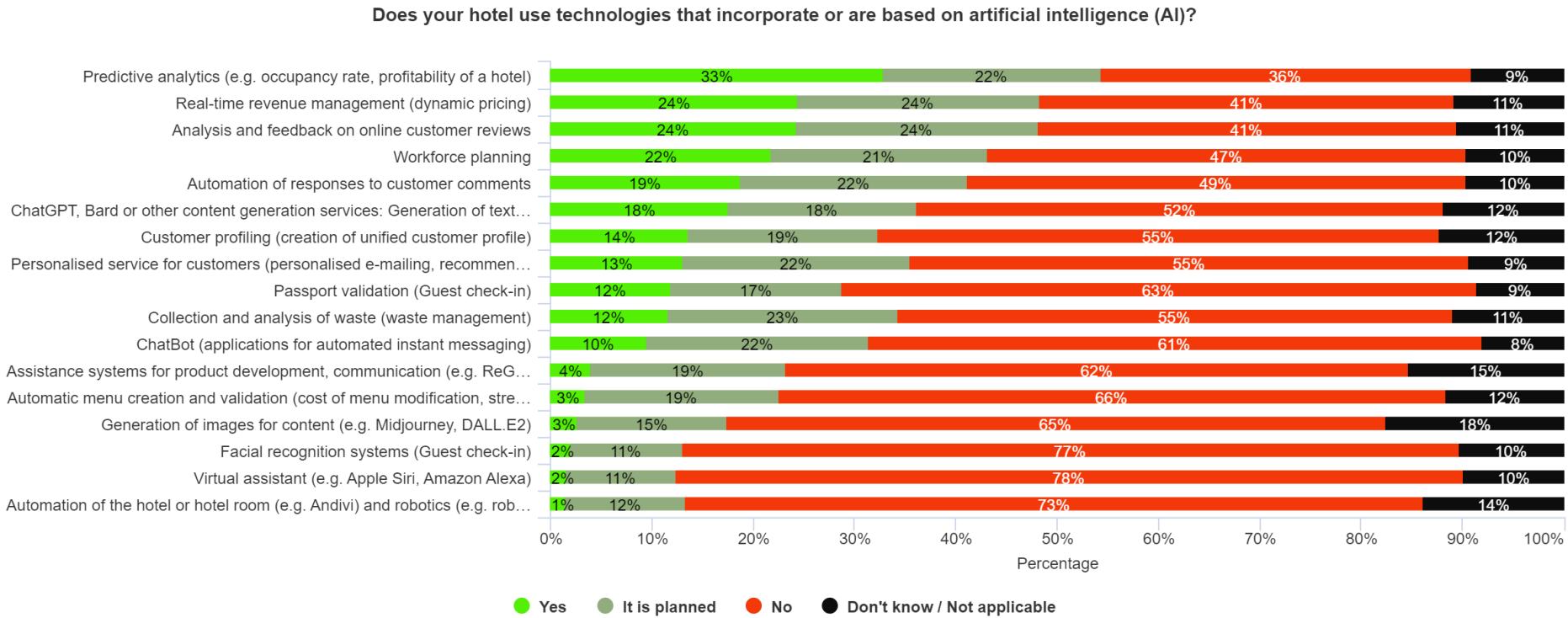

Annex 5: AI Technologies adopted in Switzerland

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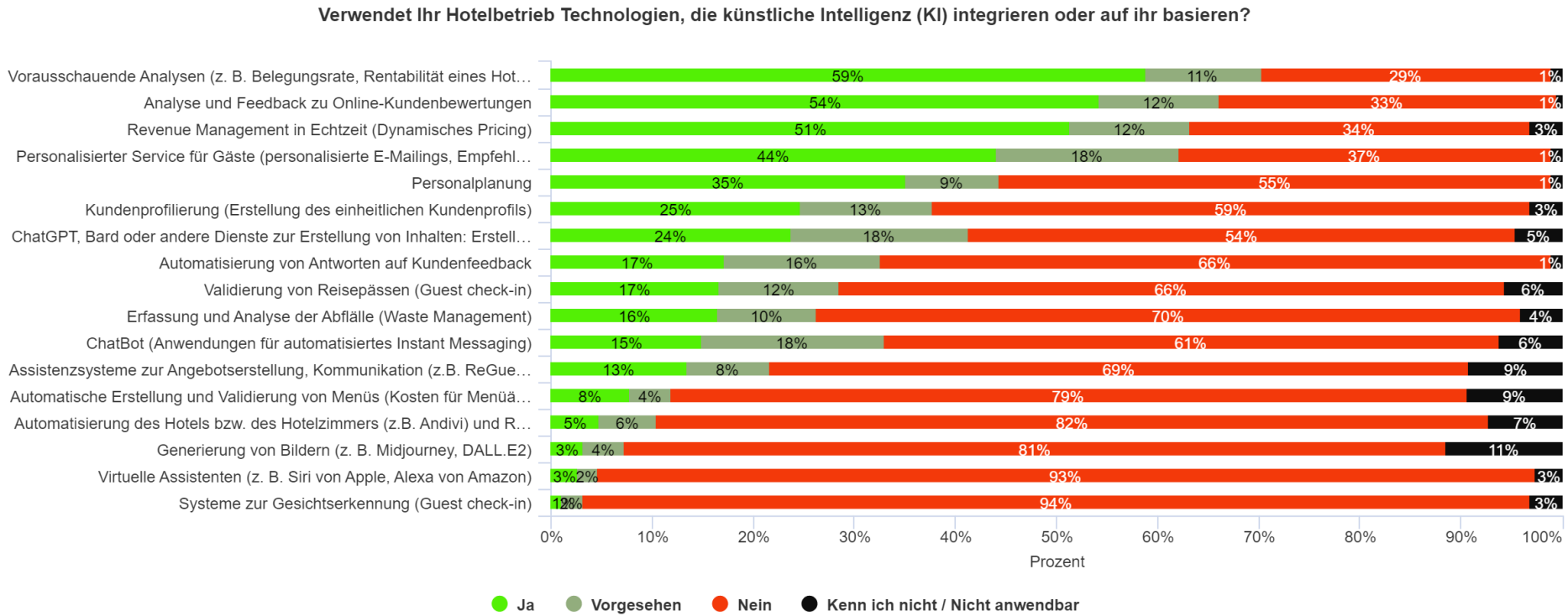

> Annex: Perceived Benefits of AI Technologies by hotels in Austria

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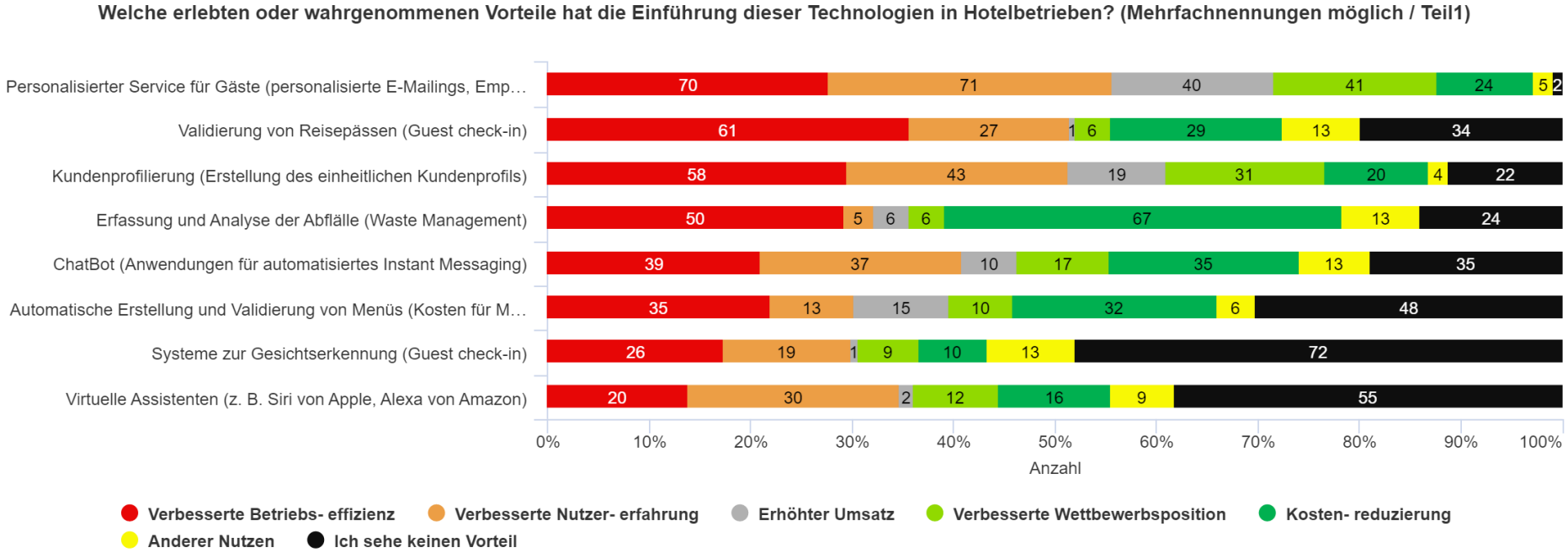
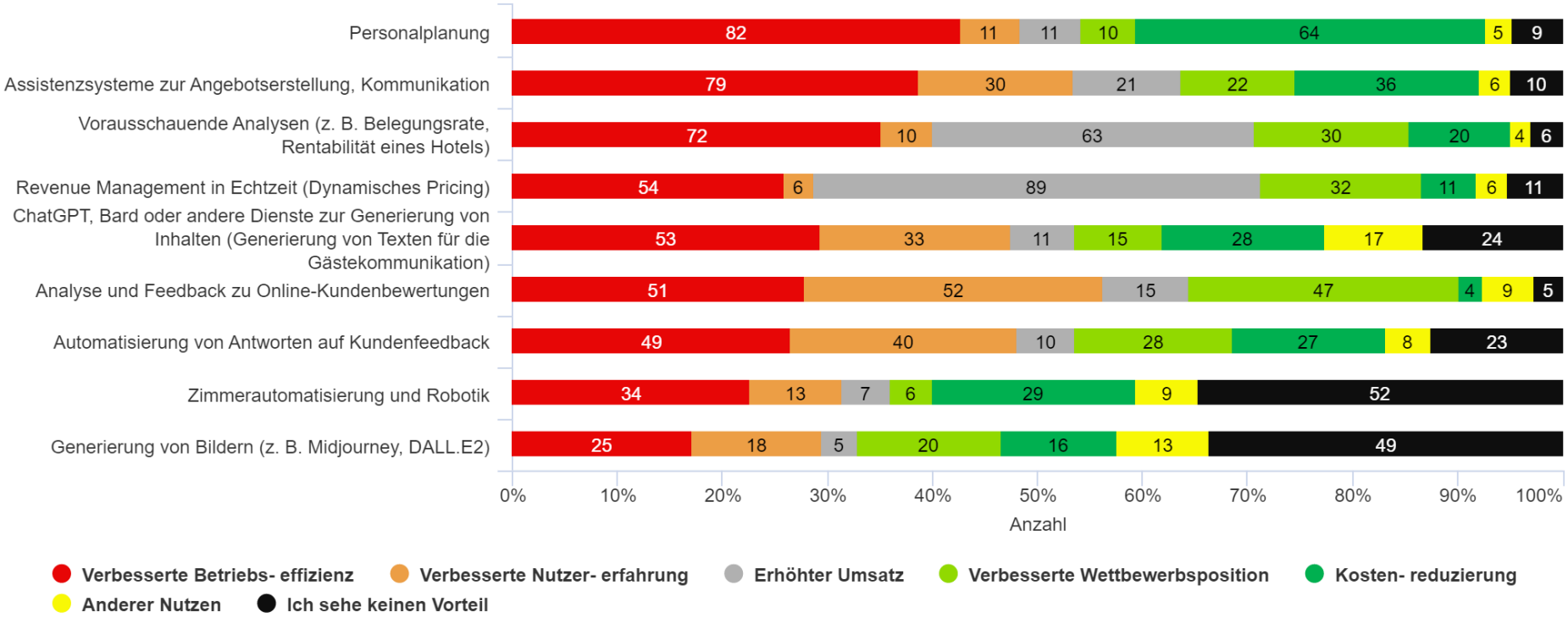
Annex 6: Perceived Benefits of AI Technologies by hotels in Austria

Annex 6: Perceived Benefits of AI Technologies by hotels in Austria (I)



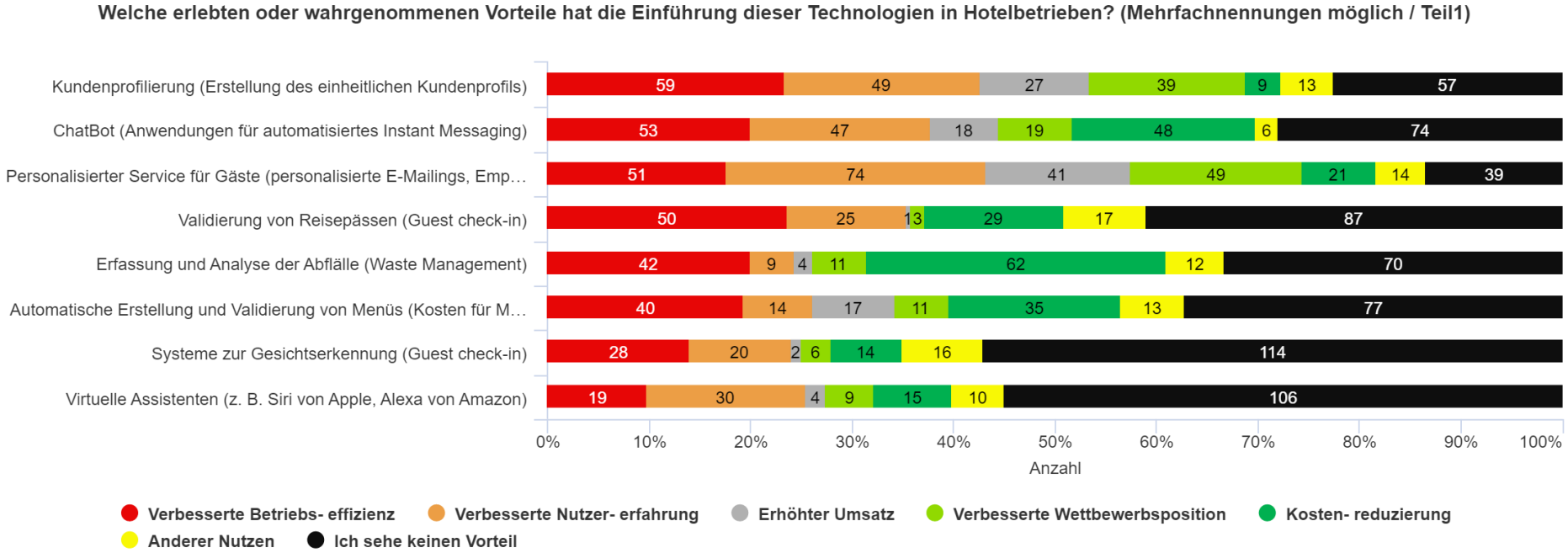
Annex 6: Perceived Benefits of AI Technologies by hotels in Austria (II)

Welche erlebten oder wahrgenommenen Vorteile hat die Einführung dieser Technologien in Hotelbetrieben? (Mehrfachnennungen möglich / Teil 2)



Annex 6: Perceived Benefits of AI Technologies by hotels in Germany

Annex 6: Perceived Benefits of AI Technologies by hotels in Germany (I)



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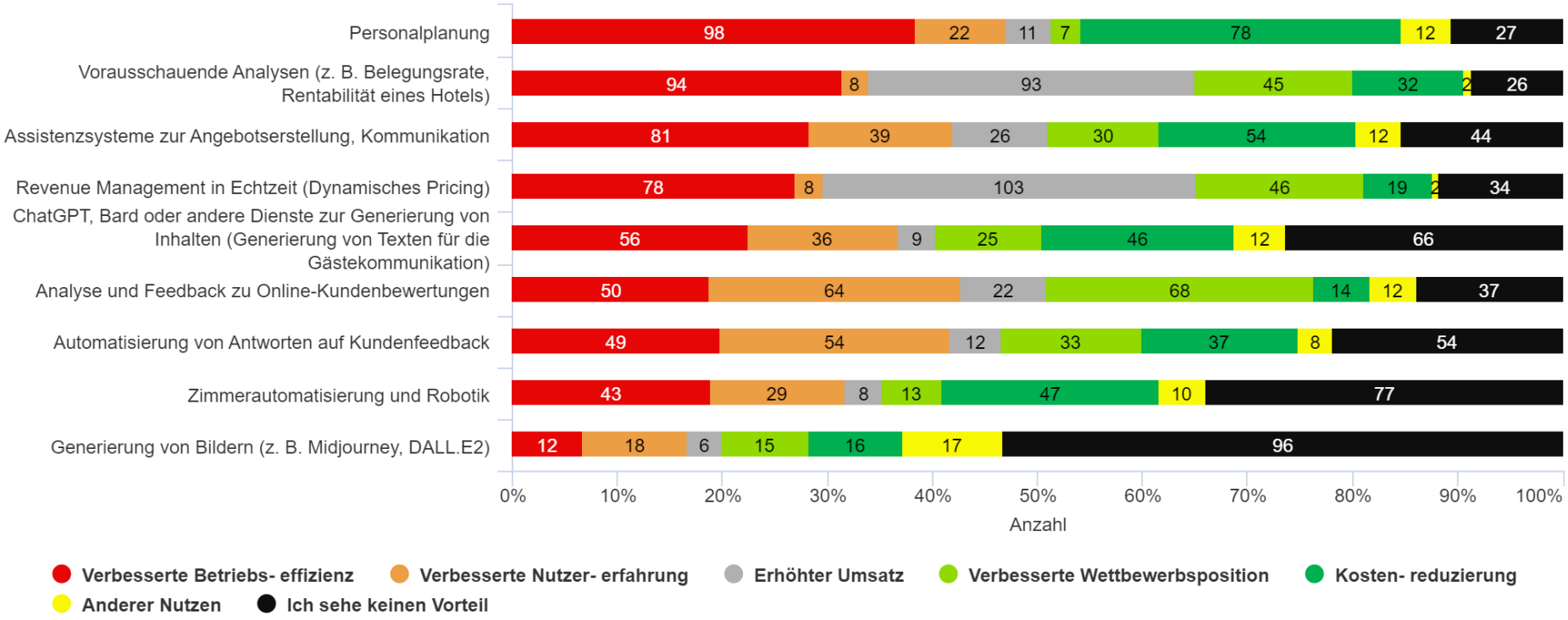
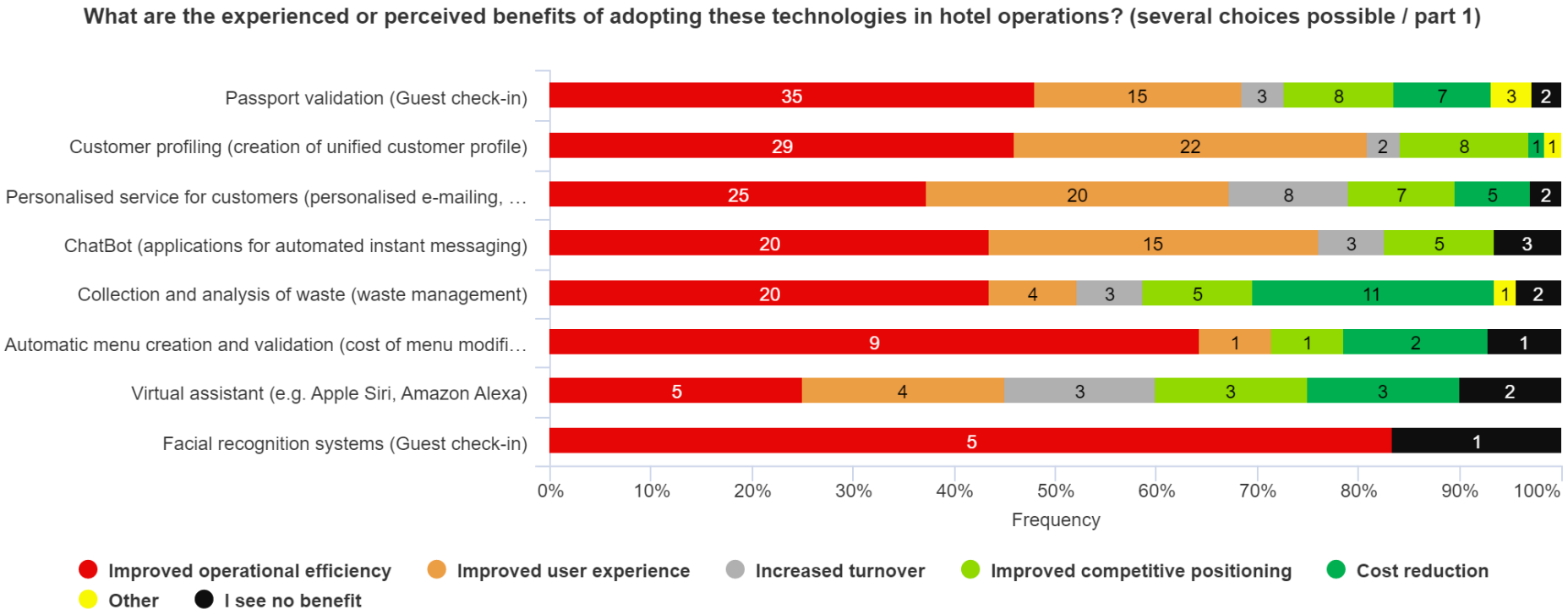


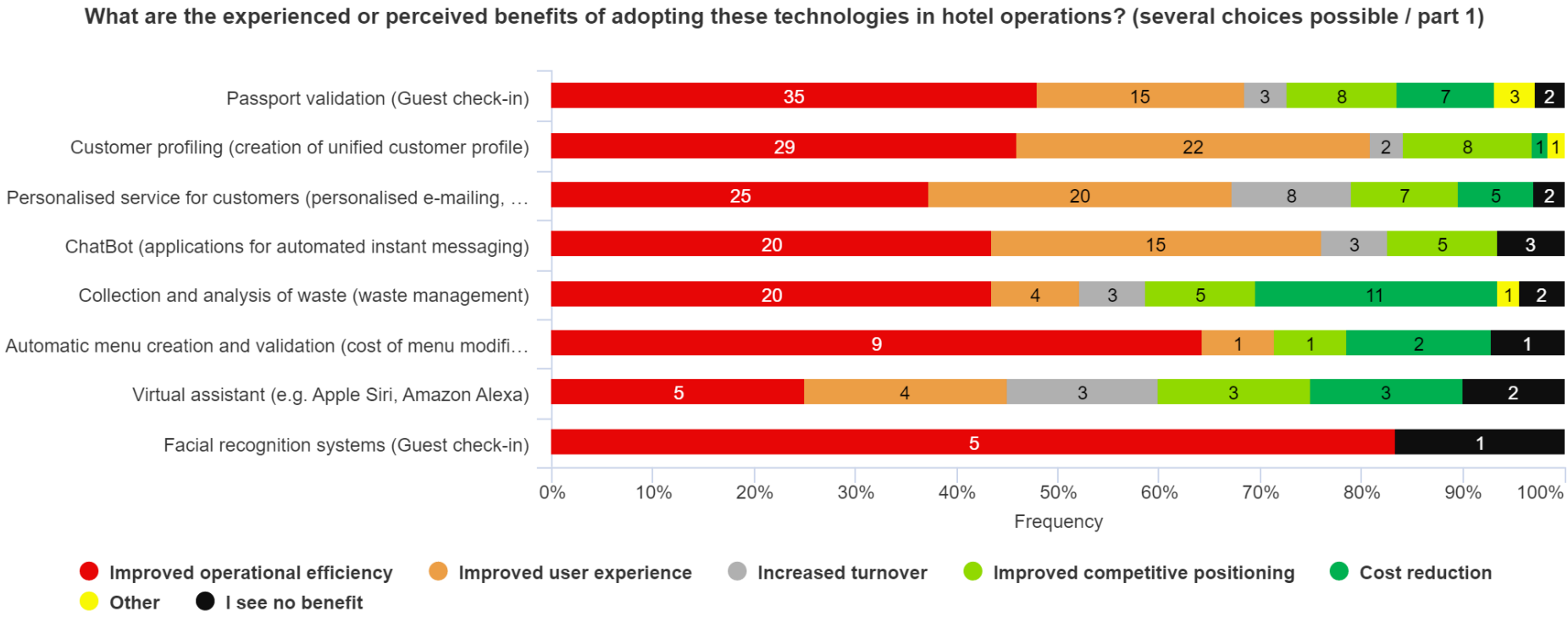
Annex 6: Perceived Benefits of AI Technologies by hotels in Greece

Annex 6: Perceived Benefits of AI Technologies by hotels in Greece (I)



- Low response rate for this question in Greece !

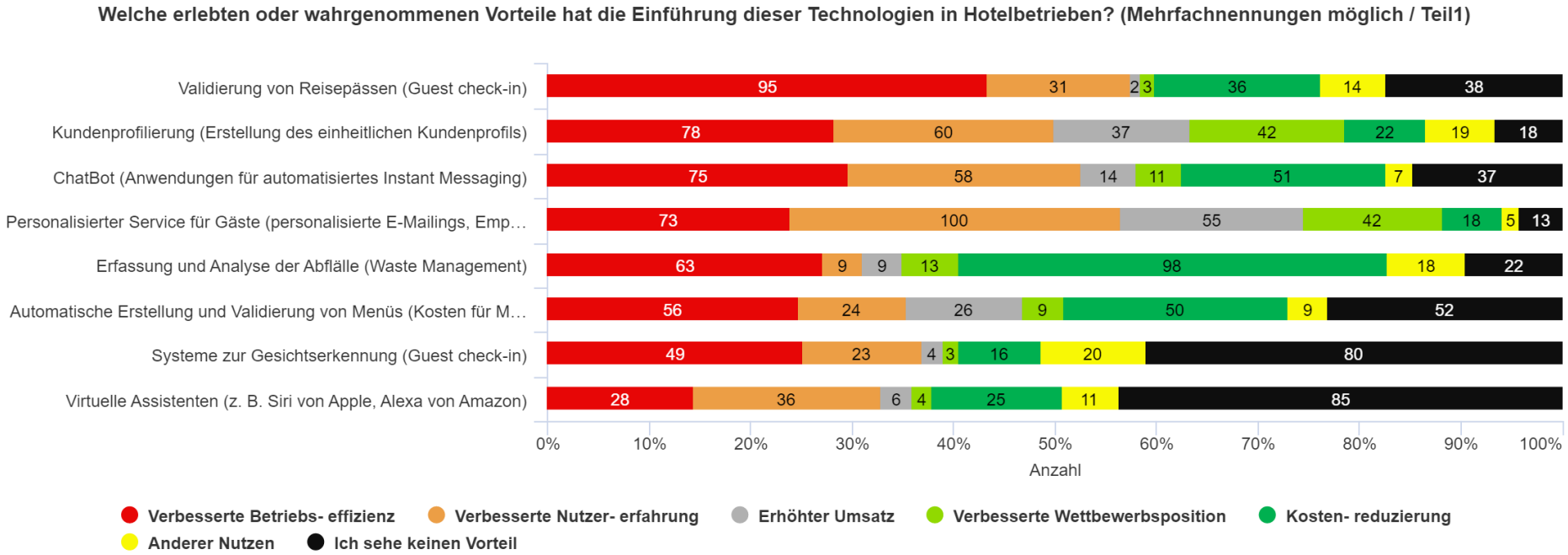
Annex 6: Perceived Benefits of AI Technologies by hotels in Greece (II)



- Low response rate for this question in Greece !

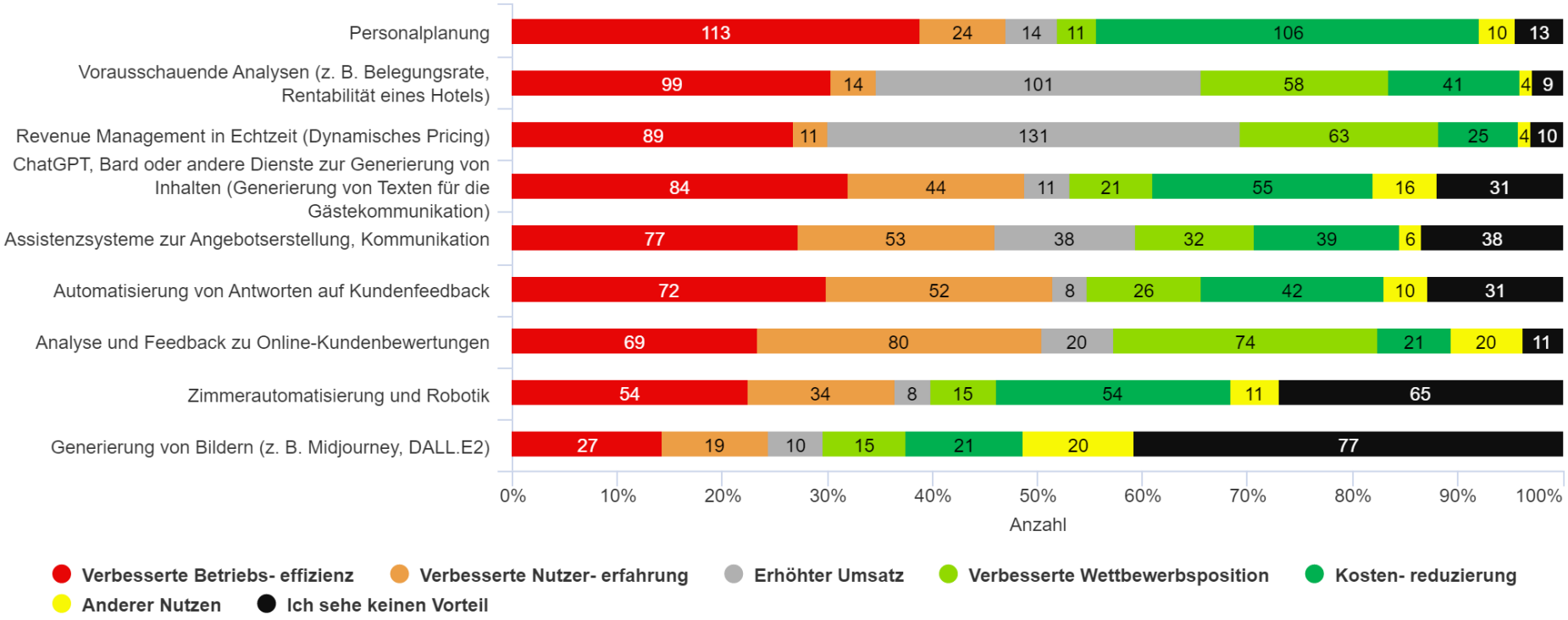
Annex 6: Perceived Benefits of AI Technologies by hotels in Switzerland

Annex 6: Perceived Benefits of AI Technologies by hotels in Switzerland (I)



Annex 6: Perceived Benefits of AI Technologies by hotels in Switzerland (II)

Welche erlebten oder wahrgenommenen Vorteile hat die Einführung dieser Technologien in Hotelbetrieben? (Mehrfachnennungen möglich / Teil 2)



> Annex 7: Specific challenges or obstacles integrating AI

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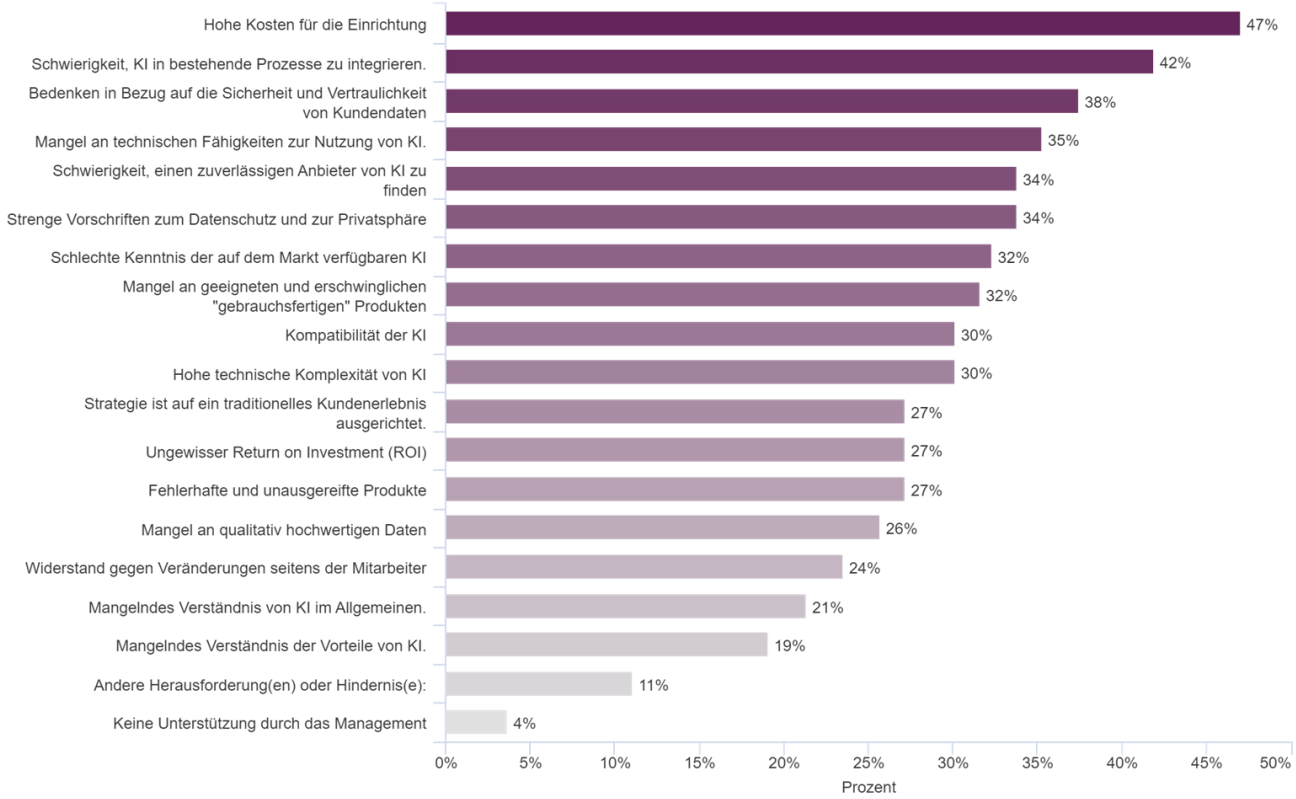
Annex 7: Specific challenges or obstacles integrating AI in Austria

Annex 7: Specific challenges or obstacles integrating AI in Austria (I)

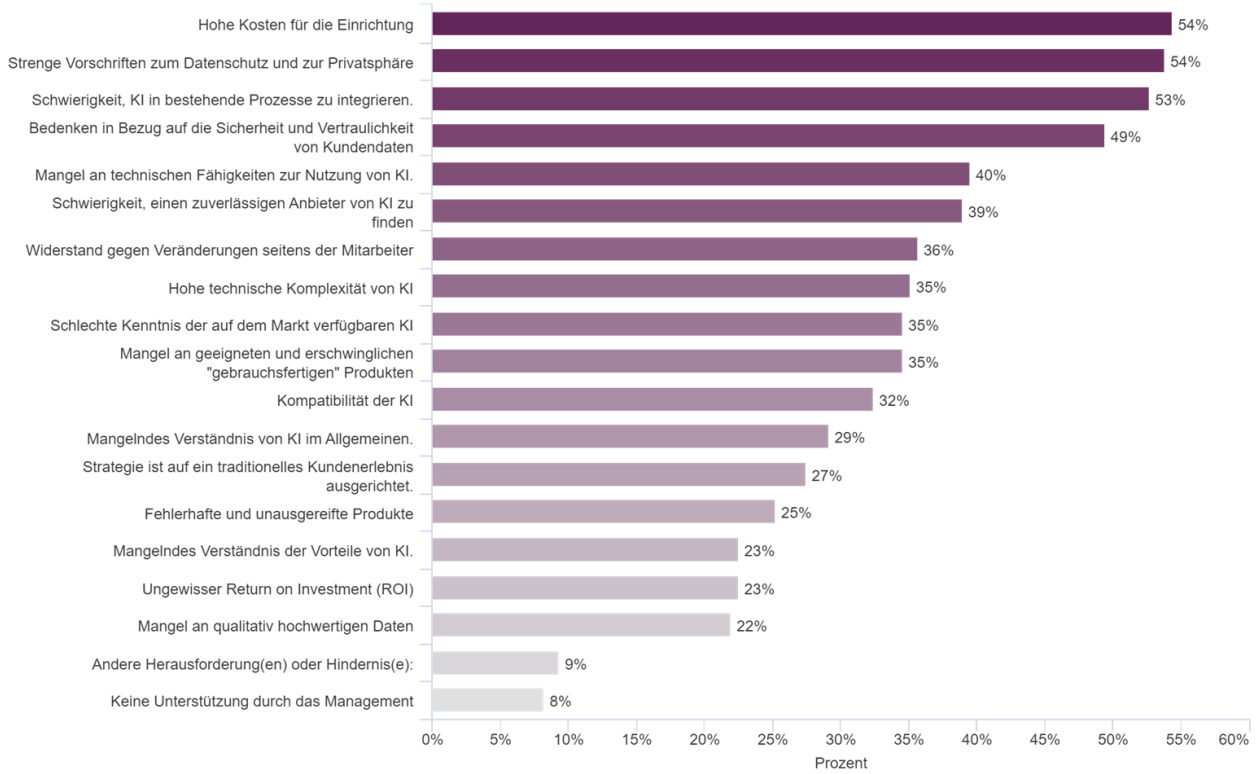
Auf welche besonderen Herausforderungen oder Hindernisse sind Sie bei der Integration von KI in den Betrieb Ihres Hotels gestoßen, falls Sie diese bereits eingeführt haben? Falls Sie KI noch nicht eingeführt haben, welche potenziellen Hindernisse sehen Sie? (Mehrfachauswahl möglich)



Annex 7: Specific challenges or obstacles integrating AI in Germany

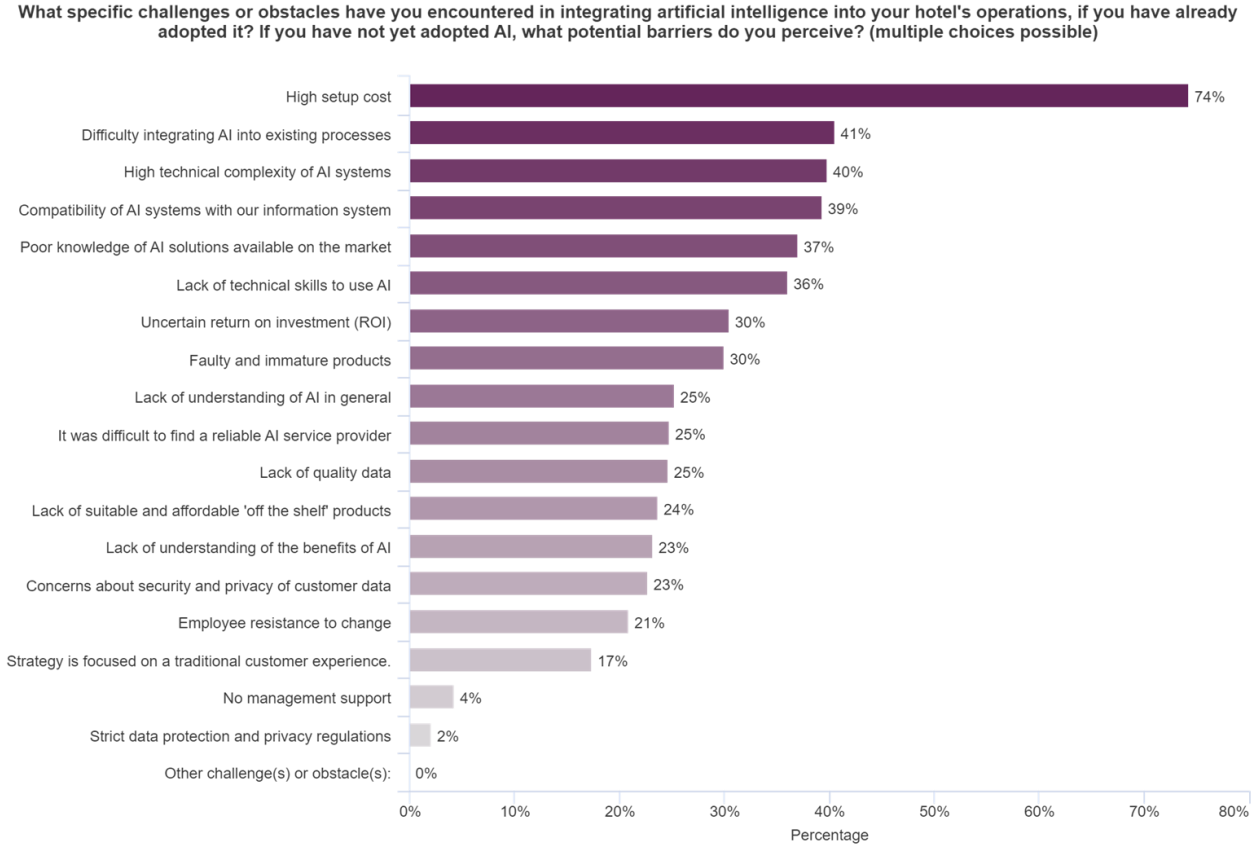
Annex 7: Specific challenges or obstacles integrating AI in Germany (I)

Auf welche besonderen Herausforderungen oder Hindernisse sind Sie bei der Integration von KI in den Betrieb Ihres Hotels gestoßen, falls Sie diese bereits eingeführt haben? Falls Sie KI noch nicht eingeführt haben, welche potenziellen Hindernisse sehen Sie? (Mehrfachauswahl möglich)



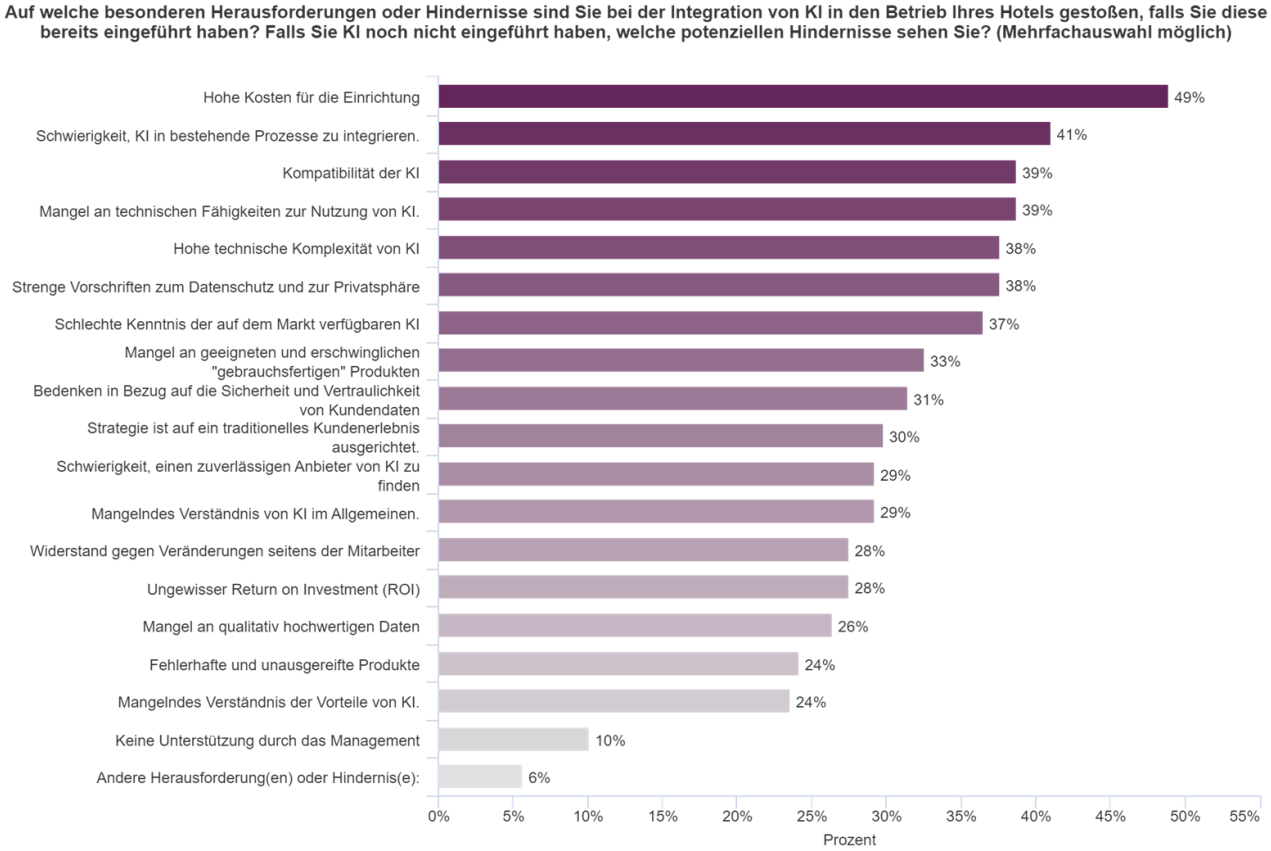
Annex 6: Annex 7: Specific challenges or obstacles integrating AI in Greece

Annex 7: Specific challenges or obstacles integrating AI in Greece (II)



Annex 6: Annex 7: Specific challenges or obstacles integrating AI in Switzerland

Annex 7: Specific challenges or obstacles integrating AI in Switzerland (I)



> Annex 8: Key AI Impact Areas for SMEs in Tourism

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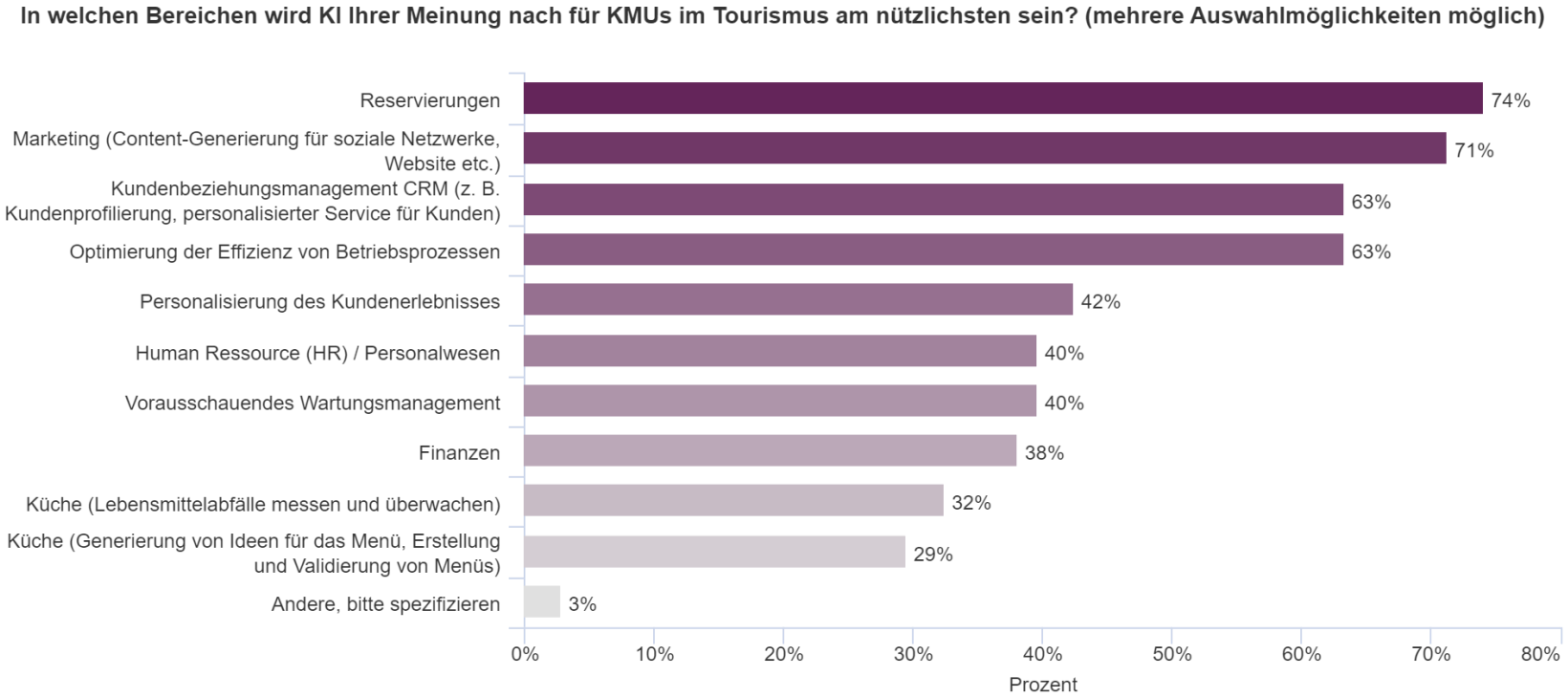
Annex 8: Key AI Impact Areas for SMEs in Tourism in Austria

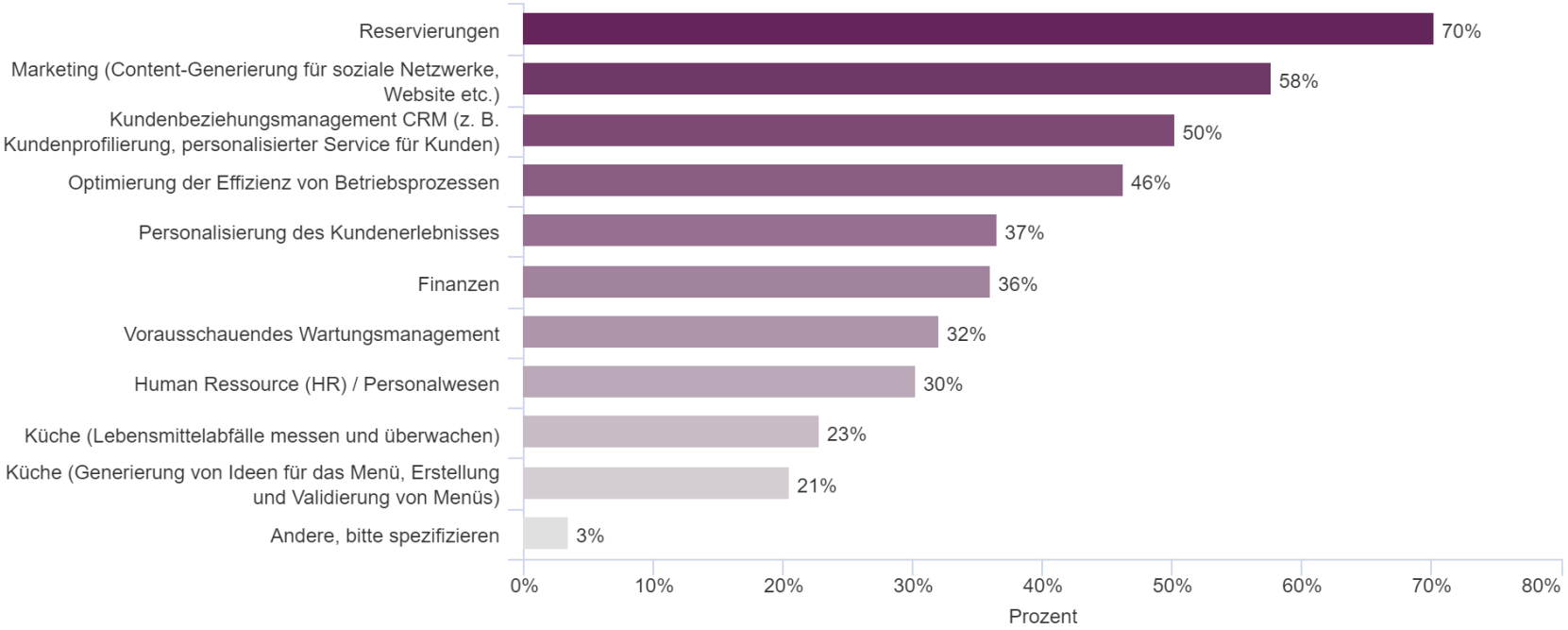
Annex 8: Key AI Impact Areas for SMEs in Tourism in Austria (I)



Annex 8: Key AI Impact Areas for SMEs in Tourism in Germany

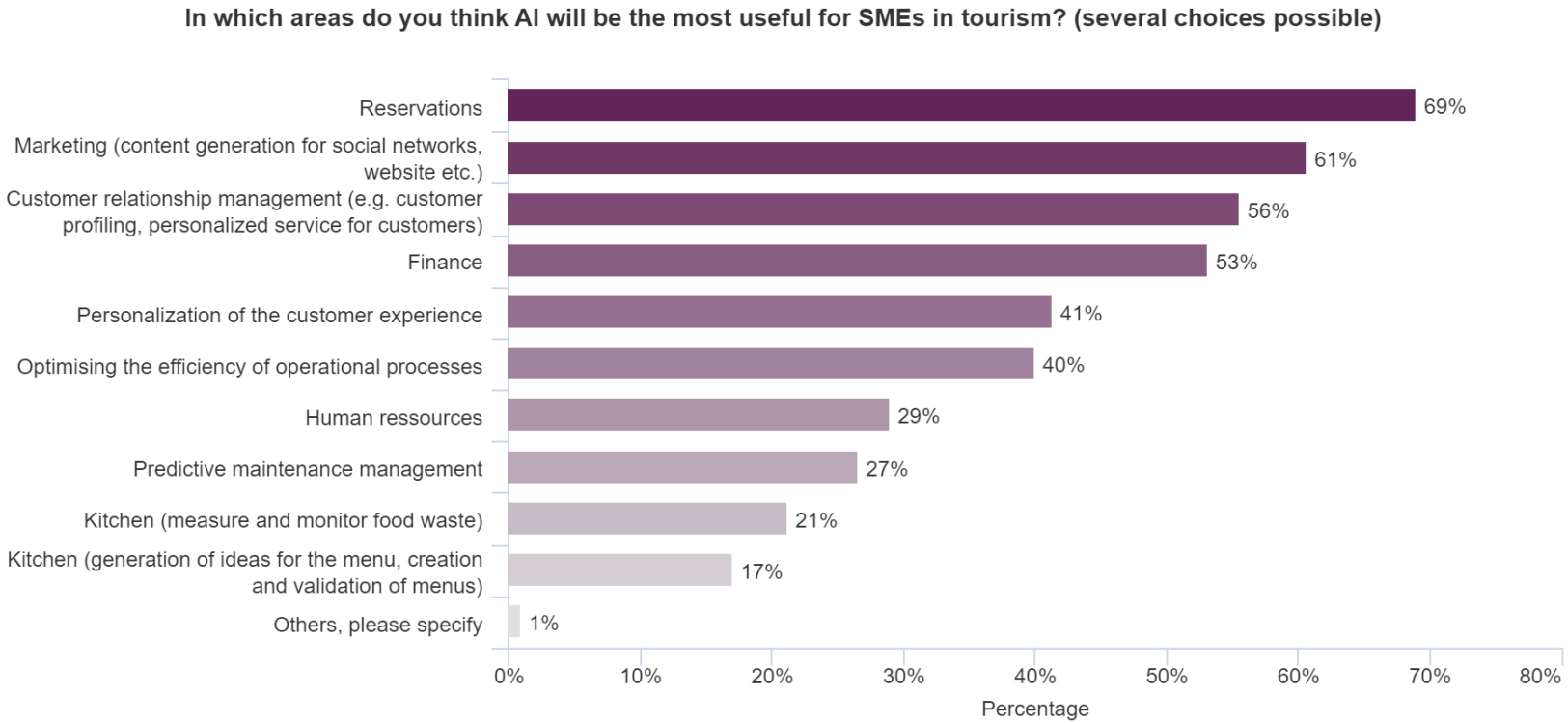
Annex 8: Key AI Impact Areas for SMEs in Tourism in Germany (I)

In welchen Bereichen wird KI Ihrer Meinung nach für KMUs im Tourismus am nützlichsten sein? (mehrere Auswahlmöglichkeiten möglich)



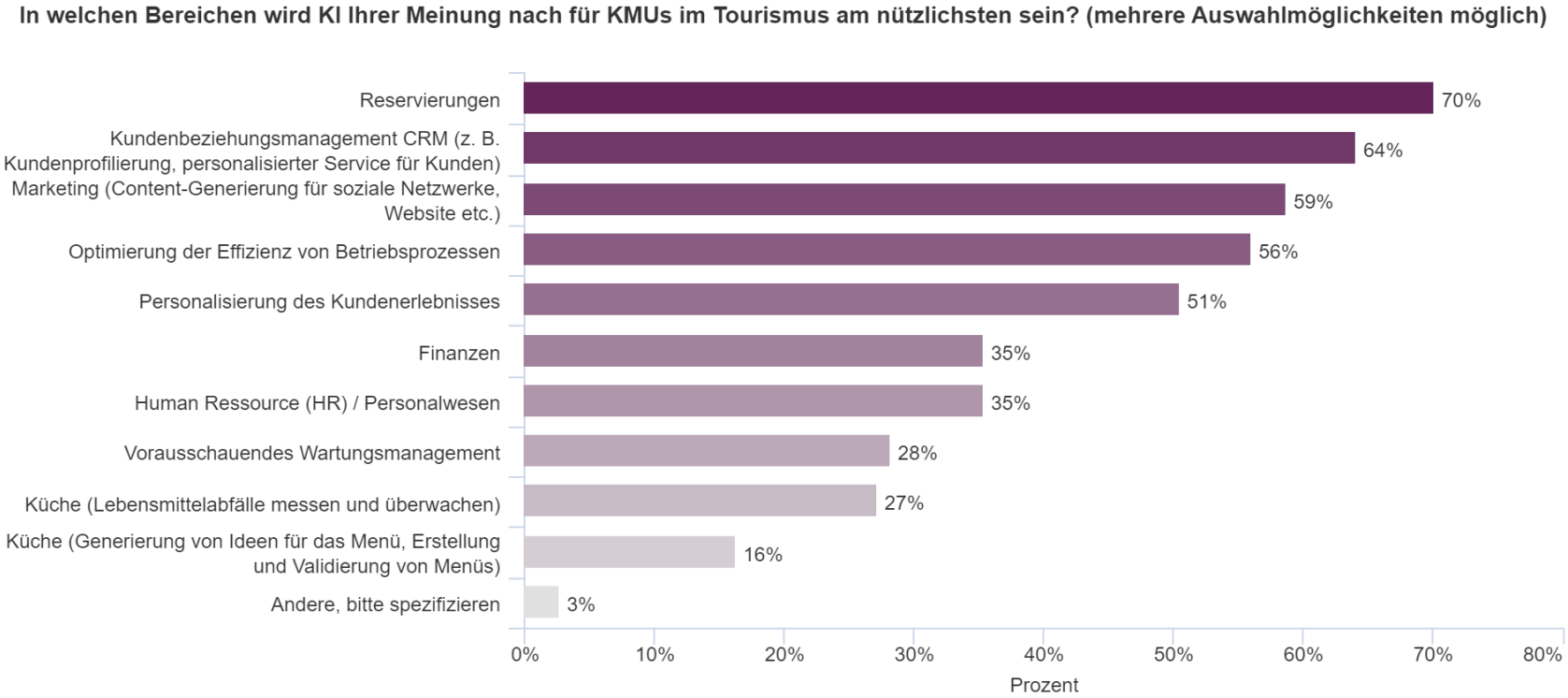
Annex 8: Key AI Impact Areas for SMEs in Tourism in Greece

Annex 8: Key AI Impact Areas for SMEs in Tourism in Greece (II)



Annex 8: Key AI Impact Areas for SMEs in Tourism in Switzerland

Annex 8: Key AI Impact Areas for SMEs in Tourism in Switzerland (I)



> Annex 9: References

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