Drivers of Adoption of AI Service Robotics for German Hospitality Companies

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Abstract

This thesis examines the drivers for the adoption of AI-powered service robotics in the German hospitality industry, focusing on its potential to address labor shortages and increase efficiency. As hotels and restaurants face increasing personnel shortages and changing customer expectations, service robotics seem like a feasible solution. Adoption currently remains uneven as it depends on company readiness and customer acceptance.

Qualitative findings from expert interviews were combined with quantitative data from a customer survey. The interviews showed a cautious but growing interest in robotics, especially for back-of-house applications. Key drivers included cost efficiency, reduced workload and strategic flexibility, while barriers ranged from investment costs to emotional disconnect with brand identity. On the customer side, survey data confirmed perceived usefulness and ease of use as factors influencing adoption, with acceptance being highest for standardized tasks in low-cost or mid-sized facilities. Still, emotional preferences for human service remained, especially in luxury environments.

Strategic implications pointed to judicious implementation, staff training and communication with guests. Managers are advised to adopt a hybrid service model where robotics complements human interaction, not wholly replacing it. This work offers insights for hospitality leaders looking to adapt operations to an increasingly automated service landscape while maintaining service quality.

Keywords: Service Robotics, Hospitality Industry, AI, Germany, Customer Acceptance, Labor Shortage, Technology Integration, Dynamic Capabilities, Technology Acceptance Model, First and Second Mover Advantage, Diffusion of Innovation, Market-Based View

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Sumário

A presente tese analisa os fatores que impulsionam a adoção da robótica de serviço baseada em Inteligência Artificial (IA) na hotelaria alemã, focando na escassez de mão de obra e no ganho de eficiência. Diante desses desafios e das novas exigências dos clientes, a robótica surge como solução promissora, embora a sua adoção varie conforme a preparação das empresas e a aceitação dos hóspedes.

A pesquisa combina entrevistas com especialistas e uma enquete com clientes. As entrevistas revelam um interesse crescente na robótica para serviços, especialmente para tarefas operacionais. Os principais fatores são redução de custos, alívio da carga de trabalho e estabilidade. As barreiras incluem investimentos iniciais e possível conflito com a identidade da marca. Os dados indicam que clientes reconhecem a utilidade da robótica, com maior aceitação em ambientes padronizados e económicos. A preferência por atendimento humano, contudo, permanece em contextos de luxo.

As implicações incluem implementação gradual, formação de equipas e comunicação transparente. Recomenda-se um modelo híbrido, onde robôs complementem, sem substituir, o contato humano. Esta tese oferece orientações práticas para gestores que buscam integrar tecnologia sem comprometer a qualidade do serviço oferecido.

Palavras-chave: Robótica de Serviços, Indústria Hoteleira, IA, Alemanha, Aceitação do Cliente, Escassez de Mão-de-Obra, Integração Tecnológica, Capacidades Dinâmicas, Modelo de Aceitação Tecnológica, Vantagem do Primeiro e do Segundo Motorista, Difusão da Inovação, Visão Baseada no Mercado

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List of Abbreviations

Abbreviation	Definition
AI	Artificial Intelligence
CA	Competitive Advantage
DC	Dynamic Capabilities
MBV	Market-Based View
RBV	Resource-Based View
FMA	First Mover Advantage
SMA	Second Mover Advantage
DoI	Diffusion of Innovation
TAM	Technology Acceptance Model
PU	Perceived Usefulness
PEU	Perceived Ease of Use

1 Introduction

The German hospitality industry is facing a severe labor shortage that has been growing over the years. This is driven by several factors, including demographic changes, the lingering effects of the pandemic, and demanding working conditions that have historically characterized the sector. The problem became particularly evident after the pandemic. In 2019, approximately 2.255 million people were employed in Germany's accommodation and food service activities industry, but by 2021, this number had dropped to 1.774 million, indicating a loss of around 480.000 workers (Statista, 2025).

One of the clearest indicators of the crisis is the duration of job vacancies. As of 2024, positions in the hospitality industry remained unfilled for an average of 194 days, highlighting the difficulty businesses face in attracting qualified personnel. The average duration in all industries in Germany was with 158 days more than a month shorter (Job Openings Vacancy Period in Germany 2025, 2025).

Although it has been possible to replace many skilled workers who left during the pandemic, these are often employees with less professional experience. In addition, an above-average number of people in the hospitality industry work part-time or as mini-jobbers. In spring 2024, the part-time rate was 51.5%. The increase in staff after corona mainly consists of mini jobbers who are only allowed to work 43 hours a month. As there is a shortage of staff, more and more workers are being recruited from abroad (Terpitz, 2024).

As in other industries, digitalization is a measure deployed to save human resources and simplify processes. However, unlike some industries, this is not always possible for hospitality through automated processes, as a lot of manual work is required in customer contact and service. One option is the use of Artificial Intelligence (AI)-driven service robotics. Henn Na Hotels are prominent examples of this (Reis et al., 2020). In Germany, there are already some hotels and restaurants that have integrated the use of AI driven service robotics, but it is not yet an industry-wide phenomenon.

Barriers cited include skepticism on the part of customers, loss of a high level of human service, high initial investment costs and fear of possible job losses.

Our research question is: **What are drivers of adoption of AI service robotics that add value for German hospitality companies?**

To analyse this, we will approach the question from two different directions. On one hand, we examine the perspective of companies and examine take factors including profitability, openness to innovation, data regulation and sustainable integration. Alternatively, we address the customer perspective, in particular acceptance depending on hotel standards, openness to technology and general prejudices against AI-driven robotics.

2 Literature review

2.1 Robotics

Robotics is a multidisciplinary field that integrates mechanical engineering, electrical engineering, and computer science to design and build machines capable of performing tasks autonomously or semi-autonomously (Weinberg et al., 2001). In the context of management and service industries, robotics primarily refers to service robots - machines designed to assist humans by performing useful tasks, often in customer-facing roles (Paluch et al., 2020).

A definition of service robots is provided by the International Organization for Standardization: these are “robots that perform useful tasks for humans or equipment, excluding industrial automation applications.” They may operate with varying levels of autonomy, from fully autonomous systems to semi-autonomous or even remotely operated tools (Murphy et al., 2017).

In hospitality and related service sectors, the implementation of robotics is classified into two key categories:

- Front-end robots: Engage directly with customers (e.g., receptionists, room service delivery bots, concierge roles).
- Back-end robots: Support internal operations (e.g., cleaning robots, kitchen assistants, inventory robots) (Banu et al., 2024).

Advancements in AI, machine learning, and sensor technologies have transformed service robots from simple mechanical assistants into interactive and decision-making agents. This significantly impacts industries that rely heavily on high-touch customer service, such as hospitality, by enhancing guest experiences and operational efficiency (Ivanov & Webster, 2019).

The literature highlights the strategic role robotics can play in enhancing competitive advantage (CA) through:

- Operational efficiency (e.g., automating repetitive tasks, reducing labor costs) (Vidó et al., 2020),
- Service differentiation (e.g., novelty or futuristic brand image) (Belanche et al., 2021),
- Improved consistency in service delivery (Tuomi et al., 2020),
- And data generation for customer insights (Tuomi et al., 2020).

However, scholars emphasize the need to balance automation with the human touch. Robotics may enhance service quality and productivity but could also disrupt customer expectations, especially in industries where emotional intelligence and empathy are valued (Rosete et al., 2020).

This sets the stage for examining how robotics is specifically reshaping the hospitality industry.

2.2 Hospitality industry

The hospitality industry, a cornerstone of the global service sector, is undergoing rapid transformation due to labor shortages, shifting customer expectations, and technological disruption (Giousmpasoglou, 2024). In Germany, these pressures are particularly acute. The industry, which includes hotels, restaurants and other accommodation services, has long been characterized by its labor-intensive nature, seasonal employment patterns and reliance on both skilled and unskilled workers.

2.2.1 The German Context

Germany's hospitality industry contributes significantly to the national economy, employing millions and serving both domestic and international guests. However, the sector is currently facing a severe labor shortage. Between 2019 and 2021, employment in Germany’s accommodation and food service sector dropped from approximately 2.255 million to 1.774 million - a loss of nearly 480,000 workers (Statista, 2025).

As of 2024, hospitality job vacancies remained unfilled for an average of 194 days, far exceeding the cross-industry average of 158 days. This signals a persistent mismatch between labor demand and supply (Job Openings Vacancy Period in Germany 2025, 2025). Furthermore, the industry's post-pandemic workforce has shifted toward part-time and mini-job arrangements, with over 50% working reduced hours. While foreign labor has been recruited to fill some gaps, systemic staffing issues remain unresolved (Terpitz, 2024).

This shortage has direct implications for service quality, profitability, and long-term competitiveness, especially in an industry where customer interaction is central to the value proposition.

2.2.2 Global Trends for Context

Globally, the hospitality industry is navigating similar pressures, including digital transformation, shifting labor markets, and changing consumer behaviour (Kuo et al., 2017). In response, many international chains have begun integrating digital technologies and automation to improve operational resilience (Ivanov & Webster, 2019). Markets such as Japan, South Korea, and the U.S. have seen early adoption of AI-driven tools and robotics to supplement human labor, particularly for repetitive and standardized tasks (Tussyadiah, 2020).

Germany, by contrast, has been more conservative toward automation, owing to regulatory complexity, cost concerns, and cultural emphasis on personalized service (OECD, 2024). This presents both a challenge and opportunity for robotics as a complement to human staff.

2.3 Robotics in the Hospitality Industry

Robotics in hospitality are a growing reality, introduced across various hotel and restaurant functions, from check-in and concierge tasks to food delivery and housekeeping (Reis et al., 2020).

2.3.1 Practical Applications

Service robots in hospitality primarily perform repetitive, standardized, and physically demanding tasks, enabling human staff to focus on more complex and interpersonal roles. Examples include:

- Front-desk robots that handle check-ins and information services (e.g., Henn na Hotel in Japan).
- Delivery robots that transport food or amenities to guest rooms.
- Cleaning and maintenance bots used for routine housekeeping and floor sanitation (Reis et al., 2020).

These robots are often equipped with sensors, voice recognition, and AI algorithms to interact with guests and operate semi-autonomously within hotel environments.

2.3.2 Strategic Benefits

The literature identifies multiple benefits of AI-controlled robotics for hospitality firms:

- Operational efficiency: Robots can reduce staffing pressures and service bottlenecks, particularly during peak hours (Kapur & Williams, 2025).
- Cost savings: Long-term savings on wages and employee turnover can offset the high upfront investment (Bowen & Morosan, 2018).
- Service consistency: Robots deliver standardized services without fatigue or emotional variability, improving consistency in routine tasks (Tuomi et al., 2020).
- Data insights: Some robots collect behavioural data from guest interactions, enabling data-driven service improvements (Chowdhury, 2022).

2.3.3 Key Challenges

Despite these advantages, adoption remains limited, especially in markets like Germany. Challenges include:

- High initial investment: The cost of acquiring, customizing, and maintaining robots is a major barrier for small and mid-sized businesses (Reis et al., 2020).
- Customer resistance: Some guests perceive robots as impersonal or unsettling, particularly in cultures with strong service expectations (Tuomi et al., 2020).
- Technology limitations: Service robots often struggle in dynamic environments with complex social interactions or unexpected guest needs (Reis et al., 2020).
- Loss of “human touch”: The essence of hospitality lies in personal, emotional connection, which robots still cannot replicate (Kapur & Williams, 2025).

2.3.4 Strategic Considerations

Hospitality firms must strategically position robotics not as full replacements for staff, but as augmentative tools. A hybrid service model, where robots and human employees collaborate, appears most promising in preserving service quality while addressing labor gaps (Bowen & Morosan, 2018).

This sets the stage for examining how firms can integrate robotics into broader competitive strategies.

2.4 Management Theory

2.4.1 Company Side

In the context of adopting AI-controlled service robotics, the strategic perspective of firms is central to understanding how innovations are implemented. Technological adoption is not solely a question of feasibility, but one of strategic intent, competitive positioning, and organizational capability. Particularly in dynamic sectors like hospitality, where external pressures such as labor shortages intersect with internal constraints like limited resources, firms must navigate complex decisions around innovation. To explain these decisions, this thesis draws on a set of interrelated management theories. Dynamic Capabilities (DC), the Market-Based View (MBV), and First and Second-Mover Advantage provide a theoretical foundation for examining how firms leverage robotics not just to automate tasks, but to build and sustain long-term CA.

2.4.1.1 Dynamic Capabilities

In environments characterized by rapid technological change and uncertainty, such as the current labor-strained hospitality sector, the ability of firms to adapt swiftly and strategically is essential. The DC framework provides a lens through which such adaptive behaviour can be analysed. Originating from critiques of the Resource-Based View (RBV), DC explain how firms build, integrate, and reconfigure internal and external resources to respond to environmental changes (Teece et al., 1997).

Teece et al. (1997) formalized DCs as the firm's ability to "integrate, build, and reconfigure internal and external competencies to address rapidly changing environments." They outlined three core processes:

- Sensing: Identifying and assessing opportunities and threats.
- Seizing: Mobilizing resources to capture value.
- Transforming: Continuous renewal of capabilities and organizational structures to maintain competitiveness (Teece et al., 1997).

These ideas posit that DCs are identifiable and replicable processes such as product development, knowledge creation, and strategic decision-making. These capabilities differ across market conditions: in moderately dynamic markets, they are detailed and analytical, while in high-velocity markets, they are simple, experiential, and iterative (Eisenhardt & Martin, 2000).

Later contributions extended this view:

- Fragmented definitions were consolidated to define DCs as a firm's capacity to purposefully create, extend, or modify its resource base in a timely manner in response to opportunities and threats (Barreto, 2010).
- The microfoundations of DCs, leadership, organizational design, and culture, were emphasized (Teece, 2007).
- The relevance of dynamic capabilities in international and uncertain environments was highlighted, noting that firms must develop context-specific capabilities and engage in continuous learning to stay competitive (Samsudin & Ismail, 2019).

In hospitality, DCs are critical for leveraging new technologies like service robotics. Firms that can sense trends in automation, seize investment opportunities, and transform workflows and staff training stand a better chance of maintaining service quality amid labor shortages. This adaptability has been linked to organizational ambidexterity, the ability to balance exploiting existing capabilities with exploring new opportunities, which is highly relevant to technology integration in hotels and restaurants (O'Reilly & Tushman, 2011).

The DC concept has been critiqued for its vagueness and overextension, with concerns that DCs are often hard to distinguish from operational ones and may lack predictive power. These critiques suggest that the value of DCs lies not in their abstract appeal, but in their effective operationalization within specific business contexts, such as labor-constrained service environments requiring robotic augmentation (Collis & Anand, 2018).

Ultimately, the effectiveness of DCs depends on organizational routines, culture, leadership, and external fit, all of which must align with the firm's strategic goals and the nature of the external environment (Collis & Anand, 2018). In the hospitality industry, this may mean coupling DCs with tools like experimentation, cross-functional teams, and open innovation to ensure that robotic adoption yields lasting CA.

2.4.1.2 Market-Based View (MBV)

The MBV represents an influential paradigms in strategic management. Unlike the RBV or DC, which emphasize internal firm assets, MBV asserts that external market conditions such as industry structure, competition and customer preferences are the primary drivers of firm

performance. This stems from the work of Michael Porter (1980), whose Five Forces framework identifies competitive pressures that shape profitability: the threat of new entrants, bargaining power of buyers and suppliers, threat of substitutes, and industry rivalry (Porter, 1980).

From an MBV perspective, sustained CA is achieved by positioning the firm favourably within its industry. This can involve pursuing cost leadership, differentiation, or niche strategies, all of which depend on understanding and responding to external dynamics (Porter, 1980). In the hospitality industry, where firms operate in intensely competitive markets and are highly exposed to shifting consumer trends and seasonal demand, strategic positioning is essential to survival and profitability (Enz et al., 2015).

Robotics adoption aligns well with MBV thinking:

- Cost leadership: Robots can reduce wage costs and improve operational efficiency (Belanche et al., 2021).
- Differentiation: Hotels can market themselves as technologically advanced or future-oriented (Bilgihan & Ricci, 2024).
- Barrier creation: First adopters may shape consumer expectations or establish switching costs that deter competitors (Milohnić & Kapeš, 2024).

Porter later acknowledged the need for a dynamic theory of strategy, recognizing that firms must evolve in response to innovation and uncertainty, rather than rely solely on static competitive positioning (Porter, 1991). This evolution brings the MBV closer to DC, where strategy involves responding to environmental change, not just exploiting existing market structures.

The MBV has also been extended by scholars who argue that CA stems from how well a firm matches its market offering to customer needs (Hunt & Morgan, 1995). Firms must not only find attractive positions but also defend them by innovating and adapting to competitors' moves (Peteraf & Barney, 2003).

In the context of service robotics, MBV provides a compelling rationale for early adoption:

- If customer expectations shift toward speed, hygiene, or novelty (e.g., due to post-pandemic preferences), firms with robotic services may gain a first-mover advantage.

- In markets where labor shortages are widespread, robotic integration can secure a cost and service-level advantage over slower competitors.

The MBV has been criticized for underestimating the role of internal firm capabilities for achieving and sustaining CA (Collis & Montgomery, 1995). Scholars within the RBV argue that while external market structure influences firm performance, it's ultimately a firm's unique resources and how they are configured and deployed that drive long-term success (Kraaijenbrink et al., 2010). Furthermore, strict adherence to market signals may hinder innovation and adaptability, potentially leading to strategic convergence, where firms imitate each other's practices and thereby erode meaningful differentiation (Posen et al., 2023)

Thus, the MBV should be seen as complementary to internal perspectives like RBV and DC. In the case of robotics in hospitality, the external drivers (e.g., labor market constraints, customer tech preferences) must be assessed alongside the firm's internal ability to integrate, manage, and scale robotic solutions.

2.4.1.3 First & Second Mover Advantage

Strategic timing in market entry is a crucial consideration for firms seeking to adopt emerging technologies such as service robotics. First-Mover Advantage (FMA) suggests that early entrants into a new market or technology space can gain enduring benefits, including brand recognition, technological leadership, and pre-emption of resources. Conversely, Second-Mover Advantage (SMA) highlights how later entrants may outperform pioneers by learning from their mistakes, improving on early innovations, and avoiding high initial investment costs (Lieberman & Montgomery, 1988).

First movers may benefit from:

- Technological leadership: By investing in innovation early, firms can establish superior know-how or secure intellectual property.
- Pre-emptive positioning: Capturing scarce assets (e.g., customer loyalty, favourable locations, regulatory approvals).
- Buyer switching costs: Early adopters may lock in customers who are reluctant to switch to competitors (Lieberman & Montgomery, 1988).

These mechanisms can be particularly relevant in the hospitality industry, where brand image, customer experience, and operational reputation are highly valuable. For example, a hotel chain introducing robotics for contactless room service during a health crisis may set new service expectations and enjoy lasting reputational benefits.

However, first-mover strategies are not without risk:

- High investment costs in immature technologies.
- Uncertain customer acceptance.
- The possibility of the free-riders effect, where followers will benefit from lower implementation costs and more refined technology (Lieberman & Montgomery, 1988).

FMA depends on the rate of technological evolution and the speed of market adoption. In environments where both are high, such as in robotics, early entrants may encounter high risk and unstable returns, while later entrants can sometimes outperform pioneers by waiting for clearer consumer signals and more stable technology platforms (Suarez & Lanzolla, 2007).

A game-theoretical perspective highlights the need for first movers to balance commitment and flexibility: overinvestment can lead to suboptimal paths, while underinvestment invites imitation. This idea of "strategic commitment under uncertainty" aligns with dynamic capabilities, emphasising that sensing timing and managing uncertainty can be as crucial as being first (Kopel & Löffler, 2008).

Furthermore, early investment in proprietary assets can trigger substitution efforts by rivals, leading to technology leapfrogging rather than imitation (Polidoro & Toh, 2011). This risk is particularly relevant in industries such as hospitality, where firms that adopt specific robotic platforms early may later face obsolescence as newer, more efficient technologies emerge.

Therefore, in adopting AI-powered service robots, firms must assess whether they seek to be pioneers (establishing standards and capturing market share early) or fast followers (minimizing risk and leveraging improved technology). Both approaches can be sources of CA, but success depends on the firm's organizational flexibility, risk tolerance, and market foresight.

2.4.2 Consumer Side

In the context of service robotics, consumer acceptance is not merely a technical challenge. It is a core determinant of market success. Understanding how and why customers accept or reject

technological innovations is essential, particularly in hospitality where customer satisfaction, comfort, and perceived service quality are central. Two of the most influential frameworks, Diffusion of Innovation (DoI) and the Technology Acceptance Model (TAM), help explain adoption behaviour and provide a basis for interpreting survey data in this thesis.

2.4.2.1 Diffusion of Innovation

Developed by Rogers, the DoI framework explains how innovations spread through populations over time (Rogers, 1962, 1983). The adoption S-curve segments users into innovators, early adopters, early majority, late majority, and laggards. Rogers (2003) identified five key attributes influencing adoption speed:

1. Relative Advantage: Perceived benefits over the status quo.
2. Compatibility: Fit with existing values, past experiences, and needs.
3. Complexity: Difficulty in understanding or using the innovation.
4. Trialability: Ability to test the innovation before commitment.
5. Observability: Visibility of results to others (Rogers, 2003).

In hospitality, these attributes influence whether customers are willing to interact with robots. For example, delivery robots that clearly reduce wait times (relative advantage), are easy to understand (low complexity), and are used by leading brands (observability) are more likely to be accepted.

Technology acceptance research in tourism has confirmed the relevance of the DoI framework to hospitality innovations. Relative advantage, compatibility, and observability have been identified as particularly important predictors for guest-facing technologies such as service robots (Pourfakhimi et al., 2018).

DoI has also been used to explore intra-organizational adoption, highlighting differences between voluntary adopters and forced adopters, a distinction that could apply to both guests and hospitality employees expected to use or interact with robots (Zhou, 2008).

2.4.2.2 Technology Acceptance Model (TAM)

The TAM, developed by Davis, remains an influential framework for explaining individual adoption of technology. It proposes that Perceived Usefulness (PU) and Perceived Ease of Use

(PEU) are the core determinants of a user's attitude toward a system, which in turn influences behavioural intention and ultimately actual system use (Davis, 1989). TAM has become particularly valuable in-service industries such as hospitality, where guest interaction with technology is increasingly central to the customer experience.

In the hospitality context, TAM helps explain how guests evaluate and adopt service robots and AI-driven systems. Empirical research indicates that PU and PEU significantly affect a guest's willingness to interact with robotic technologies in hotels, particularly for functions like check-in, concierge service, and room delivery (Wang & Qualls, 2007). These findings suggest that user-centred design and perceived service enhancement are critical for successful implementation.

Recent extensions of TAM have further improved its explanatory power. TAM2 and TAM3 incorporate additional constructs such as subjective norms, trust, and facilitating conditions, reflecting the influence of social pressure, institutional support, and confidence in system reliability (Venkatesh & Bala, 2008). In parallel, the Unified Theory of Acceptance and Use of Technology builds upon TAM and the DoI theory, integrating broader organizational and cultural factors to capture more complex adoption environments (Kiwanuka, 2015).

Building on these foundations, Akinyemi & Onukwulu (2025) propose a hybrid TAM-DoI framework tailored to hospitality and logistics. Their model emphasizes that guest experience, employee readiness, and stakeholder collaboration are critical dimensions for effective technology adoption. Unlike traditional models that focus solely on user perception, their framework connects front-end acceptance with back-end organizational support, highlighting the role of staff training, change management, and operational alignment in successful deployment of technologies like service robots. This is especially pertinent in hospitality settings, where seamless coordination between human and robotic actors directly impacts service quality (Akinyemi & Onukwulu, 2025).

2.4.2.3 Integration and Implications

Together, TAM and DoI are ways to understand consumer behaviour toward robotic services (Ivanov & Webster, 2019). While TAM explains adoption based on cognitive perceptions (e.g., ease of use), DoI adds a social and innovation-diffusion perspective, introducing constructs like observability, trialability, and compatibility with existing practices (Lee et al., 2011). This integrated view allows hospitality firms to address not only usability but also social acceptance,

visibility, and perceived value, which are key elements in shaping guest willingness to engage with robotic technologies (Ivanov & Webster, 2019)

TAM and DoI form our conceptual basis for analysing guest attitudes toward service robots. Specifically, they inform the customer-side survey used in this study, helping to identify both barriers and motivators to robot interaction from the guest's perspective. Insights derived from this analysis aim to support evidence-based recommendations for technology adoption strategies that are not only efficient but also psychologically and socially aligned with customer needs.

3 Methodology

A mixed-methods research design combined the literature review with qualitative expert interviews and a quantitative consumer survey. This was chosen to enhance validity following the logic of methodological triangulation (Jick, 1979).

3.1 Research Design

While the interviews focused on managerial assessments and strategic considerations, the survey investigated customer-side acceptance factors. This design enabled the independent testing of multiple theoretical lenses - including DC, MBV, FMA&SMA, TAM, and DoI - with conceptual overlap allowing for integrative discussion.

3.2 Qualitative Phase: Expert Interviews

Thirteen semi-structured interviews were conducted with decision-makers or domain experts across various hospitality segments, including high-end hotels, boutique accommodations, system gastronomy, and rural/urban operations. Interviewees were selected through purposive sampling to ensure maximum variation in terms of business type, location, and robotics experience.

The interview guide consisted of 14 standardized questions, with one conditional item (Q4) adapted depending on whether robotics had already been implemented (see Figure 1). All interviews were conducted via telephone, Google Meets, or in person. Interviews were recorded with informed consent and subsequently transcribed.

Category	Question	Objective
Background & Context	Q1: Could you briefly describe your role and your area of responsibility within the company?	Establishes the respondent's perspective and relevance to the topic.
Background & Context	Q2: Can you describe the type of hospitality services your company provides?	Contextualizes the organizational setting – useful for understanding if robotics would be feasible or relevant.
Robotics Experience & Current Status	Q3: Have you or your company already implemented or seriously considered using service robotics?	Identifies whether robotics is already being applied or not; tests openness to innovation (DC View).
Robotics Experience & Current Status	Q4: If you haven't adopted robotics, could you explain why not? If yes, were there any concerns at the beginning?	Reveals perceived barriers to adoption (DC View, MBV, strategic risk).
Strategic Rationale & Innovation Thinking	Q5: What role do you think robotics could play in responding to labor shortages in your organization or the industry more broadly?	Tests whether robotics is viewed as a tactical solution or strategic tool – aligns with DC and industry trends.
Strategic Rationale & Innovation Thinking	Q6: In your opinion, what types of tasks are most likely to be performed by robots?	Tests in which areas robotics are most suitable for the hospitality industry.
Strategic Rationale & Innovation Thinking	Q7: Do you view robotics more as a short-term fix or a long-term strategic tool?	Distinguishes between operational reaction vs strategic transformation (DC View vs MBV).
Strategic Rationale & Innovation Thinking	Q8: Do you consider robotics something that could help you differentiate from competitors or reduce costs?	Explores whether robotics serves differentiation (innovation) or cost leadership – MBV (Porter).
Strategic Rationale & Innovation Thinking	Q9: How important is it for your company to be among the first movers in adopting new technologies like robotics?	Relates to First-/Second-Mover Advantage theory – identifies strategic posture.
Implementation Barriers & Organizational Fit	Q10: What do you see as the biggest internal challenges to adopting robotics?	Looks at organizational readiness and innovation barriers – DC.
Implementation Barriers & Organizational Fit	Q11: From a customer perspective, do you see acceptance or resistance to robotic service?	Explores customer expectations – connects to survey and TAM/DoI models.
Implementation Barriers & Organizational Fit	Q12: Are there external barriers like data regulations, investment costs, or unclear ROI that make robotics adoption difficult?	Identifies external constraints and market conditions – MBV.
Outlook & Industry Trends	Q13: How do you see the role of robotics evolving in the hospitality industry over the next 5–10 years?	Expert opinions on future developments.
Outlook & Industry Trends	Q14: Do you think robotics will become a standard part of hospitality, or remain a niche feature?	Tests belief about mainstream adoption vs resistance – industry-level implications.

Figure 1 – Interview Guide

Our sample reached data saturation, which typically occurs within 12 targeted expert interviews (Guest et al., 2006).

Qualitative content analysis was used to evaluate the interviews (Mayring, 2014). A deductive coding scheme was developed based on the key constructs from DoI, the MBV, and First-/Second-Mover Theory. Emergent themes were then clustered and compared across interviewees.

An overview of the interview sample characteristics is presented in Figure 2.

Participant ID	Company type	Role	Robotic integrated
AH	Boutique hotel development	Project developer	No
BH	Camping & Gastronomy	Owner & general manager	No
DD1	Holiday resort	Managing director (CEO)	Yes
DD2	Design/Boutique hotel	Hotel manager	No
FH	Luxury hotel (5-star)	Former Director Rooms / Hotel manager	No
JF	Ice Cream Café Chain & Service Robotics Distributer	Owner	Yes
JM	Wine trade & gastronomy	Entrepreneur / Former caterer	No
KH	Restaurant & café	Former owner	No
LO	Private catering	Founder & managing director	No
ML	Coastal vacation hotels	Hotelier & managing director	Yes
OM	Upscale country hotel	Operations manager	No
PB	Coastal vacation hotel	Owner & general manager	No
PT	Coastal vacation hotel	Owner	No

Figure 2 – Interview Sample Characteristics

3.3 Quantitative Phase: Online Survey

A standardized online questionnaire was developed and administered via Qualtrics. The survey was live for 20 days and distributed through social media platforms. Out of 200 initial responses, only those who completed the questionnaire and indicated Germany as their country of residence were included in the final sample (n = 164).

The survey design covered several theoretical areas. First, a set of demographic and behavioural items was included to describe the sample and control for contextual variation (see Figure 3).

Thematic Area	Question	Answer Format	Answer Options (Examples)	Relevance / Purpose
Demographics & Behavior	What is your age?	Multiple Choice	Under 18; 18-24; 25-34; 35-44; 45-54; 55+	Segments responses by age to assess generational differences in tech acceptance.
Demographics & Behavior	What is your gender? (optional)	Multiple Choice	Male; Female; Prefer not to say	Optional; may help identify gender-based preferences.
Demographics & Behavior	What is your country of residence?	Drop-down	Country list	Focus lies on the German market, others used for comparison if sample size allows.
Demographics & Behavior	What is your highest completed level of education?	Multiple Choice	No degree; High school; Vocational; Bachelor's; Master's; PhD	Education may correlate with openness to technology.
Demographics & Behavior	What was your total household income before taxes during the past 12 months in Euros?	Multiple Choice	< 25,000€/ year; 25,000- 49,999€/ year; 50,000-99,999€/year; 100,000-199,999€/year; >200.000€/ year; prefer not to say	Income may correlate with different service demand.
Demographics & Behavior	How often do you stay at hotels?	Multiple Choice	Rarely; 3–4/year; 5–6/year; >7/year	Assesses familiarity with hospitality settings.
Demographics & Behavior	How often do you eat at restaurants per month?	Multiple Choice or Numeric	<1/month; 1–2/month; 3–5/month; >5/month	Provides context for hospitality exposure.
Demographics & Behavior	Have you ever interacted with a service robot in hospitality (hotel or restaurant)?	Yes/No	Yes; No	Determines prior exposure to service robots.
Demographics & Behavior	If yes, in what function?	Drop-down	Reception; Room service; Housekeeping; Luggage; Restaurant	Qualitative context of prior interaction.

Figure 3 – Survey Questions: Demographics & Behaviour

Second, perceived usefulness and ease of use were measured in line with the TAM (see Figure 4).

Thematic Area	Question	Answer Format	Answer Options (Examples)	Relevance / Purpose
Perceived Usefulness (PU)	I believe service robots can make hospitality services more efficient.	Likert Scale	Strongly agree – Strongly disagree	Assesses if robots are seen as improving performance.
Perceived Usefulness (PU)	Service robots could help reduce wait times in restaurants or hotels.	Likert Scale	Strongly agree – Strongly disagree	Tests perceived time-saving benefits.
Perceived Ease of Use (PEU)	I would find it easy to communicate with a service robot (e.g., at a hotel check-in desk).	Likert Scale	Strongly agree – Strongly disagree	Assesses interaction ease.
Perceived Ease of Use (PEU)	I think ordering and being served via a service robot would be easy and intuitive.	Likert Scale	Strongly agree – Strongly disagree	Tests full-service flow usability perception.
Perceived Ease of Use (PEU)	I consider myself comfortable using modern digital technologies.	Likert Scale	Strongly agree – Strongly disagree	Determines tech-savviness as a moderator variable.

Figure 4 - Survey Questions: TAM

Third, constructs from the DoI framework were assessed using targeted items (see Figure 5).

Thematic Area	Question	Answer Format	Answer Options (Examples)	Relevance / Purpose
Relative Advantage (DoI)	Compared to human staff, robots could perform repetitive tasks more reliably.	Likert Scale	Strongly agree – Strongly disagree	Tests if robots are seen as more efficient.
Relative Advantage (DoI)	Robots provide a unique or innovative experience I would like to try.	Likert Scale	Strongly agree – Strongly disagree	Evaluates novelty appeal.
Compatibility (DoI)	Robots are a good fit for modern hotels and restaurants.	Likert Scale	Strongly agree – Strongly disagree	Tests how well robots match expectations.
Compatibility (DoI)	Robots would disrupt the atmosphere I expect in hospitality.	Likert Scale	Strongly agree – Strongly disagree	Reverse-coded to check emotional conflict.
Compatibility (DoI)	I prefer a human touch when I go to hotels or restaurants.	Likert Scale	Strongly agree – Strongly disagree	Reverse-coded to explore preference for human interaction.
Observability & Trialability (DoI)	I have seen videos or ads featuring robots in hospitality.	Yes/No	Yes; No	Checks visibility of robotic services.
Observability & Trialability (DoI)	Seeing others use robots would make me more likely to try them.	Likert Scale	Strongly agree – Strongly disagree	Measures social influence on adoption.

Figure 5 - Survey Questions: DoI

Finally, additional dimensions covering contextual acceptance and attitudinal/value-related factors were included to complement the theoretical analysis (see Figure 6&7)

Thematic Area	Question	Answer Format	Answer Options (Examples)	Relevance / Purpose
Contextual Acceptance	How comfortable would you feel interacting with a robot in the following settings?	Matrix Likert Scale	Low-budget to luxury hotels and restaurants	Explores situational sensitivity across service tiers.
Contextual Acceptance	Which of these roles do you generally find acceptable for a robot in the hospitality industry?	Multiple Answer	Reception; Room service; Housekeeping; Restaurant; etc.	Identifies acceptable service domains.
Contextual Acceptance	Which of the following tasks can be performed by service robots without compromising the premium status of a five-star hotel?	Multiple Answer	Reception; Room service; Housekeeping; Restaurant	Identifies acceptable service domains in a high-end setting.
Contextual Acceptance	How comfortable would you be with a hotel where you have no human interaction but service happens in a fast, efficient and seamless manner?	Likert Scale	Extremely comfortable – Extremely uncomfortable	Measures comfort levels regarding fully automated environments.

Figure 6 - Survey Questions: Contextual Acceptance

Thematic Area	Question	Answer Format	Answer Options (Examples)	Relevance / Purpose
Attitudes & Value Perception	I would trust a robot as much as a human to provide good service.	Likert Scale	Strongly agree – Strongly disagree	Assesses emotional trust.
Attitudes & Value Perception	I would judge a service robot more critically than a human staff member if both made the same mistake.	Likert Scale	Strongly agree – Strongly disagree	Explores perceived double standards.
Attitudes & Value Perception	I feel uncomfortable with the idea of being served by a robot.	Likert Scale	Strongly agree – Strongly disagree	Detects emotional resistance.
Attitudes & Value Perception	I would pay more / the same / less for service involving robots.	Multiple Choice	More; The same; Less	Gathers perceived value or pricing bias.

Figure 7 - Survey Questions: Attitudinal/Value-related Factors

Constructs were measured using 5-point Likert scales with selected demographic and behavioural items following multiple choice, drop-down, or yes/no formats depending on the nature of the variable. Descriptive results are presented in Chapter 4, followed by deeper statistical analysis including an ordinal regression model conducted using R. This approach was selected based on current methodological recommendations to treat Likert-type items as ordinal data (Carifio & Perla, 2007; Jamieson, 2004).

4 Data Analysis and Findings

This chapter presents the results divided into two sections: the analysis of the expert interviews and the analysis of the customer survey. Each section addresses a different perspective on the central research question: **"What are drivers of adoption of AI service robotics that add value for German hospitality companies."**

While section 4.1 focuses on the strategic thinking, challenges, and expectations of decision-makers in the industry, section 4.2 provides insights into customer acceptance, evaluating emotional, functional and contextual perceptions of robotic services across different hospitality settings.

4.1 Analysis of qualitative data - Expert Interviews

4.1.1 Robotics Experience & Current Status

4.1.1.1 Experience with or consideration of service robotics

Most interview participants had at least considered the use of service robotics, with three companies (DD1, JF and ML) reporting active use. All rely on clearing robots, which follow fixed routes to transport dirty dishes to the kitchen. ML added a notable detail by emphasizing their attempt to humanize the experience: *"We customized her with my wife's voice."* This reflected an effort to integrate technology in a way that aligns with the emotional tone of hospitality.

Several others described concrete testing or evaluation phases. For example, DD2 and OM reported discussions with providers and scenario analysis, though no implementation followed.

A few participants (e.g., PB, PT) stated that robotics had not been seriously explored, often citing limited perceived value or a commitment to personal service. PT explained: *"We haven't implemented or seriously considered it. For us, personal contact is key."*

While adoption remained low, the data showed a broad awareness of service robotics and a cautious, yet ongoing engagement with its possibilities, particularly for back-of-house tasks like dish collection.

4.1.1.2 Reasons for non-adoption and initial obstacles

Most interviewees emphasized the importance of personal service as a key reason for not adopting robotics. AH stated that *"real service is created through empathy, spontaneous reaction, and relationship,"* while PT added that *"guests appreciate the conversation at*

breakfast and the personal welcome." For many, robotics was seen as incompatible with the emotional core of hospitality.

Practical limitations were also frequently mentioned. BH explained that *"the space is too tight. A robot couldn't even make the turns,"* and LO noted that for very small-scale operations, *"there are currently no viable robotic solutions."* Additionally, several experts, including DD2, JF and PB, pointed to the high investment costs and uncertain ROI as key deterrents.

Among those who adopted robotics, early concerns focused on cost and effectiveness. DD1 acknowledged affordability as a general barrier, even though they proceeded. ML noted that while his decision was spontaneous and that he is happy with the outcome, he knows other hotels where it didn't work out. JF confirmed that although his own implementation was successful from the start, he sees the broader challenge in overcoming initial acceptance barriers, particularly within the German market. As he described, efforts are ongoing to lower the threshold of acceptance and normalize robotics in hospitality, healthcare, and other service environments.

In summary, adoption was primarily hindered by a combination of service philosophy, spatial constraints, and economic concerns, with only a few operators choosing to test robotics despite these challenges. JF's observations further highlight that systemic cultural resistance can remain a relevant obstacle even for successful adopters.

4.1.2 Strategic Rationale & Innovation Thinking

4.1.2.1 Robotics as a response to labor shortage

Most participants agreed that robotics holds real potential to alleviate the effects of the labor shortage. Particularly for simple, repetitive, or back-of-house tasks. As PT put it: *"Especially for tasks no one wants to do anymore, robotics could be useful."*

Several interviewees highlighted that the shortage is not limited to qualified professionals but includes general labor. DD1 noted: *"The challenge is not just skilled labor. It's a lack of workers overall, especially unskilled labor. That's exactly where robots help."* KH also pointed out that, *"Staff can be relieved of physically strenuous tasks such as carrying plates, which makes the workplace more attractive. This means that employees can be retained for longer."*

JF offered one of the strongest endorsements, describing robotics as the starting point for addressing staff shortages in his business. *"Service robotics was the foundation of our effort to*

deal with the labor shortage. Without this option, reopening our cafés after the pandemic would not have been possible." He added that robotics not only relieves employees, but also enhances the opportunity for guest interaction and increases the potential for upselling.

At the same time, many drew clear boundaries regarding roles involving direct guest interaction. ML remarked: *"As a dish collector, it's definitely a help. But in guest-facing service, I'm skeptical."* AH shared a similar view, emphasizing that robotics cannot replace the emotional qualities required in personal service.

Some also pointed to specific business models that may benefit more readily from automation. JM referenced standard environments like canteens or system catering, while FH envisioned broader use cases across the entire hotel operation, from check-in to security.

Overall, robotics were seen as a partial solution, effective in supporting staff and enhancing efficiency in certain operational zones, but not as a substitute for human interaction in core guest-facing experiences. JF's case shows that in some business contexts, robotics can become a critical enabler of operational continuity and commercial recovery.

4.1.2.2 **Potential areas of application**

Interviewees consistently identified repetitive, standardizable tasks without direct guest interaction as the most suitable areas for robotics. These included dish collection, cleaning, basic transport, and kitchen prep. PB summed it up clearly: *"Definitely back-of-house areas: cleaning, simple transport, maybe waste disposal."*

Many also mentioned room service and check-in in hotels focused more on convenience than personal contact. FH noted that *"practically all standardized tasks"* could be addressed - from minibar restocking to security patrols. Others pointed to logistical or support functions.

Robotic kitchen aids were also mentioned by several participants. JF added that robotics is particularly well-suited for tasks like overnight cleaning, heavy lifting, and repetitive work, and even sees potential in interactive marketing scenarios.

In contrast, complex or guest-facing tasks were generally seen as unsuitable, reinforcing a boundary between technical feasibility and emotional expectations.

4.1.2.3 **Robotics as short-term fix or strategic tool**

Nearly all interviewees viewed robotics as a long-term strategic instrument, rather than a short-term fix. High investment costs and the current technological limitations were frequently mentioned as reasons why short-term benefits are limited.

FH emphasized: *"Initial investments are high, but in the long run, robotics will prevail."* DD1 similarly stated that once introduced, *"robots are not typically replaced by people again."* JF strongly confirmed this view, describing robotics as a core component of a long-term strategy to relieve staff and enhance workplace quality.

Only a few participants saw potential for temporary relief, and even then, mainly as a complementary measure, not a substitute for solving structural workforce issues.

Ultimately, the consensus position viewed robotics as a future-oriented solution, with limited immediate payoff but growing strategic relevance over time.

4.1.2.4 **Cost efficiency vs. competitive differentiation**

Most interviewees believed that the stronger value of robotics lies in cost efficiency, not in creating a unique market position. Several pointed out that automation could significantly reduce labor costs, particularly in larger or standardized operations. As FH put it: *"In countries with high labor costs like Germany, cost reduction is a strong driver."*

In contrast, the potential for differentiation was seen as limited and short-lived. DD2 argued that *"once others adopt it, the effect is gone,"* while PB described it as a possible short-term attention driver, but not a sustainable edge. AH and BH dismissed it altogether as misaligned with their brand concepts focused on emotional service and personal connection.

JF, however, suggested that improving the work environment through robotics could provide a strategic advantage in increasingly competitive labor markets, highlighting a form of internal differentiation.

Only a few experts mentioned guest engagement or novelty value, such as ML, who noted that their robot is perceived as *"a charming addition."*

In general, cost reduction was widely seen as the more compelling advantage of robotics, whereas its use for strategic differentiation was considered situational at best, and unlikely to offer a lasting competitive edge.

4.1.2.5 First-mover vs. follower mentality

Most interviewees clearly identified with a follower mindset, preferring to observe and assess rather than lead in the adoption of new technologies like robotics. Many emphasized that innovation must be tied to practical benefit and conceptual fit, rather than adopted for its own sake.

PB stated: *"We're not a first mover. We observe, evaluate, and calculate."* Similarly, ML underlined: *"We don't need to be the first or the best. What matters is that the technology fits."*

Only two participants (DD1 and JF) actively identified as a first movers. DD1 cited involvement in other early tech pilots and the importance of flexibility and responsiveness: *"It's not about prestige, it's about the ability to react quickly to change."* JF emphasized that, although his robotics journey began out of necessity, he now proudly embraces his pioneering role, actively shaping the trajectory of the technology through in-house product development and quality control.

Some, like AH and JM, noted openness to innovation in principle, but stressed that timing and alignment with business goals are more important than pioneering status.

In summary, there was a strong preference for strategic caution, with most seeing no value in early adoption unless clearly justified by operational or market advantage.

4.1.3 Implementation Barriers & Organizational Fit

4.1.3.1 Internal challenges in adopting robotics

The most frequently cited internal challenge was technical reliability and integration into existing infrastructure. Multiple participants stressed that robotics must function seamlessly in daily operations. DD1 stated: *"The system must run smoothly. That was the biggest challenge."*

Staff acceptance emerged as another key concern. Several interviewees noted that introducing robotics requires cultural adjustment and building trust within teams. JM described this as *"overcoming fears and clearly communicating the benefits."*

Physical space and architectural limitations were also mentioned, particularly by operators of older or compact properties. BH, DD2 and PT pointed to structural adaptation as a serious constraint.

Additionally, a few participants raised the issue of insufficient support structures, including technical maintenance, qualified personnel, and long-term service. OM emphasized: *"A functioning service network for maintenance and support is essential."* ML and KH also point out that there is a lack of technical support, particularly in rural areas.

Ultimately, the main internal barriers to robotics adoption lie in technical functionality, employee engagement, and infrastructure readiness, often reinforced by uncertainty and a lack of reliable support systems.

4.1.3.2 Perceived guest acceptance

Responses to this question revealed a mixed picture, with strong generational and contextual differences shaping customer acceptance of robotics. Many participants reported skepticism, particularly among older guests and those in premium or tradition-oriented environments. AH observed: *"Guests want to be understood and treated individually."* PT noted that their guests *"seek interaction, ask for recommendations, and enjoy conversation."*

Conversely, some operators reported enthusiastic reactions, especially when robots are used in a supporting role or when presented playfully. DD1 highlighted: *"If it's charmingly packaged, it's seen as enrichment."* ML estimated that *"98% of guests find our robot likeable."*

Several interviewees described divided attitudes depending on guest type. DD2 and PB both observed that younger or tech-savvy guests tend to be more open, while others remain cautious or resistant.

Overall, guest acceptance depends heavily on how and where robotics are integrated. Subtle, complementary uses tend to be well received, while attempts to replace human interaction are often met with resistance.

4.1.3.3 External barriers to implementation

Across nearly all interviews, the primary external hurdle cited was the high investment cost of robotic systems. Many participants questioned the return on investment, particularly in smaller operations.

Concerns about uncertain profitability and long-term reliability were also widespread. JM noted that with complex systems, *"the investments are enormous, and profitability is hard to assess."* FH additionally pointed to internal political resistance, mentioning that *"works councils are often skeptical about technological innovations."*

While data protection was mentioned, most interviewees downplayed its significance in practice. JF confirmed this view, explaining that compliance can be ensured through measures like using European servers and limiting sensory data collection.

To summarize, the main external barriers to the adoption of robotics, besides internal political resistance, are economic, with upfront costs and unclear ROI at the forefront, while legal or data-related concerns play a minor role.

4.1.4 Outlook & Future Trends

4.1.4.1 Future relevance in the hospitality sector

There was near-unanimous agreement among the interviewees that the role of robotics in hospitality will increase significantly over the next 5-10 years. However, most expected this growth to be selective, depending heavily on business model, scale, and degree of standardization.

Robots was seen as likely to spread mainly in chain hotels, system gastronomy, and high-throughput environments. PB and BH both emphasized that larger, standardized operations will be at the forefront of this development. AH added that while robotics may grow in economy segments, it will likely remain marginal in individual, design-driven hotels.

ML and DD1 differentiated between application areas, predicting limited use in guest-facing service, but broader adoption in back-of-house roles such as cleaning, clearing, and check-in. DD1 also stressed that the even greater disruption may come from AI, beyond robotics alone.

For the most part, participants expected a gradual but clear increase in robotic adoption, shaped by context, practicality, and brand positioning, rather than a uniform or disruptive transformation across the entire sector.

4.1.4.2 Niche solution or future industry standard?

Most interviewees expected robotics to remain a niche solution, at least within the traditional hospitality landscape. Many argued that widespread adoption is unlikely in highly personalized or design-driven settings, where human interaction is central to the brand experience.

DD1 summarized this view: *"In many small businesses, there's simply no space, no budget, and often no real need."* PB added that robotics *"might become standard in large properties with repetitive tasks, but not in the classic hospitality segment."*

Meanwhile, several participants saw potential for robotics to become standard within specific market segments, particularly budget hotels, system catering, or urban high-volume operations. FH and JM both emphasized that efficiency-focused environments are well-suited for automation, especially in back-of-house areas.

A few, like LO and OM, predicted that robotics will eventually become a standard component in the industry, though still highly dependent on the concept and positioning of the business.

In summary, most experts anticipated a dual development: robotics becoming standardized in operationally driven models, while remaining a complementary or niche element in service-oriented, high-touch environments. JF, however, expressed stronger confidence in a broader shift, arguing that the combination of cost control and improved work quality will drive robotics toward becoming a standard across much of the industry.

4.2 Analysis of quantitative data – Customer Survey

The following section presents the analysis of the quantitative customer survey, designed to capture consumer views on service robotics in hospitality. The analysis is structured around the TAM and DoI frameworks and covers contextual acceptance and value perception.

To improve clarity and comparability, “strongly agree” and “somewhat agree” responses were grouped as “agree”, and the same applied to disagreement levels. This allowed for a more intuitive presentation of overall trends. Where meaningful, results were broken down by intensity.

Neutral responses (“neither agree nor disagree”) were treated as non-informative for attitudinal analysis and excluded from percentage-based summaries for interpretive clarity. All percentages refer to valid responses (n = 164); minor rounding deviations may occur. Multiple-choice items (e.g., acceptable roles) are reported descriptively.

This approach ensured a clear, focused representation of consumer sentiment, while maintaining transparency in data handling and interpretation logic.

4.2.1 Demographics & Behaviour

A total of n = 164 respondents completed the survey, all residing in Germany. The sample was skewed toward younger, educated, and tech-savvy individuals: nearly 70% were under 35, and over 70% held at least a bachelor's degree. Gender representation was relatively balanced.

In terms of income, participants were distributed across all brackets, with one-third earning below €25,000 and a notable share in middle to high-income ranges. This diversity allowed for differentiated interpretations of price sensitivity and value perception.

Respondents also showed frequent hospitality usage, with most staying in hotels several times per year and dining out regularly. This indicated strong familiarity with service environments.

Importantly, 47% had already interacted with a service robot, most commonly in restaurant delivery and check-in contexts. This direct exposure strengthened the reliability of their attitudes toward robotic services.

Overall, the sample reflected a diverse but innovation-friendly demographic, providing a solid foundation for analysing perceptions of AI-driven service robotics in hospitality.

4.2.2 Technology Acceptance Model (TAM)

4.2.2.1 Perceived Usefulness (PU)

To assess how useful customers perceived service robots to be in hospitality settings, two core items were evaluated: whether robots could improve efficiency and whether they might help reduce wait times.

The results showed a strong overall endorsement of PU:

- 79% of respondents agreed that service robots could make hospitality services more efficient, while only 9% disagreed.
- Similarly, 83% agreed that robots could help reduce wait times, with just 5% expressing disagreement.

These results confirmed that most participants recognized clear operational benefits, particularly regarding speed and process optimization. This supported a core assumption of the TAM, where perceived usefulness is considered a critical driver of user acceptance.

Nonetheless, a small group of respondents remained skeptical. This might be due to concerns about reliability, the need for human oversight, or a general lack of familiarity. These issues are explored further in the following sections.

4.2.2.2 Perceived Ease of Use (PEU)

To assess how easy customers expected interaction with service robots to be, three core items were evaluated: communication, ordering/being served, and general digital comfort.

The results showed a moderately high overall agreement:

- 55% of respondents agreed that communicating with a service robot would have been easy, while 28% disagreed.
- 54% agreed that ordering and being served would have been easy, with 27% in disagreement.
- 83% stated they were comfortable using modern digital technologies, while only 10% expressed discomfort.

These results suggested that most respondents did not perceive robotics as a technical barrier in principle. The slightly lower agreement for direct robot interaction compared to general digital comfort might have reflected concerns about unfamiliar interfaces, speech recognition, or limited prior exposure. Taken together, the findings supported the assumption that technical interaction was not seen as a major hurdle.

4.2.3 Diffusion of Innovation (DoI)

4.2.3.1 Relative Advantage

To assess perceived benefits over traditional human service, two items were evaluated: functional reliability and experiential novelty.

The results showed clear support for practical benefits:

- 64% of respondents agreed that robots could perform repetitive tasks more reliably than human staff, while 16% disagreed.
- 52% agreed that robots offered an experience they would like to try, while 21% disagreed.

These findings suggested that customers recognised the operational strengths of service robots, particularly in automating routine tasks. This reinforced earlier findings on PU. However, the

appeal as a novel or emotionally engaging experience appeared more limited. In line with the DoI framework, relative advantage was primarily acknowledged on a functional level, with less emphasis on symbolic or experiential value.

4.2.3.2 Compatibility

To assess whether service robots were seen as compatible with hospitality settings, three items were evaluated: fit with modern environments, potential disruption, and preference for human service.

The results showed a clear contrast between general openness and emotional preference:

- 57% agreed that robots were a good fit for modern hospitality, while 20% disagreed.
- 55% believed robots could disrupt the expected atmosphere; 27% disagreed.
- 82% preferred human interaction, with only 5% disagreeing.

These findings highlighted a central tension: although many respondents were open to robotic solutions, they remained emotionally attached to human service. In line with the DoI framework, compatibility appeared conditional - robotics were accepted in principle, but only if they complemented rather than replaced valued interpersonal elements.

4.2.3.3 Drivers of Compatibility Perception – Ordinal Regression Results

To identify factors influencing the perception that service robots are a good fit for modern hospitality, an ordinal logistic regression was conducted using Q17 as the dependent variable ("Robots are a good fit for modern hotels and restaurants").

Predictors included psychological and functional factors (perceived efficiency, disruption of atmosphere, tech comfort, prior robot experience, media exposure) as well as socio-demographics (age, education, income, gender). Only respondents identifying as male or female were included, as just one selected "prefer not to say".

Two predictors were significant: perceived efficiency (Q10) had a strong positive effect ($\beta = 1.23$, $p < .001$), while perceived atmospheric disruption (Q18) had a strong negative effect ($\beta = -0.94$, $p < .001$). Guests who believed robots improve efficiency were more likely to view them as a good fit; those who felt robots disrupt the ambiance were less likely to do so.

Other variables, including technology comfort, prior experience, media exposure, age, education, income, and gender, were not statistically significant ($p > .05$). Female respondents

showed a slightly more skeptical tendency (β = -0.45), but this was not significant (p = .15) (Appendix N).

These results suggested that compatibility perceptions are primarily shaped by functional and emotional evaluation, not demographics or exposure. Adoption strategies should highlight operational benefits and ensure robots are seen as enhancing rather than undermining brand atmosphere.

4.2.3.4 Observability & Trialability

We next explored whether respondents had already been exposed to robotic services in hospitality and whether social observation influenced openness to trying such technologies themselves.

55% of the participants reported having seen service robots in media, such as videos or advertisements, suggesting that these technologies are becoming increasingly visible in the public sphere. Conversely, 45% had not encountered them in this way, indicating that visibility is still limited to certain audiences or channels.

Regarding trialability, 58% of respondents agreed that seeing others interact with service robots would make them more likely to try them as well, while only 16% disagreed. This highlighted the relevance of peer behaviour in shaping technology adoption.

In line with the DoI framework, these findings suggested that social exposure and observability are important factors in influencing customer openness. Peer-based familiarity might serve as a driver for acceptance, especially in early phases of adoption.

4.2.4 Contextual Acceptance

The next line of enquiry examined how customer acceptance of robotic service varies depending on situational and environmental context, specifically the type of hospitality setting, the nature of the task, and alignment with service expectations.

Respondents were asked how comfortable they would feel interacting with service robots across various hospitality settings. As shown in Figure 8, comfort levels were highest in standardised,

efficiency-driven environments, and declined as emotional or experiential expectations increased.

- 49% felt extremely comfortable with robotic service in fast food restaurants, and 35% in budget hotels.
- In mid-range hotels, only 10% reported the same level of comfort.
- At the high end, only 6% felt extremely comfortable in fine dining restaurants, and just 4% in luxury hotels.
- Conversely, 45% stated they would feel extremely uncomfortable with robots in five-star hotel settings.

These findings underlined that respondents were generally more open to robotic service in settings that prioritise speed and standardisation.

Interestingly, this pattern reversed between segments: in the low-budget category, respondents reported higher comfort levels in restaurants (49%) than in hotels (35%). In the high-end segment, however, discomfort was slightly greater in fine dining than in luxury hotels, indicating the particular importance of ambiance and personal interaction in gourmet experiences.

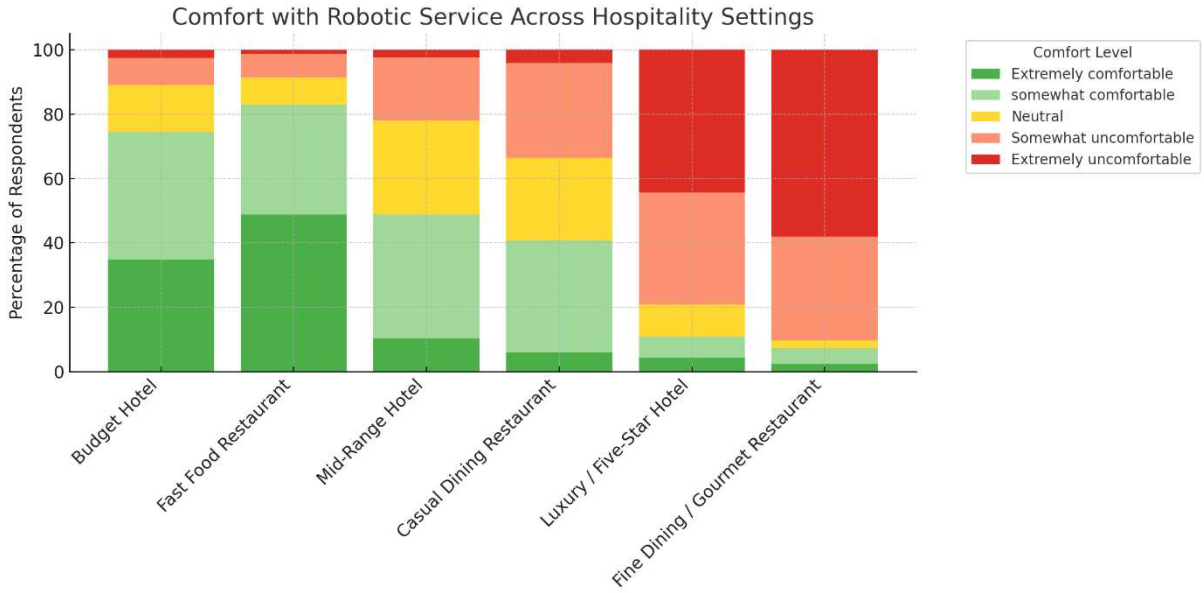

Figure 8 – Comfort with Robotic Service Across Hospitality Settings

As shown in Figure 9, acceptance of robotic assistance varied significantly by task and service context. In general hospitality settings, respondents showed high support for operational roles

without direct guest contact - 87% approved of luggage transport, 65% of housekeeping, and 57% of check-in. In-room service and food delivery were viewed slightly more critically (55% and 45%, respectively), while only 7% rejected all options.

Acceptance dropped notably in five-star environments. While 68% still approved of robotic luggage transport and 51% of housekeeping, support for guest-facing roles declined sharply: 30% for in-room service, 19% for check-in, and only 10% for food delivery. Notably, 26% believed luxury hotels should avoid guest-facing robotics entirely.

These results confirmed that task type and service level strongly influence perceived suitability, with back-of-house roles seen as the most viable applications, especially in premium settings where personal service is expected.

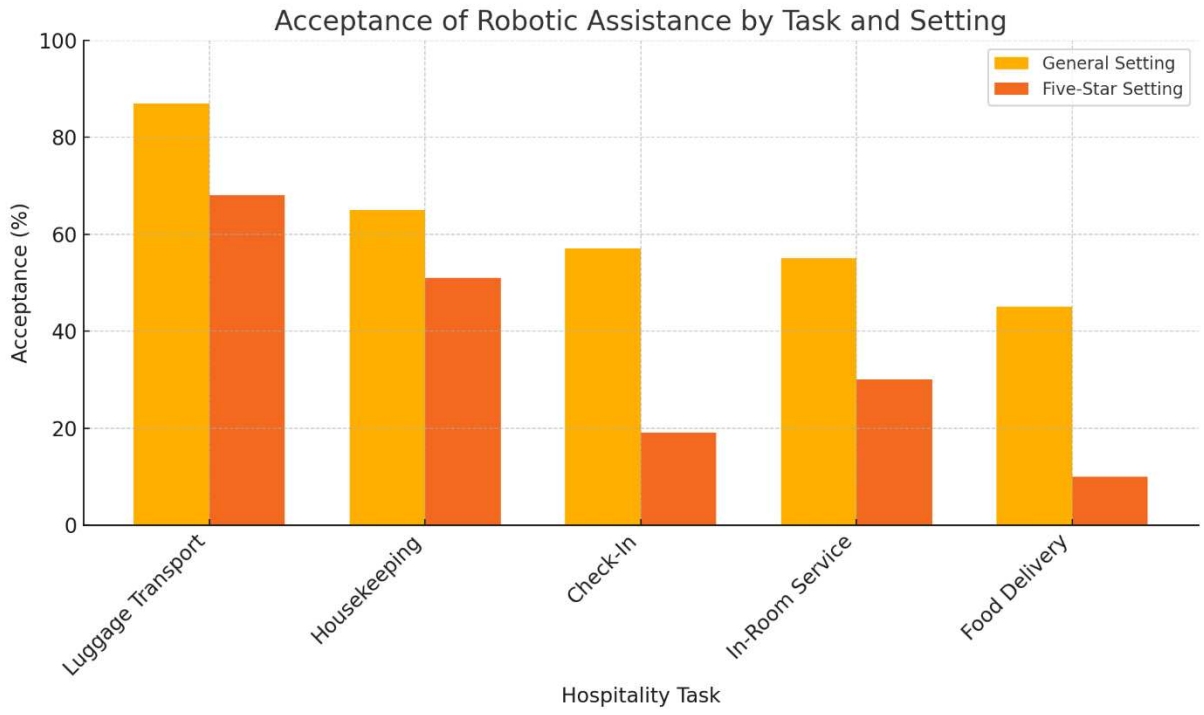

Figure 9 - Acceptance of Robotic Assistance by Task and Setting

Respondents were asked how they would feel about a hotel offering all services exclusively through robots - fast, efficient, and with no human interaction. As shown in Figure 10, opinions were clearly divided. This result illustrated a clear acceptance boundary, while many appreciated efficiency, a significant share reacted critically to the complete loss of human contact.

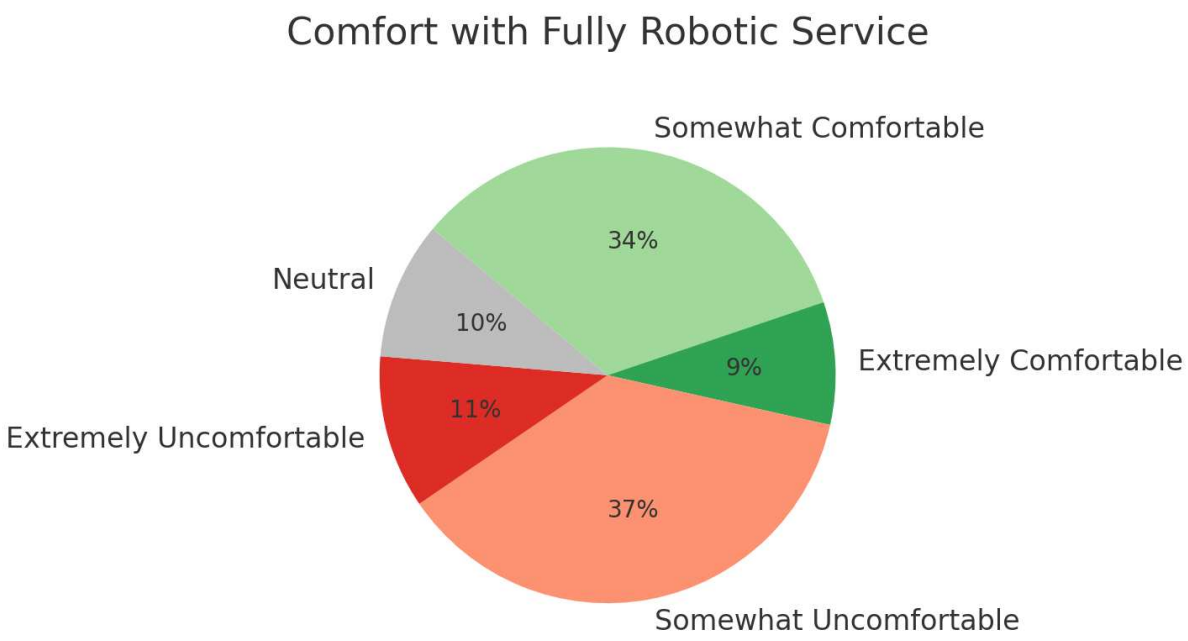

Figure 10 - Comfort with Fully Robotic Service

The findings evinced that contextual acceptance was shaped by expectations of personalization, the service environment, and the nature of the task. While guests were open to robotics in support roles and functional settings, resistance remained high in emotionally charged or premium service contexts.

4.2.5 Attitudes & Value Perception

We then explored how participants assessed robotic service in terms of trust, expectations, emotional comfort, and perceived value. The results showed a mix of curiosity, caution, and cost-consciousness.

When asked whether they would trust a service robot as much as a human, 38% agreed (6.1% strongly, 31.5% somewhat), while 45% disagreed, and 17% were neutral. This indicates that although some respondents are open to trusting robotic service, a significant portion still perceives a reliability gap compared to human staff.

Expectations appeared to be higher for robots than for human employees. On the statement *"I would judge a service robot more critically than a human for the same mistake"*, 60% agreed, while only 16% disagreed. This suggested that many respondents expect flawless performance from technology and may be less forgiving of errors when made by machines.

Emotional comfort was evaluated via the question: *"I feel uncomfortable with the idea of being served by a robot."* The results were mixed: 29% agreed, but 49% disagreed, while 22% remained neutral. These results implies that while emotional discomfort existed, most respondents were not fundamentally opposed to robotic interaction.

The last question assessed perceived economic value. When asked whether they would expect to pay more, less, or the same for robotic service, 71.5% said they would expect to pay less, 26.1% expected no difference, and only 1.8% would be willing to pay more. This indicated that most customers associate robotic service with cost savings, not premium experience.

In summary, respondents displayed a pragmatic attitude: they were willing to consider robotic service but associated it with high performance standards and lower price expectations. While not emotionally adverse to robots, they clearly viewed trust and value as contingent on flawless functionality and economic justification.

5 Discussion

5.1 Introduction

The empirical results from the expert interviews and the quantitative customer survey were examined relationally and in the context of the theoretical frameworks introduced in Chapter 2. In particular, we drew on the DC framework, the MBV, First- and Second-Mover Theory, and consumer adoption models such as the TAM and the DoI.

5.2 Integration of Qualitative and Quantitative Findings

A central point of alignment between industry experts and consumers was the role of service robotics in performing repetitive, operationally intensive tasks. Interviewees frequently emphasized the potential of robots to relieve staff of physically demanding and unattractive duties, especially in back-of-house settings such as cleaning, dish transport, or logistics. This assessment corresponded with customer preferences expressed in the survey, where 87% of respondents found luggage transport suitable for robotic execution, followed by 65% for housekeeping and 57% for check-in. Both perspectives supported the view that service robotics were most accepted when deployed in roles that are standardized, low in emotional complexity, and operationally burdensome for human staff.

Beyond agreement on use cases, there was also shared recognition of contextual dependencies. Several managers emphasized that the feasibility of robotics is closely linked to spatial layout,

operational scale, and brand positioning. Similarly, the survey data showed that acceptance of robotics drops significantly in premium service contexts. While 49% of respondents felt extremely comfortable with robotic service in fast food restaurants, only 6% expressed such comfort in fine dining environments and 4% in luxury hotels. These figures reflected expert statements that robotics might be incompatible with the emotional service logic of personalized hospitality, especially in boutique or high-end establishments.

Despite these areas of convergence, the two datasets also revealed asymmetries in perception. One key divergence lay in the perceived novelty and strategic role of robotics. From the managerial side, robotics were primarily seen as a pragmatic response to the labor shortage and a tool for improving operational efficiency. Most interviewees rejected the idea that robotics offered long-term differentiation potential, arguing instead that its novelty effect is short-lived and easily imitated. In contrast, customer responses suggested a stronger interest in the innovative aspect of robotics. More than half of survey participants (52%) expressed that they would like to try robotic service because it represents a novel experience, and 58% indicated that seeing others interact with robots would increase their own willingness to do so. These findings implied that customers might attribute more experiential value to robotics than managers currently assume.

Emotional compatibility represented another area of divergence. Many managers emphasized the irreplaceability of human service in emotionally charged interactions, noting that empathy, spontaneity, and interpersonal connection are central to the hospitality experience. While the customer survey confirmed that 82% of participants preferred human interaction, emotional resistance to robotic service was not as pronounced as managers feared. Only 29% of respondents stated that they feel uncomfortable with the idea of being served by a robot, and nearly half explicitly disagreed with that statement. Moreover, 68% considered luggage transport by a robot in a five-star hotel acceptable, and 51% accepted robotic housekeeping in such settings, although acceptance dropped sharply for guest-facing roles like food delivery and check-in. These results suggested that while emotional expectations set limits on robotic integration, they did not constitute a universal barrier. Instead, acceptance depended on the specific role and service environment.

Further dissonance emerged in strategic positioning. Most interviewees described their firms as cautious followers, waiting for clearer market signals and proven use cases before adopting robotics. This reserved approach was consistent with broader risk-aversion in the industry.

However, the survey data indicated that customer expectations might be evolving more rapidly. 47% of all respondents had already interacted with service robots in hospitality contexts, and 55% had seen such technologies in media. These numbers suggested growing visibility and normalization of robotic services, potentially ahead of provider readiness. The discrepancy raised the risk of a perception gap, in which consumer openness outpaces managerial action, particularly among younger, digitally experienced guests.

In conclusion, the integration of qualitative and quantitative findings revealed broad agreement on the functional value of service robotics, especially in repetitive and low-touch contexts. However, there were notable differences in how stakeholders framed the emotional, experiential, and strategic implications of robotic adoption. While managers focused on operational logic and long-term feasibility, customers appeared more willing to engage with robotic services under the right conditions. These insights pointed to the need for differentiated, context-sensitive strategies that align internal readiness with evolving user expectation. An issue further explored in the theoretical interpretation that follows.

5.3 Theoretical Interpretation

5.3.1 Dynamic Capabilities

The DC framework helps us evaluate how hospitality firms identify, respond to, and integrate emerging technologies like AI service robotics into their operations. In the context of this study, the framework proved particularly relevant, as it connects external environmental pressures, most notably the severe labor shortage (a threat), with internal organizational responses in the form of innovation, strategic investment, and transformation.

The findings from the expert interviews demonstrated that most hospitality firms have successfully engaged in the first of Teece's (1997) foundational DC processes: sensing. Nearly all interviewees acknowledged the ongoing labor crisis and expressed awareness of service robotics as a potential solution. For example, several respondents explicitly linked the deployment of robots to the need to maintain service quality despite staffing challenges. PT stated that "especially for tasks no one wants to do anymore, robotics could be useful," while DD1 emphasized that the problem lies not only in skilled labor but in the general absence of workers, making robotic support a logical step.

However, the transition from sensing to seizing - the capability to mobilize resources and take advantage of the identified opportunity - was more limited and conditional. Only three out of

thirteen interviewees reported active robotic implementation, and several others described stalled projects or cost-driven rejections. Barriers such as high investment costs, limited space, and technical uncertainty hindered wider adoption, despite the clear awareness of robotics' potential benefits. This suggested that while firms can perceive opportunities, their ability or willingness to seize them remains constrained by resource limitations and strategic caution.

The third DC process, transforming, was also selectively visible. JF stands out as his firm has implemented robotics and also embedded it as a core component of its post-pandemic business recovery strategy. He described robotics as “the foundation of our effort to deal with the labor shortage,” further noting improvements in staff satisfaction and upselling opportunities as secondary benefits. In this case, robotics was not treated as a one-time investment but as a transformation driver affecting operations, guest experience, and internal workflows. However, JF represented a notable exception. Most other firms had not initiated the kind of organizational change or capability renewal that Teece (1997) defines as transformation. Instead, many operators continued to evaluate robotics at the margin, treating them as an optional add-on rather than a structural shift.

These findings supported the relevance of the DC framework but also highlighted its conditional application. While the exogenous trigger - the labor shortage - was strongly and widely acknowledged, actual DCs varied significantly across firms. The concept of organizational ambidexterity helps explain this variation (O'Reilly & Tushman, 2011). Firms like JF’s demonstrated ambidextrous behaviour by balancing incremental improvements in service with exploratory investment in robotics. Others, by contrast, remained focused on existing routines and were hesitant to explore novel configurations, limiting their capacity to transform in response to environmental change.

The data also suggested that DCs in hospitality were closely tied to leadership orientation and organizational culture. For example, DD1 emphasized the importance of adaptability and technical experimentation as part of their general strategy, indicating an internal culture that supports rapid prototyping and technology testing. In contrast, PB and PT framed innovation in terms of risk management and operational fit, showing limited appetite for experimentation. These differences reflect the “microfoundations” of DCs, including leadership, learning processes, and investment logic (Teece, 2007).

In summary, the interviews provided evidence that hospitality firms in Germany have successfully developed the ability to sense external challenges and identify robotics as a

potential response. However, only a small subset of firms has moved towards fully seizing or transformation. DCs in this context are present but unevenly developed, often constrained by financial, structural, or cultural barriers. To realize the full value of AI service robotics, firms must not only recognize opportunity but also actively build the internal systems, leadership structures, and learning mechanisms that enable strategic transformation. In this respect, the DC framework highlighted both the potential and the current limitations of robotic adoption in the hospitality industry.

5.3.2 Market-Based View

The MBV focuses on the external environment as the primary determinant of firm performance, emphasizing how organizations can gain and sustain CA by positioning themselves effectively in relation to market forces. In the context of service robotics in the hospitality industry, this perspective is relevant, as firms operate within a high-pressure environment defined by labor scarcity, cost sensitivity, fierce competition for occupancy and evolving customer expectations.

The empirical findings supported the idea that the current labor shortage is acting as a powerful external force compelling firms to consider automation. Most interviewees identified cost efficiency and operational continuity as central motives for robotic adoption. FH explicitly framed robotics as a rational response to Germany's high labor costs, while ML described the use of robots to sustainably reduce staffing pressures. From an MBV perspective, these responses reflected the strategic pursuit of cost leadership, one of Porter's classic competitive positioning strategies.

Beyond cost efficiency, the MBV also encourages consideration of service differentiation as a possible strategic response. Although some experts mentioned guest engagement and novelty value, most managers were skeptical about the long-term differentiation potential of robotics. PB argued that once robotics becomes more widespread, its novelty effect will quickly fade, while AH and BH viewed it as incompatible with brand concepts based on personal service. As such, differentiation based on robotic service is seen as fragile and context-bound, particularly in segments where emotional experience is central to value creation.

From the demand side, however, the customer survey revealed that certain market segments might indeed value robotics as a differentiator, at least initially. 52% of all respondents described robotic service as a novel experience they would like to try, and 58% said they would be more likely to try robots after seeing others do so. These findings suggested that, in the early phases of diffusion, robotics might offer a limited window for differentiation, particularly in

functionally oriented or technology-positive environments. This short-term edge might be especially relevant for budget hotels or system gastronomy formats, where customers place less emphasis on interpersonal interaction.

MBV also emphasizes the role of evolving consumer preferences as a source of competitive opportunity. In this respect, the survey data indicated a shift toward greater acceptance of automation, particularly in operational and low-contact tasks. The high approval ratings for robotic luggage transport (87%), housekeeping (65%), and check-in (57%) suggested that customer expectations have already moved towards a more hybrid service model. Firms that fail to adapt to these emerging preferences might find themselves at a competitive disadvantage, not because robotics offers a unique selling proposition, but because it becomes a baseline expectation in certain service segments.

However, the interviews showed that many firms are not yet capitalizing on these market signals. Most respondents adopted a follower mentality, citing high investment costs, operational uncertainty, and limited alignment with their current business model as reasons for inaction. From a MBV perspective, this suggested a strategic misalignment: while market forces clearly point toward the growing relevance of robotics, firms are slow to position themselves accordingly.

A further insight from the data concerned aligning external positioning with internal operational fit. Hunt and Morgan's (1995) relational perspective within MBV highlights that success depends not only on responding to external market needs, but on how well a firm matches its offerings to those needs. In this study, the most successful adopters, such as JF, demonstrated both external awareness and internal capability to implement robotics meaningfully, suggesting that MBV and DC might be mutually reinforcing rather than oppositional.

Taken in totality, these findings supported several key MBV assumptions: the hospitality labor market exerts significant external pressure, cost leadership is a viable motive for robotic adoption and shifting customer expectations open space for selective differentiation. At the same time, many firms remain strategically cautious, resulting in delayed positioning despite clear environmental signals. This strategic inertia might limit the competitive benefits of robotics in the short term and reflects a gap between external opportunity and internal execution.

5.3.3 First-Mover vs. Follower

FMA and SMA discuss the benefits of firms choosing to pioneer new technologies and set industry benchmarks, or whether they prefer to enter later, once risks and uncertainties have diminished. The findings from the expert interviews clearly showed that most hospitality businesses in Germany have adopted a follower mindset, opting for risk mitigation over early positioning.

Only two interviewees (DD1 and JF) explicitly described themselves as first movers. In both cases, this strategic orientation was closely tied to either organizational culture or necessity. DD1 emphasized a general openness to innovation and the ability to "react quickly to change," while JF explained that the implementation of robotics was not originally a strategic choice but rather a critical survival mechanism during the post-pandemic recovery phase. Over time, however, JF's firm evolved into that of an active pioneer, integrating robotics into the company's core operations and developing internal know-how.

In contrast, most participants adopted a more cautious, observational stance. This aligned with the concept of SMA, where firms seek to learn from the experiences of early adopters, avoid costly failures, and benefit from improved technology and reduced implementation costs.

This follower orientation is consistent with the risk profile of the hospitality industry, which tends to operate on narrow margins, limited capital reserves, and high dependency on service quality. The uncertainty surrounding the return on investment for robotics, cited by multiple participants as a key barrier, further reinforced the reluctance to act pre-emptively. Several interviewees also referenced the current lack of robust technical support infrastructure and limited supplier experience in Germany, making early adoption even more challenging.

However, the customer survey suggested that this widespread preference for follower strategies might come at a cost as 47% of respondents had already interacted with service robots in hospitality settings, and 55% reported having seen such technologies in the media. This level of consumer exposure implied that the visibility and normalization of robotics are advancing independently of provider action. Furthermore, over half of the participants expressed curiosity or willingness to try robotic services, particularly in standardized and low-touch environments. These attitudes indicated that the market may be more receptive than providers assume, and that delaying adoption could lead to a competitive lag rather than protection from risk.

FMA could enhance brand visibility, media attention, and alignment with tech-oriented customer segments. Such advantages may stem not only from technology leadership but from

the ability to shape consumer expectations and establish switching costs (Lieberman & Montgomery, 1988).

The foregoing findings revealed a clear preference for follower strategies among hospitality firms, motivated by financial caution, operational constraints, and uncertainty about customer acceptance. However, the market signals identified in the customer survey suggested that firms may underestimate the pace of consumer acceptance and normalization.

5.3.4 Technology Acceptance Model and Diffusion of Innovation

The TAM and the DoI frameworks point to factors how customers evaluate and adopt technologies. The quantitative survey results offered strong empirical support for both models, while also revealing dimensions specific to the hospitality sector.

The survey data showed clear endorsement of TAM's two core constructs since 83% of the respondents agreed that service robots can reduce wait times, and 79% believed they increase efficiency. These high agreement levels indicated that most participants perceived robotic services as useful, particularly in improving operational processes. Likewise, ease of use was generally affirmed: 54% of respondents stated that ordering and being served by a robot would be easy, and 55% believed that communication with robots would be straightforward. These findings suggested that technical usability is not a major barrier, especially among digitally literate consumers.

However, the results also highlighted a discrepancy between functional acceptance and emotional readiness. While most respondents recognized the utility and usability of robotic services, emotional ambivalence remained. For instance, 82% of respondents expressed a general preference for human interaction, and 29% indicated discomfort with the idea of being served by a robot. This suggested that while TAM's instrumental logic holds, it is insufficient on its own to predict actual behavioural acceptance in emotionally sensitive service contexts such as hospitality.

The DoI framework helps explain this tension by incorporating additional dimensions such as compatibility, observability, and trialability. Compatibility emerged as a particularly important boundary condition: although 57% of respondents agreed that robots are a good fit for modern hospitality, 55% also believed that robots might disrupt the expected atmosphere. This indicated that customers evaluated robotic services not only in terms of functional fit but also in terms of alignment with the emotional and aesthetic expectations associated with different hospitality environments.

Trialability and observability also played a notable role. Most respondents (58%) reported that observing others use robots would increase their own likelihood of trying them, and 55% had already seen robots through media. This social exposure might help normalize the technology, reducing uncertainty, and accelerating diffusion, particularly among younger or tech-savvy guests. However, only 47% had interacted with a service robot, suggesting that personal experience still lags visibility. Underscoring the importance of onsite testing and pilot deployments.

The regression analysis further supported the predictive relevance of both TAM and DoI constructs. Perceived efficiency was found to be the strongest positive predictor of compatibility perception, while perceived atmospheric disruption was the strongest negative predictor. Demographic variables such as age, income, and gender, by contrast, had no significant effect. This reinforced the idea that psychological and experiential evaluations, rather than structural attributes, shaped customer attitudes toward robotic services.

Combining TAM and DoI, the survey revealed that customer acceptance was both cognitively and socially conditioned. Guests were willing to accept robotic services when they offered clear advantages, were easy to use, and did not conflict with the emotional expectations of the setting. This aligned with recent extensions of the TAM model, such as TAM2 and TAM3, which incorporate trust, subjective norms, and contextual factors into the adoption process. Similarly, hybrid models that integrate TAM and DoI, such as those proposed by Akinyemi and Onukwulu (2025), highlight that consumer adoption is not isolated from broader environmental factors, including employee readiness, institutional support, and the symbolic framing of technology.

Thus, the combined application of TAM and DoI explained much of the variance in customer attitudes toward service robotics in hospitality. While PU and PEU drove basic acceptance, deeper adoption depended on the emotional and contextual fit of the technology. Observability, social influence, and compatibility with hospitality values acted as decisive moderators.

5.4 Practical Implications for the Hospitality Industry

The empirical findings of this study offer a range of practical insights for hospitality firms seeking to navigate the integration of AI-driven service robotics into their operations. These are relevant considering particular dynamics of the industry alluded to above – ongoing labor shortages and the shifting expectations of increasingly digital-savvy customers. Rather than promoting robotics as a one-size-fits-all solution, the data suggested that successful implementation requires a highly contextual, strategically aligned approach.

First, robotics should be positioned as a tool for relieving operational pressure in standardized, low-emotion service contexts. Across both datasets, the clearest use cases emerged in back-of-house and logistical roles, where robots can enhance efficiency without interfering with the core emotional dimensions of hospitality. In such settings, robotic support can improve employee working conditions, reduce physical strain, and free up human staff for more complex or guest-focused tasks. Companies struggling to fill repetitive roles or reduce staff turnover may find substantial value in targeted automation of these functions.

Second, hospitality firms should avoid positioning robotics as a replacement for human interaction in emotionally sensitive guest-facing roles. Although a minority of guests were curious about robotic novelty, the majority still preferred human contact in premium and personalized service settings. The findings showed that emotional disruption and misalignment with service ambiance were key barriers to acceptance. Therefore, any robotic implementation should be carefully assessed in terms of its impact on brand identity, service atmosphere, and guest expectations. In high-touch environments, robotics might be more effective when used as an invisible support layer rather than a visible guest interface.

Third, customer communication played a critical role in driving acceptance. The survey revealed that social visibility and observational learning significantly increased guests' openness to robotic service. Hospitality providers should therefore consider low-risk pilot projects and targeted communication strategies that showcase robotics as a complement to human service, rather than a disruptive force.

Fourth, employee engagement and training were essential to successful integration. Although not directly measured in the customer survey, the expert interviews frequently mentioned staff acceptance as a critical internal barrier. Employees need to understand how robotics will affect their roles, receive adequate technical and procedural training, and be involved early in the implementation process. A participatory rollout strategy could help reduce fear, build trust, and foster a culture of collaboration between human and robotic team members.

Fifth, providers must carefully assess the spatial and technical requirements of robotic systems. Before investing, firms should evaluate infrastructure compatibility, connectivity requirements, and the availability of technical support. In some cases, architectural adaptation or hybrid deployment models may be necessary to enable seamless integration.

Finally, decision-makers should view robotic adoption not merely as a technical upgrade, but as a strategic move that intersects with broader business goals. Firms that adopt robotics without

clear strategic intent, whether for novelty, marketing, or external pressure, risk undermining service coherence and operational stability. Conversely, those who implement robotics in alignment with their brand promise, operational model, and customer expectations are more likely to realize long-term benefits, both in cost efficiency and customer satisfaction.

5.5 Strategic Implications for Managers

The adoption of AI-driven service robotics is not only an operational question but a strategic decision that requires alignment with long-term business objectives, resource structures, and market positioning. The findings of this study provide several key insights for hospitality managers who are considering how and when to invest in robotics within their organisations.

In sum, robotics offers real strategic potential for hospitality firms, but only if it is embedded in a coherent and context-specific approach. Managers should avoid reactive or superficial adoption and instead treat robotics as a component of broader innovation and transformation strategies. Strategic success will depend on timing, operational fit, employee alignment, and the ability to continuously adapt technology to shifting guest expectations and market dynamics.

6 Conclusion

6.1 Final Summary

This thesis explored the adoption of AI-powered service robotics in the German hospitality industry, integrating managerial and customer perspectives. The findings showed that adoption is primarily driven by the need to address labor shortages and increase operational efficiency, especially in standardized and repetitive tasks behind the scenes. Value is created when robotics are strategically integrated into service processes without replacing the human element.

Managers see robotics as a long-term tool to stabilize operations and support staff, but face challenges related to investment costs, spatial constraints, and alignment with emotional service values. Most companies adopt a cautious follower mindset, waiting for proven use cases and clear returns before committing to robotics.

From the customer perspective, PU is high, and ease of use is acceptable, particularly in functional environments such as budget hotels or fast food. However, emotional expectations

remain strong. Guests prefer human interaction in high-end or emotionally rich settings, making robotic acceptance highly context dependent.

Successful implementation depends on aligning technology with brand identity, service ambiance, and guest expectations. Adoption becomes valuable when robotics support rather than substitute personal service. Companies with strong DC and strategic foresight can use robotics to their advantage.

6.2 Theoretical Contributions

This study extends existing scholarship by contextualizing robotics within the German hospitality sector. It derives practical implications from the DC framework by describing how firms can sense technological opportunities like robotics, but their ability to seize and transform can be constrained.

The MBV is supported in that external pressures, such as labor shortages and customer expectations, drive adoption interest. However, the findings also confirmed that market signals alone are insufficient without internal capabilities and strategic alignment.

The study further adds to First-Mover vs. Follower scholarship by revealing that follower strategies dominate, but fast and responsive implementation is key when it comes to robotics.

Finally, it expands TAM and DoI by demonstrating that emotional and contextual factors, such as compatibility with service ambiance and social observability, significantly influenced customer acceptance beyond usefulness and ease of use alone.

6.3 Limitations of the Study

This work has several methodological limitations. The qualitative sample of thirteen expert interviews, while diverse, might not capture the full range of industry views. Similarly, the quantitative survey reflected a relatively young and digitally experienced demographic, which could have influenced the degree of openness toward robotics. In addition, the study measured perceptions at a single point in time, not long-term behavioural outcomes, which limited its predictive scope.

6.4 Directions for Future Research

Future studies should explore the long-term impact of service robotics on guest satisfaction, employee dynamics, and operational performance in real-world hospitality settings. Longitudinal designs could help capture how perceptions and usage evolve over time. Comparative research across countries or cultural settings might also reveal important contextual differences in adoption drivers. Finally, deeper investigation into emotional acceptance and human-robot interaction quality could support more effective integration strategies in guest-facing roles.

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8 Appendices

8.1 Appendix A Interview AH

Albrecht Heine

F1: Could you briefly describe your role and responsibilities in the company?
I work as an independent project developer in the upscale design and boutique hospitality sector. My focus is on the development, construction, and launch of new hotel concepts – from strategic positioning through brand development and design to staff training on site. I support investors and operators from the concept phase through construction or expansion to operational implementation.
F2: Could you describe the type of hospitality or gastronomy services your company offers?
My projects are mainly in the 4- to 5-star segment as well as in lifestyle and boutique hospitality. Here, personal and authentic service takes center stage. The offerings range from high-quality accommodation concepts to culinary formats that strongly emphasize individuality, atmosphere, and interpersonal encounters.
F3: Have you or your company already implemented service robotics or seriously considered it?
Not yet. I have deliberately decided against the use of such technologies, as they contradict my philosophy of a human-centered host. But I closely observe the development and implementation in other hotel concepts – also from the perspective of identifying potentially meaningful future enhancements.
F4: If you have not yet implemented robotics, could you explain why not?
Because I am convinced that real service is created through personality – through empathy, spontaneous reactions, and relationships. Robots cannot currently deliver that. Moreover, implementing them in the properties I manage would break the brand identity. The robots I know of are purely for dish and goods transport. These are not applicable in my concepts.
F5: What role do you think robotics could play in addressing the labor shortage?
In selected areas, such as back-of-house, robotics could certainly provide relief – e.g., with logistical tasks or cleaning. But it cannot truly compensate for the lack of service staff when the goal is personal guest contact.
F6: What types of tasks do you think are most likely to be taken over by robots?
Routine tasks such as luggage transport, possibly room service delivery (impersonal), or cleaning support (back-of-house, kitchen, staff areas, laundry, housekeeping). Also receiving goods, quality control, transport and sorting, as well as inventories. Basically, everything that requires little guest contact but needs to be carried out reliably.
F7: Do you see robotics more as a short-term solution or a long-term strategic tool?
More as a supplement – not as a strategic core tool. In certain operational situations, it might make sense, but the goal must remain to inspire people to join the profession, not to replace them.
F8: Do you believe robotics could help you differentiate from competitors or reduce costs?
Possibly reduce costs – in large, highly standardized operations. But in my world, differentiation is more about atmosphere, design, personality, and storytelling – robotics doesn't really offer a competitive advantage there.
F9: How important is it for your company to be among the first to adopt new technologies like robotics?
I am open to innovation, but not at any cost. Technology must fit the concept. I see no added value in simply being the first – but rather in being the right fit for the target audience.
F10: What do you see as the biggest internal challenges in implementing robotics?

Cultural fit. The integration of robots changes processes, teams, and ultimately guest expectations. That has to align with the brand, the story, and the property's aspirations. Moreover, it's often difficult to convince both employees and guests.
F11: From a customer perspective: do you perceive acceptance or resistance toward robot-assisted service?
Among my target group, there's more skepticism. Guests value authenticity, want to be understood and treated individually. A robot is often more of a foreign element. Comparable to a chatbot in customer service. Individual inquiries can't be answered and lead to frustration.
F12: Are there external barriers such as data protection regulations, investment costs, or unclear profitability that make the implementation of robotics more difficult?
Yes, particularly the cost-benefit question remains unresolved. Investments are high, ROI is uncertain. Data protection – especially with camera-based systems – is also a critical issue, especially in Germany.
F13: How do you see the role of robotics evolving in the hospitality industry over the next 5–10 years?
I think it will increase – especially in standardized chain hotels or in the economy segment. There it can make processes more efficient. In individual, design-focused properties with high standards of atmosphere, it will likely remain marginal.
F14: Do you think robotics will become a standard component in hospitality or remain a niche product?
For certain segments: standard. For others: niche. It will strongly depend on the kind of guest experience one aims to deliver. Those who focus on human connection will never fully switch to robotics.

8.2 Appendix B Interview BH

Boy Hoff

F1: Could you briefly describe your role and responsibilities in the company?
I am the owner and co-manage the operation. We run a campsite on the Baltic Sea with about 500 pitches. This includes an in-house restaurant with around 120 seats – breakfast, lunch, coffee and cake, as well as dinner. We try to make everything ourselves, including baking the cakes. My area of responsibility covers the overall management of operations, staff, offerings, and quality assurance.
F2: Could you describe the type of hospitality or gastronomy services your company offers?
We offer classic camping holidays – but on a modern level. Our target audience is families with children, but also older couples. The gastronomy is intentionally down-to-earth: bread roll service, breakfast, lunch dishes, cake, and warm meals in the evening. All of this is embedded in a natural yet professionally managed environment with high standards of service and cleanliness.
F3: Have you or your company already implemented service robotics or seriously considered it?
Yes, we have considered it. I gathered information at the trade fair in Husum – there were providers presenting robots as support in the service area.
We even tested a device but found that it wasn't practical for our structure and operational processes. Our walking distances are too short, and the movement areas are too tight – making it inefficient for robots.
F4: If you have not yet implemented robotics, could you explain why not?
The main reason is that it's simply not worthwhile in our operation. The distances in our restaurant are too short, the space too confined – a robot would barely be able to maneuver

around corners. In addition, we have a very family-oriented concept that relies on personal contact. A robot would be more of a disturbance than a help. It might make sense in larger properties with long distances – but it doesn't fit our setup.
F5: What role do you think robotics could play in addressing the labor shortage in your company or the industry in general?
In principle, I see potential – especially in the kitchen or for dishwashing, meaning support tasks. But: the technology would need to be much more advanced. Currently, robotics is only suited for highly standardized processes. In the service area, where a lot of interpersonal communication is required, it's not a solution in my view. But if it worked reliably, robotics could provide relief – for example in clearing tables or transport.
F6: What types of tasks do you think are most likely to be taken over by robots?
Tasks that don't require direct communication with guests:
Washing dishes, transporting plates, clearing tables, or perhaps cleaning hallways and sanitary facilities. Anywhere repetitive tasks occur, robotics could be useful. But as soon as it comes to individual requests or improvisation – such as serving or taking orders – humans are unbeatable.
F7: Do you see robotics more as a short-term solution or a long-term strategic tool?
If anything, then long-term. In the short term, I see no benefit – the technology is still too immature and expensive. In the long term, it could help automate simple tasks, but only where processes are highly standardized. For our individual, family-focused operation, it's not a realistic option.
F8: Do you believe robotics could help you differentiate from competitors or reduce costs?
Not really for us. Differentiation through technology doesn't fit our concept – our strength lies in personal, direct contact. Lowering costs? Maybe in theory, but with the current investment costs and limited benefits, I remain skeptical. It might pay off in large operations – but not in ours.
F9: How important is it for your company to be among the first to adopt new technologies like robotics?
Not important at all. We don't need to be pioneers – we rely on proven processes and personal closeness. If something becomes established and really works, we'll take a look. But we don't want to be guinea pigs. We prefer to wait until the technology is mature and practical.
F10: What do you see as the biggest internal challenges in implementing robotics?
Definitely: space and structural conditions. Our restaurant is tightly laid out – a robot can't navigate it properly. Also: the staff would need to adapt and be able to handle the technology. Our guests don't expect high-tech – they expect warmth – that would be a cultural disconnect.
F11: From a customer perspective: do you perceive acceptance or resistance toward robot-assisted service?
I believe most would be rather skeptical. Our guests come for the atmosphere, the conversations, the personal contact. A robot delivering bread rolls would not be seen as progress but as a loss. Maybe younger target groups might be curious – but not our audience.
F12: Are there external barriers such as data protection regulations, investment costs, or unclear profitability that make the implementation of robotics more difficult?
Yes, absolutely. The investment costs are disproportionate to the benefit – at least for an operation our size. Also, maintenance, updates, and potential repairs are off-putting. I don't see data protection as a major issue – but profitability is the key. It has to be financially viable – and currently it's not.
F13: How do you see the role of robotics evolving in the hospitality industry over the next 5–10 years?
It will increase, especially in larger operations or standardized hotel chains.
There, it makes economic and logistical sense. But I don't think it will become widespread –

the industry is too diverse. It will remain a complementary tool, not a dominant standard.
F14: Do you think robotics will become a standard component in hospitality or remain a niche product?
I think it will remain a niche product. It might make sense for specific applications in large hotels or urban areas – but not broadly. In rural, family-run businesses, personal contact is key – and robotics simply doesn't fit the concept. It will come, yes – but not everywhere.

8.3 Appendix C Interview DD1

David Depenau

F1: Could you briefly describe your role and responsibilities in the company?
As spokesperson of the management board, I oversee the entire operational area. I'm responsible for all operational departments of the holiday park.
F2: Could you describe the type of hospitality or gastronomy services your company offers?
I'd describe it as holiday hospitality. That's the best overarching term for it.
F3: As I've heard, you already use service robots for food-related tasks in your operation. Could you briefly describe how this works and how it's integrated into daily operations?
We use clearing robots – not for delivery, but for collecting dishes. The robot runs fixed routes in the "Möwenbräu" restaurant during breakfast and dinner at the buffet. Staff place dishes on it, the robot drives to the kitchen and returns empty. This saves walking distances. We also have self-check-in kiosks at reception. Guests can choose between using those or checking in with staff.
Follow-up: How was the implementation organized – was there a pilot phase or any special team preparation?
There was no formal staff training. The technical setup, however, was significantly more complex – especially the test phase, route definition, and various workflow adjustments. We were early adopters and involved as experimental partners because there were hardly any comparable applications in Germany at the time. The technology was essentially still in beta – it was literally in its infancy. We are generally very open to such developments and consciously use our scale to practically test new approaches.
F4: Were there any initial concerns or arguments against the use of robots? If so, how did you address them?
A general argument against service robots is, of course, the relatively high purchase cost. That's likely to deter many smaller hospitality businesses, which often lack the financial capacity. In those cases, owners tend to rely on lower-paid temp workers – sometimes informally or off the books. Such flexible human labor is cheaper in the short term than a robot costing €8,000, €10,000, or even €15,000, which only pays off over time with continuous use. It was a consideration for us as well, but in the end we said: Let's just try it. We started with one unit and learned from experience – trial and error. Once we saw it worked, we bought more. Naturally, we calculated the return on investment beforehand, and the providers also offer estimates – for example, how many work hours can be saved, multiplied by minimum wage, and so on.
F5: What role do you think robotics could play in addressing the labor shortage in your company or in the industry in general?
The challenge isn't just a shortage of skilled workers, but a general shortage of labor – and that's often overlooked in public debates. Most positions in our sector don't require formal qualifications. The biggest need is for general labor, and recruiting in that area is especially difficult. Immigration of low-skilled workers is heavily regulated, with political hurdles and resistance making it difficult to bring in workers from abroad – even though the industry urgently needs them. This is where service robots can provide real relief. They can take over

tasks that are becoming increasingly hard to staff. AI can also help – with tasks like reservations or handling basic written communication.

F6: What types of tasks do you think are most suitable for robots?

Robots are particularly well-suited for standardized tasks like clearing tables, serving food, or handling check-in processes. There are also cooking robots now – but those systems are very expensive and not economical for most businesses. In general: many things can be automated if solutions are well integrated. But not every business size is suitable. Smaller businesses often can't afford comprehensive robotic systems. Plus, the demands vary depending on the hospitality model. In holiday hospitality like ours, we're not just selling overnight stays – we're selling emotions. In classic star hotels, luxury is part of the experience – for us, it's about the vacation feeling and personal atmosphere. To credibly convey those emotional components, human interaction is essential in service. Robotics must be applied in a targeted and context-sensitive way. One example in our business is the self-check-in: alongside the traditional reception, we offer kiosks where guests can check in independently. Many guests like this because they can get settled quickly without waiting. In this context, robotics offers real value – for the business and for the guests.

F7: Do you see robotics more as a short-term solution or a long-term strategic tool?

For us, the use of robots is clearly a long-term decision. Once a robot is implemented, it usually isn't replaced by a human again. Robots don't get sick, take vacation, or experience burnout – they provide reliable, predictable performance. A major catalyst for exploring these technologies more deeply was the COVID-19 pandemic. The crisis massively worsened staffing issues and pushed many businesses to the brink. Since then, the personnel situation has continued to deteriorate, with many workers having left the industry for good. Against this backdrop, automation is becoming increasingly important.

F8: Do you believe robotics could help you differentiate from competitors or reduce costs?

I don't see service robots primarily as a differentiator – many businesses, especially larger ones, are already using this technology. The real benefit lies in long-term cost reduction. Once the investment has paid off, robotics becomes very economically attractive – especially with rising wages. Just last year, new wage agreements noticeably increased labor costs, and that trend is likely to continue. In contrast, a robot incurs fixed, predictable costs after implementation. Its lifespan is foreseeable, and there's no downtime from illness or vacation. That makes it highly appealing from a business perspective.

F9: How important is it for your company to be among the first to adopt new technologies like robotics?

Very important. For example, we were also early participants in autonomous shuttle projects. It's not about prestige – it's about flexibility and the ability to respond quickly to change. To stay competitive, you have to be innovative, and you can't be innovative if you're the last to adopt new technologies.

F10: What do you see as the biggest internal challenges in implementing robotics?

The biggest challenge was getting the technology to run reliably. Integration into operations had to be smooth. For staff, it wasn't a problem. So, the main issue was operational execution.

F11: From a customer perspective: do you perceive acceptance or resistance toward robot-assisted service?

Mostly enthusiasm. Kids especially love the robots – design matters; they're like little R2D2s. As long as it's packaged charmingly, guests see it as a bonus, not a drawback.

F12: Are there external barriers like data protection regulations, investment costs, or unclear profitability that make it difficult to implement robotics?

Yes, investment costs are high. One device costs €8,000–€15,000. That scares off smaller businesses. Data protection wasn't an issue for us, as the robots don't process sensitive data.

F13: How do you see the role of robotics evolving in the hospitality industry over the next 5–

10 years?
I'm convinced the use of robotics will continue to grow – but even greater potential lies in artificial intelligence, beyond just robotics applications. We already use AI in many internal processes, like writing promotional texts or handling standard tasks. Just recently, we decided to give staff from various departments access to ChatGPT – this initiative actually came from the teams themselves. The feedback has been consistently positive. AI tools clearly help us save time, personnel resources, and ultimately reduce costs.
F14: Do you think robotics will become a standard component in hospitality or remain a niche product?
I believe robotics will remain more of a niche solution in hospitality. Many smaller businesses simply lack the space, budget – and often the need. Our sector relies heavily on low-skilled labor, which can be more easily replaced by other people. In industry, it's different: a robot replacing a Mercedes worker is taking over from a highly skilled, highly paid professional – so the investment pays off much faster. In hospitality, however, robots are often too costly, spatially impractical – and above all: personal contact between guest and staff is key. That human element can't easily be replaced by technology.

8.4 Appendix D Interview DD2

David Deilmann

F1: Could you briefly describe your role and responsibilities in the company?
I am the founder and owner of the Factory Hotel.
F2: Could you describe the type of hospitality or gastronomy services your company offers?
The Factory Hotel is a privately run design and boutique hotel with 144 rooms.
We have several gastronomic concepts on-site, operated by different leaseholders. So the gastronomy is not run in-house, but is part of a broader network on the premises. The focus is clearly on high-quality urban lifestyle with a strong architectural concept.
F3: Have you or your company already implemented service robotics or seriously considered it?
Currently, we do not use any service robotics, but we are observing developments with interest. We've already been in contact with relevant manufacturers and have considered whether implementation in the restaurant or housekeeping areas would make sense. However, we haven't committed to a specific solution yet – mainly because we want to critically assess the actual benefits first.
F4: If you have not yet implemented robotics, could you explain why not?
On the one hand, because we haven't been able to fully weigh the investment costs against the actual added value. On the other hand, our operational structure doesn't easily lend itself to robot-assisted workflows – the architecture, in particular, poses certain challenges. And to be honest: we're skeptical whether our guests would even perceive such technologies as an improvement.
Personal contact is extremely important to us.
F5: What role do you think robotics could play in addressing the labor shortage in your company or the industry in general?
In certain areas – like housekeeping or breakfast service – robotics could certainly help alleviate the burden. But we shouldn't forget: the labor shortage primarily affects qualified staff, and that's where robots quickly reach their limits. For repetitive, simple tasks, it might be a solution.
But it won't replace a dedicated team – at best, it can support one.
F6: What types of tasks do you think are most suitable for robots?
Transport tasks – for example, moving dishes from the breakfast area to the dishwashing

station – or simple cleaning jobs in hallways. Maybe even basic room cleaning, like vacuuming or mopping – but not fully. Anything standardized and without direct guest interaction is theoretically possible.
But as soon as emotion, communication, or improvisation is involved, humans are unbeatable.
F7: Do you see robotics more as a short-term solution or a long-term strategic tool?
Long-term – if at all. I don't see real short-term benefits, as the technology is still too expensive and not mature in many areas. In the long run, it could become a strategic tool – especially in areas with standardized processes.
But it must fit the concept and must never come at the expense of the guest experience.
F8: Do you believe robotics could help you differentiate from competitors or reduce costs?
Differentiation – maybe, temporarily. But once others follow, the effect is gone. Cost reduction? That strongly depends on the area. In housekeeping or logistics, you might gain efficiency in the medium term. But the investment is high – it really has to be calculated carefully.
F9: How important is it for your company to be among the first to adopt new technologies like robotics?
Not particularly important. We like to observe trends and stay open – but we don't need to be the first. For us, it's about functionality, not innovation for its own sake. If something proves itself and truly fits, we'll take a serious look – but not before.
F10: What do you see as the biggest internal challenges in implementing robotics?
Technical integration – meaning architectural constraints and interfaces with existing infrastructure. Then there's staff training and the general handling of new tech in day-to-day operations. Another issue is team acceptance – no one should feel replaced. The introduction must be handled sensitively, otherwise it won't work.
F11: From a customer perspective: do you perceive acceptance or resistance toward robot-assisted service?
Very mixed. Younger guests or business travelers are often open-minded or curious. But especially in leisure travel or among older guests, there's a lot of skepticism. Some find robots impersonal or even disruptive – especially when it comes to service and hospitality. Acceptance depends heavily on the area of use and the type of guests.
F12: Are there external barriers like data protection regulations, investment costs, or unclear profitability that make it difficult to implement robotics?
Yes – mainly the high investment costs and unclear profitability. Often, it's hard to know how reliable the technology will be or how much support it will require. Data protection isn't a major issue for us, since we wouldn't process sensitive data through robots.
But without a clear business case, it's hard to justify the decision.
F13: How do you see the role of robotics evolving in the hospitality industry over the next 5–10 years?
I think it will increase – but not across the board. In chain hotels, with standardized processes and large operations, robotics can become a useful addition. In more individualized concepts or places with a strong focus on personal service, I remain skeptical. The development will be selective and highly dependent on the specific operation.
F14: Do you think robotics will become a standard component in hospitality or remain a niche product?
I believe it will remain a niche product for now – at least in traditional hospitality. In certain segments, such as system gastronomy or budget hotels, it might catch on. But for individual properties with a strong focus on personal service, it's more of a complementary tool than a replacement. A widespread standard is not foreseeable.

8.5 Appendix E Interview FH

Ferdinand Hanika

F1: Could you briefly describe your role and responsibilities in the company?
I was Director of Rooms and Hotel Manager in various five-star hotels. I was responsible for accommodations, room sales, front desk, housekeeping, concierge, guest relations, lobby management, and transport.
F2: Could you describe the type of hospitality or gastronomy services your company offers?
It was high-end hospitality with up to 1,000 rooms, multiple restaurants, luxury suites, butler service, and over 10,000 employees – classic five-star segment.
F3: Have you or your company already implemented service robotics or seriously considered it?
No, not really. The only example was an automated minibar that registered when a guest removed a drink.
F4: If you have not yet implemented robotics, could you explain why not?
In five-star hospitality, guests expect personal interaction. They want to speak with real people – which largely excludes robotics in front-of-house operations.
F5: What role do you think robotics could play in addressing the labor shortage in your company or in the industry in general?
A very large one. Robotics can support almost all areas – from check-in to concierge, minibar, cleaning, and security. This will be more relevant in four-star hotels and below than in luxury hospitality.
F6: What types of tasks do you think are most suitable for robots?
Room service, minibar restocking, room cleaning, security services, check-in/check-out, concierge tasks, and transport – basically all standardized tasks.
F7: Do you see robotics more as a short-term solution or a long-term strategic tool?
Definitely long-term. The initial investments are high, but robotics will become established over time.
F8: Do you believe robotics could help you differentiate from competitors or reduce costs?
Both. In countries with high labor costs like Germany, cost reduction is a strong driver. In other regions, robotics could also serve as a differentiation feature.
F9: How important is it for your company to be among the first to adopt new technologies like robotics?
The hotels I worked for were usually first movers in terms of new technology – although robotics wasn't taken seriously at the time. That has changed today.
F10: What do you see as the biggest internal challenges in implementing robotics?
Uncertainty about how guests, employees, and works councils will react. There are many questions and fears around new technologies, which only diminish over time.
F11: From a customer perspective: do you perceive acceptance or resistance toward robot-assisted service?
In five-star hospitality: clearly resistance. Human interaction is what counts there. In three- or four-star hotels, however, acceptance is significantly higher.
F12: Are there external barriers like data protection regulations, investment costs, or unclear profitability that make it difficult to implement robotics?
Yes – the biggest obstacle is often the works council. They are frequently skeptical about technological innovations. Also, investment costs and uncertain ROI are major concerns.
F13: How do you see the role of robotics evolving in the hospitality industry over the next 5–10 years?
Robotics will be introduced on a large scale first in tourism hubs like the USA and Dubai. Europe and Germany will follow. Major hotel chains will lead, with smaller properties joining

in later.
F14: Do you think robotics will become a standard component in hospitality or remain a niche product?
It will become standard – especially in two- to four-star hotels. In five-star hotels, it will remain in the back office, mostly invisible to guests.

8.6 Appendix F Interview JF

Jörg Fischer

F1: Could you briefly describe your role and responsibilities in the company?
As owner and managing partner, I'm involved in both core areas of our company. This leads to a strong focus on creating synergies – at the heart of which is the combination of gastronomy with service robotics. Other robotics areas include cleaning, logistics, and marketing.
F2: Could you describe the type of hospitality or gastronomy services your company offers?
We originally come from running ice cream cafés. Since the roots of our current company lie in executing a wide variety of gastronomic concepts, we are also passionate about other areas – for example, supplying restaurants with our gastro-style gelato. For this purpose, we developed a filling line using the same recipe as our traditional scooped ice cream.
F3: Have you or your company already implemented service robotics or seriously considered it?
As an early pioneer in deploying service robotics in our own cafés, we have since developed and continuously implemented concepts for other gastronomic establishments as well. This has led us to become Best PUDU Partner in 2022, 2023, and 2024 – a close collaboration with the global market leader in service robotics is extremely important to us.
F4: If you have not yet implemented robotics, could you explain why not? If you have, were there initial concerns or arguments against it? If so – how did you address them?
See above – however, we are constantly working to lower the acceptance threshold, especially in Germany, and to establish robotics as a permanent part of gastronomy, hospitality, and healthcare.
F5: What role do you think robotics could play in addressing the labor shortage in your company or in the industry in general?
Service robotics is at the core of our efforts to respond to the skilled labor shortage. Without this option, reopening our cafés after the pandemic wouldn't have been possible. In addition, robotics greatly relieves staff, enhances communication possibilities with guests, and increases the potential for upselling.
F6: What types of tasks do you think are most suitable for robots?
As much as possible or as little as necessary – with the right concept, which we develop, a wide variety of requirements can be addressed. Repetitive tasks, heavy lifting and carrying, overnight cleaning, or marketing interaction with guests and customers are strong examples. We're working to extend these concepts to other fields – in the long term, emotional communication will likely play a role too, especially in healthcare.
F7: Do you see robotics more as a short-term solution or a long-term strategic tool?
Always as a long-term strategy to relieve people and improve the quality of the work environment. Our concepts are always central to our approach – and that gives us a crucial edge over competitors.
F8: Do you believe robotics could help you differentiate from competitors or reduce costs?
As mentioned, the potential for cost reduction is a key factor. However, improving the work environment – in an increasingly competitive labor market – is also a major strategic advantage.

F9: How important is it for your company to be among the first to adopt new technologies like robotics?
Originally born out of necessity, we're proud of our pioneering role in this area of technology. As early adopters, we can actively shape the direction of robotics – for example, through our own product development and hardware quality control.
F10: What do you see as the biggest internal challenges in implementing robotics?
Definitely the willingness of businesses to rethink workflows and take a step into a future-oriented work culture. Our customized concepts make that step as easy as possible. Once robotics is successfully implemented, staff are quickly convinced of its benefits. We rely heavily on our experience in our own cafés – we don't introduce anything to the market that we don't use ourselves.
F11: From a customer perspective: do you perceive acceptance or resistance toward robot-assisted service?
This definitely depends on the type of gastronomic setting. In our cafés, direct contact with guests quickly demonstrated added value. In restaurants where guest interaction is more central, supportive measures are advisable – none of our concepts ever aim to eliminate human contact unless there's a clear advantage in doing so.
F12: Are there external barriers like data protection regulations, investment costs, or unclear profitability that make it difficult to implement robotics?
Investment costs are transparent and manageable thanks to our concepts and financing options. Data protection guidelines are always adhered to, as we use European servers and minimal sensor systems.
F13: How do you see the role of robotics evolving in the hospitality industry over the next 5–10 years?
Due to a trend of people leaving the hospitality industry, we will increasingly see the use of service robotics. This will help make workplaces more attractive again. Employee satisfaction is a key part of every one of our concepts.
F14: Do you think robotics will become a standard component in hospitality or remain a niche product?
As mentioned – we are convinced that the added value for both businesses and employees is clear. Cost control and work quality form a symbiosis that will evolve into a new standard.

8.7 Appendix G Interview JM

Jan Peter Marxen

F1: Could you briefly describe your role and responsibilities in the company?
In my previous role in catering, I was involved both organizationally and operationally – I managed processes, delegated tasks, and oversaw the business administratively. Being personally visible to customers was always important to me, as personal contact is essential in gastronomy.
Currently, I work in the wine trade – we import and export wines, run our own wine shops, and sell both online and to the hospitality sector. That means many different sales channels, all centered around wine. Over the years, I've also run various gastronomic operations, including restaurants and bistros.
F2: Could you describe the type of hospitality or gastronomy services your company offers?
At present, I operate in the wine trade – active in import and export, with brick-and-mortar shops, an online store, and supply services for hospitality businesses. In the past, I also worked in catering and managed several gastronomic establishments myself, including restaurants and bistros. So overall, we offer a broad range of services in the food and enjoyment sector, directly connected to gastronomy, though currently not involving hotel

operations.
F3: Have you or your company already implemented service robotics or seriously considered it?
We haven't implemented service robotics yet, but we have seriously considered it. Specifically, we've developed a concept for a staff-free "smart store" in the wine sector: the idea is that customers can digitally authenticate themselves, enter the store autonomously, and sample wines – supported by AI that provides recommendations based on their user profile. This system would run without staff and be driven by technology. The concept is closely tied to our existing wine shop "25 Wein," which already offers a curated, streamlined product range.
F4: If you have not yet implemented robotics, could you explain why not?
The reasons are mainly operational. Our current business models are working very well, so there's no immediate pressure to change anything. We see the smart store concept more as a playground or future option – an experimental field, just like our "25 Wein" shop. We're definitely interested in such technologies, but haven't yet seen a compelling need for implementation.
F5: What role do you think robotics could play in addressing the labor shortage in your company or in the industry in general?
I see robotics as a sensible solution in gastronomy – particularly in environments like canteens or system catering, where workflows are standardized. Cooking systems or automated dispensing stations could help overcome staffing shortages. Especially in businesses operating around the clock, there's great potential. For classic dining concepts with strong guest interaction, it's more difficult – but for standardized processes, robotics is a realistic option.
F6: What types of tasks do you think are most suitable for robots?
Everything that happens behind the scenes – support roles in service or the kitchen. For example, clearing plates, simple prep work, or repetitive tasks that don't involve direct guest contact. Personal interaction remains vital, especially in high-end settings. But robotics can relieve staff and allow them to focus more on guests.
F7: Do you see robotics more as a short-term solution or a long-term strategic tool?
Definitely a long-term strategic tool. In the short term, I only see limited benefits, as many systems are not yet mature and require high upfront investment. But looking ahead – particularly when the technology becomes more stable – robotics can ease the workload, increase efficiency, and support operations strategically.
F8: Do you believe robotics could help you differentiate from competitors or reduce costs?
I think the biggest potential lies in reducing costs. If robotics is well programmed, it can carry out standardized processes with fewer errors – more efficiently than human labor. At the same time, it can enhance product quality by making operations more precise. Differentiation from competitors might work in the short term, but long term it's more about efficiency and economic viability.
F9: How important is it for your company to be among the first to adopt new technologies like robotics?
For us, being among the first is not important. We observe new developments with interest but don't jump on every trend. Only once a technology is tested, works well, and fits our system do we consider implementation. For us, it's not about being innovation leaders – it's about practicality and relevance.
F10: What do you see as the biggest internal challenges in implementing robotics?
The biggest challenge is team acceptance. As management, you need to sensitively introduce the topic, reduce fears, and clearly communicate the benefits. Many see robotics initially as a threat – so it's essential to show that it's meant to support, not replace. A positive work

culture is crucial, and new technologies must be introduced carefully.
F11: From a customer perspective: do you perceive acceptance or resistance toward robot-assisted service?
In my area – especially with wine – I perceive more hesitation or skepticism. Many find robotics inappropriate or unromantic in such indulgence-driven environments. That's why I would only use robotics discreetly and in the background – without making it a big talking point. Acceptance may grow over time, but right now, for many customers it doesn't fit the emotional character of a wine experience.
F12: Are there external barriers like data protection regulations, investment costs, or unclear profitability that make it difficult to implement robotics?
Yes, absolutely. The cost-benefit ratio has to make sense. For small, simple applications – like a robot that sorts towels – it might be economically viable. But for large, complex systems, the investments are enormous, and profitability hard to predict. At present, our company isn't large enough to implement such solutions economically. But for the future, I see gradual, small-scale implementations as realistic and meaningful.
F13: How do you see the role of robotics evolving in the hospitality industry over the next 5–10 years?
I'm convinced that robotics will increase significantly in hospitality. Especially in kitchens and support roles in service, it will continue to gain ground. It's a logical development – similar to when tablets were first introduced as digital wine lists in fine dining, which seemed unthinkable just a few years ago. The ongoing labor shortage will only accelerate this trend.
F14: Do you think robotics will become a standard component in hospitality or remain a niche product?
I believe robotics will definitely become standard in certain areas – particularly in the kitchen and in supportive service functions. It may not always be visible to guests or used for direct interaction, but as a technological aid, it will become widely accepted. The more mature the systems become, the more robotics will be accepted in areas where it still feels unusual today.

8.8 Appendix H Interview KH

Kerstin Hirschberg

F1: Could you briefly describe your role and responsibilities in the company?
I was the owner of Perdoeler Mühle, but I have since leased out the business.
F2: Could you describe the type of hospitality or gastronomy services your company offers?
It is a restaurant and café offering breakfast, coffee and cake, and à la carte dishes – all in a historic setting with a large garden terrace.
F3: Have you or your company already implemented service robotics or seriously considered it?
We considered implementing clearing robots, but ultimately decided against it.
F4: If you have not yet implemented robotics, could you explain why not?
Our opening hours are not continuous, so the robot wouldn't be in constant use. That would extend its lifespan but limit its utility. More importantly, our guests come for the atmosphere and personal service – a robot that fully replaces a server just doesn't fit.
F5: What role do you think robotics could play in addressing the labor shortage in your company or in the industry in general?
A big one. Especially for tasks without direct guest contact – like clearing tables or dishwashing. That relieves staff, particularly from physically demanding tasks, and makes the workplace more attractive. It can help with employee retention.
F6: What types of tasks do you think are most suitable for robots?
As mentioned: clearing robotics, kitchen assistants, and even cooking robots – depending on

the concept. In hotels, check-in systems too – especially in operations focused more on convenience than personal service.
F7: Do you see robotics more as a short-term solution or a long-term strategic tool?
Definitely a long-term strategic tool. It can help relieve staff and offset shortages. For example, faster clearing increases table turnover – and therefore occupancy.
F8: Do you believe robotics could help you differentiate from competitors or reduce costs?
Mainly in cost reduction. I see less potential for differentiation. I don't believe most guests would see robotics as a "wow" factor.
F9: How important is it for your company to be among the first to adopt new technologies like robotics?
Not important. We evaluate technologies and then decide whether they suit our concept and offer real benefits. Being a first mover is not our goal.
F10: What do you see as the biggest internal challenges in implementing robotics?
The technology must function reliably. Also, especially in rural areas, technical support is often lacking.
F11: From a customer perspective: do you perceive acceptance or resistance toward robot-assisted service?
In concepts where robotics is well integrated – such as pizza-making robots or clearing assistants – it is well received. In other areas, it can be more problematic.
F12: Are there external barriers like data protection regulations, investment costs, or unclear profitability that make it difficult to implement robotics?
That depends on the type of robotics. The investment has to be worthwhile – but if the cost-benefit calculation makes sense, data protection isn't a major hurdle.
F13: How do you see the role of robotics evolving in the hospitality industry over the next 5–10 years?
Its use will increase. Robotics will become standard in many supporting tasks.
F14: Do you think robotics will become a standard component in hospitality or remain a niche product?
In certain segments, it will become standard. If I'm paying a lot of money for a hotel or restaurant, I expect good service. But in concepts focused on efficiency, robotics can clearly provide added value – even for the guest.

8.9 Appendix I Interview LO

Louis Oeyenhausen

F1: Could you briefly describe your role and responsibilities in the company?
I founded and run a small catering business. I employ one chef and one server. Before that, I studied Culinary Arts and Management at the Institut Paul Bocuse in France and worked at the two-star restaurant Tantris in Munich as well as a Bib-Gourmand venue in Lyon.
F2: Could you describe the type of hospitality or gastronomy services your company offers?
I provide private catering – I go to clients' homes and offer exclusive dinners for up to 15 guests, usually three to five courses.
F3: Have you or your company already implemented service robotics or seriously considered it?
Not in the service area of my business specifically, but I've been researching and preparing in the broader context of AI.
F4: If you have not yet implemented robotics, could you explain why not?
My business is very small – we serve a maximum of 15 guests. At this scale, there are currently no practical robotics solutions, and large investments wouldn't pay off.
F5: What role do you think robotics could play in addressing the labor shortage in your

company or in the industry in general?
I think robotics could play a role especially in kitchens – particularly in prep work, like mise en place. Robots can relieve or even replace chefs for simple, repetitive tasks.
F6: What types of tasks do you think are most suitable for robots?
Fixed processes like cutting vegetables – if the task is standardized, a robot can do it better and faster than a chef. Especially for repetitive tasks, it's highly efficient.
F7: Do you see robotics more as a short-term solution or a long-term strategic tool?
Definitely as a long-term strategic tool.
F8: Do you believe robotics could help you differentiate from competitors or reduce costs?
Both. I believe robotics will become widespread in the long run. Whether it helps with differentiation depends on the concept. But cost reduction – that's a given.
F9: How important is it for your company to be among the first to adopt new technologies like robotics?
It's not important to me. I'm not a pioneer – I prefer to wait and see how things develop.
F10: What do you see as the biggest internal challenges in implementing robotics?
Financing is a major hurdle. In my case, the high degree of customization in operations also makes it difficult – programming robots for so many different tasks would be too complex.
F11: From a customer perspective: do you perceive acceptance or resistance toward robot-assisted service?
I think robotics is accepted as a support tool. But for me personally, direct contact with the guest is essential – that can't be replaced.
F12: Are there external barriers like data protection regulations, investment costs, or unclear profitability that make it difficult to implement robotics?
Data protection isn't an issue for me – but investment costs definitely are. That's the biggest hurdle.
F13: How do you see the role of robotics evolving in the hospitality industry over the next 5–10 years?
Clearly growing. I find the topic very exciting, especially for specialized, simplified restaurant concepts – like porridge or pasta shops with a limited menu.
F14: Do you think robotics will become a standard component in hospitality or remain a niche product?
In the long term, robotics will become a standard component.

8.10 Appendix J Interview ML

Marco Lass

F1: Could you briefly describe your role and responsibilities in the company?
I run two hotels in St. Peter-Ording. About ten years ago, we had 30 employees – now we have 12.
One of the properties is a breakfast hotel where our robot "Püppi" is used.
F2: Could you describe the type of hospitality or gastronomy services your company offers?
We operate two vacation hotels – one with a restaurant and one Hotel Garni, which only serves breakfast. "Püppi" supports the breakfast service in that hotel.
F3: As I've heard, you already use service robots in food service. Could you describe how this works and how it's integrated into daily operations?
"Püppi" is purely a clearing robot and is used exclusively during breakfast.
She follows pre-programmed routes and collects dishes from guests.
We've customized her: instead of the default computer voice, she speaks with my wife's voice – and she makes guests smile with funny lines like "Oops, I need work, give me some dishes!"

On birthdays, we decorate her, she brings cake, and sings “Happy Birthday.”
Follow-up: How was the implementation organized – was there a pilot phase or special team preparation?
Setup took about two days with help from a technician. At first, there were technical problems – now the technician only comes once a year for maintenance.
F4: Were there initial concerns or arguments against the decision? If so, how did you deal with them?
For us, it was a spontaneous decision: saw it – loved it – bought it.
However, I know three businesses in the region that introduced robots and then removed them because they weren’t helpful.
It works well for us because guests have to interact – it significantly relieves our team. About 98% of guests are thrilled and even ask, “How’s Püppi?”
Only 1–2% find it too modern or impersonal – often due to the design. Our customization – with my wife’s voice and friendly phrases – makes her likable.
F5: What role do you think robotics could play in addressing the labor shortage in your company or the industry in general?
As a clearing assistant, definitely helpful. I’m more critical of robotics in guest-facing service – guests expect personality. Check-in is technically feasible, especially with standardized processes.
I see strong potential in back-office roles – we already use vacuum robots in our home and now in the hotel (e.g., in hallways). Window-cleaning robots are also interesting; a neighboring business is already using them. What’s crucial is that staff are trained to work with the technology.
F6: What types of tasks do you think are most suitable for robots?
Clearing – absolutely. It works great for us. Cleaning is also well-suited, like vacuum or window-cleaning robots – but they must be properly configured, and staff trained.
Check-in is “fifty-fifty” – technically possible but limited, since guests often have personal questions.
Table service, I think, is unsuitable – personal interaction is key there.
F7: Do you see robotics more as a short-term solution or a long-term strategic tool?
From today’s perspective, robotics is a long-term solution for us – our experience has confirmed that.
What matters is targeted use. Not every area is suitable, but where it fits, it’s genuinely beneficial.
F8: Do you believe robotics could help you differentiate from competitors or reduce costs?
Robotics definitely helps reduce costs when used appropriately.
We also see an entertainment value for guests – they perceive “Püppi” as a charming addition.
However, robotics can’t replace human interaction, especially in service – that remains a boundary.
F9: How important is it for your company to be among the first to adopt new technologies like robotics?
We don’t need to be the first or the best – it’s about whether the technology fits us. It must be integrable and align with our goals and processes.
Curiosity is good, but functionality matters more than prestige.
F10: What do you see as the biggest internal challenges in implementing robotics?
Getting the technology to work was the biggest challenge at the start.
Our robot was originally set to Chinese – we had to work with a technician in Hamburg, who then contacted someone in Munich.
This shows the lack of qualified personnel to set up or support such systems directly and easily.

Once it works, though, maintenance is minimal.
F11: From a customer perspective: do you perceive acceptance or resistance toward robot-assisted service?
Acceptance is very high – about 98% of guests find the robot likable and even ask, "How's Püppi?"
Only around 1–2% feel it's too modern or impersonal.
We believe personalization is key – using a custom voice, fun messages, and a friendly appearance. That way, "Püppi" is experienced as a delightful addition.
F12: Are there external barriers like data protection regulations, investment costs, or unclear profitability that make it difficult to implement robotics?
We didn't encounter major hurdles. Data protection wasn't an issue since the robot doesn't process sensitive data.
The investment was €10,000 net – comparable to a part-time employee for several months.
We estimate that it paid off after about five months – so economically, it makes perfect sense.
F13: How do you see the role of robotics evolving in the hospitality industry over the next 5–10 years?
In guest-facing service, I remain skeptical – I'm a trained hotel manager and believe that personality and humanity are essential.
But for clearing, cleaning, and possibly check-in, I see real potential.
The development will be selective: where standardization is possible, robotics will make sense – everywhere else, humans are irreplaceable.
F14: Do you think robotics will become a standard component in hospitality or remain a niche product?
A niche product.

8.11 Appendix K Interview OM

Ole Marxen

F1: Could you briefly describe your role and responsibilities in the company?
I am the administrator of Gut Immenhof. I oversaw the development of the entire hotel, including the gastronomy – from planning to execution. Today, I am responsible for managing the entire operation.
F2: Could you describe the type of hospitality or gastronomy services your company offers?
Hotel Gut Immenhof is a 50-room hotel located directly on Lake Kellersee in Malente. We offer a very high standard with individually designed rooms. The overall offering also includes an equestrian center, two restaurants, three farm shops, and a small spa area. So, it's a comprehensive, high-end concept with a rural yet sophisticated character.
F3: Have you or your company already implemented service robotics or seriously considered it?
We don't currently use service robotics, but we have looked into it. At the Internorga trade show in Hamburg, I spoke with several vendors and saw relevant systems. We evaluated whether it might make sense in the restaurant, for example, but ultimately decided against it. In our view, it doesn't fit the concept of our property here in Holstein Switzerland.
F4: If you have not yet implemented robotics, could you explain why not?
Mainly for conceptual reasons. The Melkhus, our main restaurant, would have been a potential place to use it. But we place great importance on personal interaction with our guests – especially in the upscale segment. We found it difficult to integrate robots without undermining the character of the hotel. Even with self-service aids, we said: that doesn't suit us. Personal service is our priority.
F5: What role do you think robotics could play in addressing the labor shortage in your

company or in the industry in general?
I think robotics could be a real relief in cleaning. A friend of mine runs a robotics company that specializes in cleaning robots – and I see real potential there. Whether it's vacuum robots or window-cleaning drones: in such areas, robotics could help replace labor. In the service area, I remain much more skeptical. I don't think it really works there yet.
F6: What types of tasks do you think are most suitable for robots?
Clearly: cleaning tasks. That's the most obvious application to me – vacuuming, window cleaning, simple, standardized tasks with no guest contact. For more complex tasks or those requiring emotional intelligence or communication, I don't think robots are suitable. They might help buffer labor shortages, but they won't replace skilled workers.
F7: Do you see robotics more as a short-term solution or a long-term strategic tool?
I see it more as a long-term strategic solution – if anything. In the short term, it doesn't offer much, as the technology is not yet mature and often causes problems. For example, a restaurant in Grömitz switched completely to robotics but had to close after three months because the software didn't work reliably. In system or fast-food gastronomy, it could work long-term – where speed matters more than guest interaction.
F8: Do you believe robotics could help you differentiate from competitors or reduce costs?
More for cost reduction. I see less potential for differentiation – at least not long-term, as it quickly ceases to be a unique selling point. But in certain areas, robotics can definitely improve efficiency, especially for tasks that tie up a lot of personnel. That said, the investment needs to pay off.
F9: How important is it for your company to be among the first to adopt new technologies like robotics?
Not very important. We take a more conservative approach. We don't adopt innovation just for innovation's sake. We observe new developments with interest but make very deliberate decisions. Our workflows are well established and highly valuable – we don't want to change anything hastily. If something truly fits and proves itself, then we'll look into it more closely.
F10: What do you see as the biggest internal challenges in implementing robotics?
The biggest challenge is technical reliability. If you're investing in such expensive equipment, it really needs to work. That applies to the technology itself, but also to maintenance and support. There needs to be a service network – ideally with local providers who can do repairs and offer support. That's not yet widely available. Many providers are still building up.
F11: From a customer perspective: do you perceive acceptance or resistance toward robot-assisted service?
I think as long as robots work discreetly in the background, most guests wouldn't mind. If, for example, a cleaning robot moves through the building or luggage is transported automatically, that's perfectly fine for most. But as soon as robots start talking to guests or replacing human interaction, it becomes problematic. Personal contact is very important to many people – especially in the upscale segment.
F12: Are there external barriers like data protection regulations, investment costs, or unclear profitability that make it difficult to implement robotics?
Yes – the high investment costs are a major factor. At Internorga, for example, I was told that some robot models – depending on their features – can cost up to €300,000. That's a huge sum, especially if it's unclear how reliable the technology is and how much support it will require. Data protection is less of an issue for us, as we don't process sensitive data via robots.
F13: How do you see the role of robotics evolving in the hospitality industry over the next 5–10 years?
I'm quite sure robotics will become more prevalent – especially in system gastronomy and fast-food settings. Wherever efficiency and speed are the main priorities and personal contact is secondary, robotics can offer real value. In the higher-end segment, it will take longer – but

generally speaking, the technology will continue to grow.
F14: Do you think robotics will become a standard component in hospitality or remain a niche product?
I believe robotics will become a standard – at least in certain segments. In system gastronomy, budget hotels, or wherever processes are highly standardized, it will become the norm. In individually operated properties that focus on personal service, it will likely remain a complementary tool. But overall, I believe: it will become standard, not a niche.

8.12 Appendix L Interview PB

Philipp Brandt

F1: Could you briefly describe your role and responsibilities in the company?
I am the owner and manage the hotel in all its facets – overall management. That includes everything: strategy, staff, finances, operations. Basically, everything that needs to be considered and decided in day-to-day business and beyond.
F2: Could you describe the type of hospitality or gastronomy services your company offers?
We operate two properties with a total of 40 rooms, plus a restaurant. The offering includes breakfast, occasional catering, and events such as conferences and seminars. We are not part of a hotel chain – very individual, located right on the coast, in the leisure hospitality segment. No franchise, more of a niche product.
F3: Have you or your company already implemented service robotics or seriously considered it?
We haven't implemented any service robotics and haven't seriously considered it either. So far, it hasn't been economically or operationally attractive. We're observing the market – but haven't seen any real benefits yet. If anything, we would consider areas like cleaning or transport, not guest-facing roles.
F4: If you have not yet implemented robotics, could you explain why not?
Honestly, it simply doesn't (yet) fit our business size. The ROI is hard to achieve for small properties, and there's a lack of concrete, functional applications that would truly ease our daily operations. We're open-minded, but realistic – gimmicks or PR stunts don't help us. It has to offer a clear operational advantage.
F5: What role do you think robotics could play in addressing the labor shortage in your company or in the industry in general?
There's definitely potential – especially in areas with high turnover or low qualification requirements. Robotics could take over simple, repetitive tasks: cleaning, transport, maybe dishwashing. But the shortage often affects more complex roles – a robot doesn't help there. You have to identify where it really fits – it's not a solution for everything.
F6: What types of tasks do you think are most suitable for robots?
Definitely back-of-house areas: cleaning, simple transport tasks, maybe waste disposal. Kitchen prep or dishwashing would also be conceivable – tasks with low interaction and high repetition. Front-of-house is tricky – that's about emotion, experience, improvisation. A robot can't sense mood or respond spontaneously – that's a human task.
F7: Do you see robotics more as a short-term solution or a long-term strategic tool?
If at all, then long-term. Strategically, robotics would have to be fully embedded in the concept – which (so far) isn't relevant for us, but might be for other business models. There also needs to be acceptance from guests and staff – otherwise it won't work.
F8: Do you believe robotics could help you differentiate from competitors or reduce costs?
Cost savings – maybe, but only from a certain operational size or with serial applications. Differentiation – yes, possibly, but mainly in the short term. Once many are doing it, it's no longer a unique selling point. You need to know why you're doing it – technical enthusiasm

alone isn't enough. It has to make economic and conceptual sense.
F9: How important is it for your company to be among the first to adopt new technologies like robotics?
Not important at all. We're not first movers – we observe, evaluate, and calculate. Technology is only interesting if it offers real benefit. Being an early adopter often comes with risks – we'd rather let others test it first. We prioritize stability over speed.
F10: What do you see as the biggest internal challenges in implementing robotics?
Technical integration – our building isn't designed for it. Then there's team acceptance: it requires education, training, and trust. Also, it must not disrupt ongoing operations – downtime would be critical. And, of course, it has to be easy to use – no one has time for overly complex systems.
F11: From a customer perspective: do you perceive acceptance or resistance toward robot-assisted service?
Mixed. Some would be curious or open – especially younger or tech-savvy guests. But many would be skeptical, especially returning or older guests. For us, personal contact matters – our guests expect human interaction. A robot doesn't (yet) fit that.
F12: Are there external barriers like data protection regulations, investment costs, or unclear profitability that make it difficult to implement robotics?
Absolutely: investment costs and unclear ROI are key factors. For small businesses, it's often just not viable – and the benefit must be real. I don't see data protection as a major issue personally, but of course it must be properly handled. The bigger question is: what's the actual value?
F13: How do you see the role of robotics evolving in the hospitality industry over the next 5–10 years?
It will increase – definitely. Especially in large hotels, chains, or standardized processes. But there will always be businesses that deliberately focus on human interaction. The industry will continue to diversify – robotics will become part of it, but not the new standard for everyone.
F14: Do you think robotics will become a standard component in hospitality or remain a niche product?
I believe it will remain more of a niche product – at least in classic hospitality. It might become standard in large properties with many repeatable tasks or standardized environments. But in places where individuality and personal interaction are key, robotics doesn't really fit. It's more of a complement than a replacement.

8.13 Appendix M Interview PT

Patrick de la Trobe

F1: Could you briefly describe your role and responsibilities in the company?
My wife and I are the owners and manage the hotel together. We divide the responsibilities between us.
F2: Could you describe the type of hospitality or gastronomy services your company offers?
We operate a Hotel Garni – meaning a hotel with breakfast only, no restaurant. We consider ourselves part of the leisure hospitality sector, not business – our guests come for relaxation, not for work.
F3: Have you or your company already implemented service robotics or seriously considered it?
No, we haven't implemented robotics and haven't seriously considered it either. The topic hasn't been relevant for us so far – mainly because we place great value on personal contact, e.g. during breakfast or check-in. That's a core part of our concept and also why many regular guests return. If there were a truly good room-cleaning robot – one that could clean to the

standards my wife sets – we'd jump at it!
F4: If you have not yet implemented robotics, could you explain why not?
Because we're focused on personal interaction. Our guests appreciate the conversation at breakfast, the warm welcome, the direct connection. That's what attracts many regulars. Service here isn't something to be replaced – it's meant to be a real experience.
F5: What role do you think robotics could play in addressing the labor shortage in your company or in the industry in general?
For us personally, it's not an issue – we don't face staffing shortages. But in the industry overall, we see potential – especially for simple tasks like cleaning, dishwashing, or kitchen help. For jobs that few people want to do anymore, robotics could be a useful solution.
F6: What types of tasks do you think are most suitable for robots?
Definitely back-of-house tasks: cleaning, room maintenance, clearing dishes. Anything that doesn't involve direct guest contact would be suitable. Guest-facing service, especially with personal interaction, should remain human-led.
F7: Do you see robotics more as a short-term solution or a long-term strategic tool?
That depends on the type of hotel. For us, it's not really an option – our concept relies on personal service. But for more functional hotels with reduced staff requirements – like business or budget hotels – robotics could be a meaningful long-term tool. It also depends on cost structure and positioning.
F8: Do you believe robotics could help you differentiate from competitors or reduce costs?
Robotics can certainly reduce costs in specific types of operations – especially where personnel costs are high or where savings are targeted. Differentiation is less likely, at least not in traditional hospitality with personal service. But for budget-oriented, highly functional concepts, robotics could be an economic advantage.
F9: How important is it for your company to be among the first to adopt new technologies like robotics?
It's not a goal for us. We don't need to be first – we prefer tried-and-true methods. If the technology works reliably and makes real sense, we'll consider it. But we don't experiment just for the sake of it – it has to fit our operation.
F10: What do you see as the biggest internal challenges in implementing robotics?
The biggest obstacle would be the building itself – it's not designed for robots. You'd need automatic doors, clear pathways, etc. There's also skepticism about the reliability of the technology – even our coffee machine or dishwasher has issues sometimes. That makes us cautious.
F11: From a customer perspective: do you perceive acceptance or resistance toward robot-assisted service?
We believe our guests would mostly resist it. They seek contact, ask for recommendations, enjoy chatting. Robotics doesn't fit our family-like atmosphere.
F12: Are there external barriers like data protection regulations, investment costs, or unclear profitability that make it difficult to implement robotics?
Not for us. Data protection isn't an issue. Investment costs are present, but not the main factor. It really comes down to the lack of benefit for our concept and infrastructure.
F13: How do you see the role of robotics evolving in the hospitality industry over the next 5–10 years?
We believe robotics will increase – it'll become more normal for hotels to use robots in specific areas. The technology is developing rapidly and new use cases are emerging. It will contribute to greater differentiation in the industry – some hotels will embrace automation, others will remain focused on personal service.
F14: Do you think robotics will become a standard component in hospitality or remain a niche product?

I think it will remain more of a niche. For specific concepts – large hotel chains, functional offerings – it might become standard. But it really depends on the concept. Likely, there will be greater differentiation between highly automated hotels and those offering higher levels of personal service.

8.14 Appendix N R-Studio Ordinal Logistics Regression Results

Ordinal Logistic Regression Predicting Perceived Compatibility

==========

Dependent variable:

Compatibility (Q17)

Technology Comfort (Q14) 0.179

(0.165)

Robot Experience (Q8) -0.484

(0.312)

Observability (Q20) 0.258

(0.311)

Age (Q1) -0.119

(0.151)

Education (Q4) -0.019

(0.137)

Income (Q5) -0.030

(0.109)

Perceived Efficiency (Q10) 1.229***

(0.199)

Atmospheric Disruption (Q18) -0.944***

(0.156)

Gender: Female (vs. Male) -0.448

(0.313)

Observations 163

==========

Note: *p<0.05; **p<0.01; ***p<0.001

8.15 Appendix O R-Code

```
rm(list = ls())

# Load packages

library(tidyverse)

library(stargazer)

library(ggthemes)

library(GGally)

library(skimr)

library(corrr)

library(knitr)

library(infer)

library(janitor)

library(haven)

library(ggplot2)

library(tibble)
```

```
library(dplyr)

library(readr)

library(reshape2)

library(lmtest)

library(fixest)

library(MASS)

install.packages("readxl")

library(readxl)

install.packages("sjPlot")

library("sjPlot")


file_path <- "C:/Users/chris/Documents/Unishit/Master/2 Trimester/Business Research Methods/BRM-Labs/Survey_results_excel_values_final.xlsx"

survey_data <- read_excel(file_path)

View(survey_data)


# Entferne die erste Zeile mit den Fragen und setze korrekte Spaltennamen

survey_data_clean <- survey_data[-1, ]  # löscht Zeile 1

colnames(survey_data_clean) <- survey_data[1, ]  # ersetzt Spaltennamen durch Fragen


# Umbenennung aller 34 Spalten (Frage 1 bis 29, inkl. gesplitteter Frage 22 mit 6 Items)

colnames(survey_data_clean) <- c(

 "Q1_age", "Q2_gender", "Q3_country", "Q4_education", "Q5_income" "Q6_hotel_frequency", "Q7_restaurant_frequency", "Q8_robot_experience", "Q9_robot_service_type", "Q10_pu_efficiency", "Q11_pu_wait_time", "Q12_peu_communication", "Q13_peu_ordering", "Q14_tech_comfort",
```

```
"Q15_rel_adv_reliability", "Q16_rel_adv_novelty", "Q17_compat_modern",
"Q18_compat_disruption", "Q19_compat_human_touch", "Q20_observability_seen",
"Q21_observability_peer", "Q22_1_comfort_budget", "Q22_2_comfort_midrange",
"Q22_3_comfort_luxury", "Q22_4_comfort_fastfood", "Q22_5_comfort_casual",
"Q22_6_comfort_fine_dining", "Q23_acceptable_roles", "Q24_acceptable_tasks_5star",
"Q25_comfort_robotic_hotel", "Q26_trust_robot", "Q27_judge_robot",
"Q28_emotional_discomfort", "Q29_price_expectation")

# Stelle sicher, dass die relevanten Variablen numerisch sind

survey_data_clean$Q8_robot_experience <-
as.numeric(survey_data_clean$Q8_robot_experience)

survey_data_clean$Q26_trust_robot <- as.numeric(survey_data_clean$Q26_trust_robot)

# Filtere gültige Beobachtungen (keine NAs)

df_ttest <- survey_data_clean %>%

  filter(!is.na(Q8_robot_experience), !is.na(Q26_trust_robot))

# Filtere alle gültigen Gender-Antworten (1 = male, 2 = female)

df_gender_model <- survey_data_clean %>%

  filter(Q2_gender %in% c(1, 2)) %>%  # nur male und female

  mutate(Q2_gender = as.factor(Q2_gender), Q17_compat_modern =
as.numeric(Q17_compat_modern), Q14_tech_comfort = as.numeric(Q14_tech_comfort),
Q8_robot_experience = as.numeric(Q8_robot_experience), Q20_observability_seen =
as.numeric(Q20_observability_seen), Q1_age = as.numeric(Q1_age), Q4_education =
as.numeric(Q4_education) Q5_income = as.numeric(Q5_income), Q10_pu_efficiency =
as.numeric(Q10_pu_efficiency), Q18_compat_disruption =
as.numeric(Q18_compat_disruption) ) %>%

  filter( !is.na(Q17_compat_modern), !is.na(Q14_tech_comfort),
!is.na(Q8_robot_experience), !is.na(Q20_observability_seen), !is.na(Q1_age),
!is.na(Q4_education), !is.na(Q5_income),!is.na(Q10_pu_efficiency),
!is.na(Q18_compat_disruption),!is.na(Q2_gender))

# Regressionsmodell mit Gender
```

```
model_gender <- polr(as.factor(Q17_compat_modern) ~ Q14_tech_comfort +Q8_robot_experience + Q20_observability_seen + Q1_age + Q4_education + Q5_income + Q10_pu_efficiency + Q18_compat_disruption + Q2_gender,  # NEU: Gender data = df_gender_model, method = "logistic")

# Ausgabe

summary(model_gender)

# P-Werte berechnen

ctable_gender <- coef(summary(model_gender))

p_vals_gender <- pnorm(abs(ctable_gender[, "t value"]), lower.tail = FALSE) * 2

ctable_gender <- cbind(ctable_gender, "p value" = p_vals_gender)


# Ergebnisse anzeigen

print(ctable_gender)


# Regression ausführen wie gehabt (du hast bereits: model_gender)

# Jetzt Ausgabe der APA-Tabelle:

stargazer(model_gender, type = "text",

        title = "Ordinal Logistic Regression Predicting Perceived Compatibility",

        dep.var.labels = "Compatibility (Q17)",

        covariate.labels = c("Technology Comfort (Q14)", "Robot Experience (Q8)", "Observability (Q20)", "Age (Q1)",  "Education (Q4)", "Income (Q5)", "Perceived Efficiency (Q10)", "Atmospheric Disruption (Q18)", "Gender: Female (vs. Male)"  ),

        omit.stat = c("ll", "aic"),

        digits = 3,

        star.cutoffs = c(0.05, 0.01, 0.001))
```