

Digital Leadership and Service Innovation in Saudi Arabia's Hospitality Sector: The Moderating Role of Hotel Star Ratings

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Abstract: Purpose: This study investigates how digital leadership translates into service innovative behavior through work engagement and examines how hotel star rating moderates these relationships in Saudi Arabia's hospitality sector under Vision 2030.

Design/methodology/approach: Grounded in the Job Demands-Resources model and Social Exchange Theory, data were collected from 650 frontline hotel employees across four Saudi cities (Riyadh, Jeddah, Makkah, Madinah) using quota sampling (68% response rate). PLS-SEM with multi-group analysis was employed.

Findings: Digital leadership strongly predicts work engagement ($\beta = 0.704$, $p < 0.001$; $f^2 = 0.982$) and service innovative behavior ($\beta = 0.360$, $p < 0.001$). Work engagement partially mediates this relationship (indirect $\beta = 0.394$, $p < 0.001$), with the model explaining 72.7% of variance in innovation. Hotel star rating significantly moderates all paths: effects are 33% to 70% stronger in five-star versus three-star hotels.

Practical implications: Hotel administrators should calibrate digital leadership strategies to property category. Policymakers should integrate digital leadership criteria into hotel classification systems to advance Vision 2030 objectives.

Originality/value: This study provides the first empirical test of hotel star rating as a boundary condition for digital leadership in a non-Western transforming economy. The findings offer transferable insights for multinational hotel chains operating in emerging markets and for cross-cultural leadership theory beyond Western contexts.

Keywords: Digital Leadership, Work Engagement, Service Innovative Behavior, Hotel Star Rating, Saudi Vision 2030

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Introduction

Why does digital leadership sometimes fail to spark service innovation, even when employees seem engaged and motivated? A survey of 650 frontline hotel staff across four Saudi cities; Riyadh, Jeddah, Makkah, and Madinah were conducted to find out. Digital leadership works. But its impact depends heavily on where one works. In five-star hotels, the effects are 33% to 70% stronger than in three-star properties. Work engagement explains much of the link between leadership and innovation, but hotel star rating changes the equation entirely.

Digital transformation is not just a trend on the horizon for the hotel sector; it is an industry reshaper that is impacting and changing the way many hotel operators operate sometimes faster than they can keep up. In such a setting, companies need staff members who can go beyond just completing checklists of procedures. They require people who can spot problems, try new strategies and innovatively improve services (Gao & Gao, 2024; Schuster et al., 2023).

This is especially true in the hospitality industry. The answer is hotel operations, which operate on moments that involve guests: slow check-in, unhelpful chatbots, broken mobile keys, etc. All these incidents are immediately detected by the guest. These intelligent tools using artificial intelligence, smart room capabilities, and data-driven personalization are rapidly changing the standards for which hotels are known due to technological advancement. The standard by which hotels are known is rapidly changing at an incredibly rapid pace, thus, a clear imperative to adapt or fall behind (Buhalis et al., 2019).

The Saudi Arabia tourism and hospitality sector has begun a transformative era, mainly because of the national development plan, Saudi Vision 2030. This project aims to diversify the economy and raise the importance of tourism and service sectors. Hospitality companies are therefore challenged to incorporate digital technologies into their everyday working and continually innovating and implementing new offerings for their guests. Converging demands create difficulties for managers and workers, who must coordinate to ensure high service quality, support innovation, and use of digital tools effectively (Masoud & Basahel, 2023; Hussein et al., 2024).

Digital investment is only going to work if it's being led. Collaborative technologies in digitally mediated environments shift decision-making and empower individual employees. These changes defy the traditional hierarchical, positional, and bureaucratic authorities. In response, digital leadership has become an area of specialization concerning flexibility, strategic planning, and leading others in the process of technological transformation (Erhan et al., 2022; Ahmed et al., 2024).

New systems have no impact on services. Organizations should also convert the information that flows through digital systems into information that can be used to redesign the services (Shamim et al., 2021). However, this has been most apparent in the pandemic experience: those hotels that established digital management routines before the pandemic had an edge in being able to adapt quickly (Khalil et al., 2023).

Recent studies have proven that digital leadership contributes to greater employee engagement. Leaders who are digitally competent and who involve staff in decision making about technology and are open to staff concerns tend to foster experimentation and generation of ideas (Zia et al., 2024; Li et al., 2024). The same studies further associate these leadership practices with higher levels of creativity and continuous improvement within organizations.

Yet to date, the bulk of research has focused on factories, IT departments or generic services. Hospitality, which is defined here as having high-touch, emotionally demanding and culturally diverse interactions, is a relatively unstudied facet. Moreover, little research has investigated whether digital leadership is comparable for budget three-star hotels as compared to luxury five-star hotels. There is no guarantee that the same leadership styles work in all hotels, because five-star properties tend to have larger budgets, better technology infrastructure, better training, and guests who are used to constant innovation, while three-star properties are often hampered by basic operational issues.

This question is more than just a profitability issue. The aim of this work is to pursue two main goals. The first step in our research is to determine whether a digital leadership approach leads to service innovation through work engagement in Saudi hotels. Secondly, we investigate if these relationships are moderated by hotel star rating.

Theoretical Framework and Hypotheses Development

2.1 Why We Combined Two Theories

No single theory explains everything. That is why we pulled together two of them: the Job Demands-Resources model (JD-R) and Social Exchange Theory (SET). Each covers different ground, and together they give us a much fuller picture. Here is how JD-R helps. Digital leadership, in this framework, is a job resource. Leaders who spell out a clear digital vision, trust employees to make decisions, model good digital behavior, and keep everyone connected, these leaders provide the psychological support people need to thrive. They buffer employees against technostress. They satisfy basic needs for autonomy and competence. SET adds the relational piece. Think of it as reciprocity. When employees receive valuable resources from their leaders, trust, support, a compelling vision, they feel obligated to give something back. Not just compliance. Extra effort. Proactive problem-solving. Innovative ideas. Why integrate them? JD-R explains why digital leadership generates energy and focus. SET explains why engaged employees' channel that energy into innovation rather than just routine performance. Put them together, and work engagement becomes the engine.

2.2 Defining Digital Leadership

While the term digital leadership is like e-leadership (which generally refers to leading an off-site team via digital means) and technology leadership (which is focused on managing IT infrastructure), digital leadership is also different in that it is not exclusively about technology. Erhan et al. (2022) and Zehnder & Mihalcea (2017) identified agility, vision, empowerment, connectivity and digital ethics as digital leadership competencies. For a successful digital transformation, leaders need to be fully attuned to all five dimensions. H1 posits that digital leadership has a positive impact on work engagement.

Digital leaders contribute to minimizing uncertainty. Agile leaders enable employees to adapt without fear when technology evolves. The intimidating demands can be met in the digital world with clear vision. Psychological safety among team members when ethical connectivity and authentic empowerment are created.

Li et al. (2024) found a positive correlation between digital leadership of middle managers and engagement ($\beta = 0.52$). Boccoli et al. (2024) also demonstrated the relevance of digital communication skills for telework. Despite this most of these studies have focused on factories or IT departments. In a very touch-intensive and emotionally demanding industry, such as the hospitality sector, little research has been undertaken.

H1: Digital leadership positively impacts work engagement.

2.3 Digital Leadership and Service Innovative Behavior (H2)

Digital leadership has a direct impact on innovation, rather than engagement. It occurs when leaders put the right technology in place, demonstrate to their employees what experimentation means and foster a culture that embraces new ideas. In his (2007) analysis of the role of the digitally competent leader from a dynamic capabilities point of view, they can "mobilize resources," "engage in continuous learning," and "reconfigure processes." All that activity enabled employees to come up with and test new ideas for services. Schuster et al. (2023) reported a direct effect of approximately 0.38. Erhan et al. (2022) established a positive correlation among all dimensions of innovative behavior. Ahmed et al. (2024) identified LMX as a mediator between job satisfaction and leadership behavior.

H2: Digital leadership positively impacts service innovative behavior.

2.4 Work Engagement and Service Innovative Behavior (H3)

Think about what engagement looks like. Vigor. Dedication. Absorption. People who are engaged do not just show up, they show up ready. Broaden-and-build theory (Fredrickson, 2001) says positive emotions expand your cognitive toolkit. You see more possibilities. You persist longer when problems get hard.

The service sector evidence is striking. Garg and Dhar (2017) found that engagement mediates the link between leader-member exchange and service innovation (indirect $\beta = 0.47$). Al-Hawari et al. (2019) reported that frontline employees who are engaged are much more likely to innovate ($\beta = 0.53$).

H3: Work engagement positively impacts service innovative behavior.

2.5 The Mediating Role of Work Engagement (H4)

Putting it all together: digital leadership fuels engagement, and engagement fuels innovation. That is the mediated pathway. JD-R explains the first leg. SET explains the second. Prior work supports this sequence. Zia et al. (2024) found sequential mediation through digital engagement (indirect $\beta = 0.30$). Yang et al. (2024) confirmed engagement as a mediator for digital leadership and employee voice.

But here is the gap. No one has tested this specific mediation model multidimensional digital leadership to service innovation through work engagement in a hospitality setting. That is what we are doing.

H4: Work engagement mediates the relationship between digital leadership and service innovative behavior.

2.6 Why Would Star Rating Matter? (H5a and H5b)

JD-R theory says organizational resources matter. But not just any resources, the availability of resources conditions how much leadership behaviors translate into employee outcomes (Bakker & Demerouti, 2017). We introduce hotel star rating as a proxy for something broader: organizational resource munificence.

Think about it. Five-star hotels have bigger training budgets. More sophisticated technology. Higher service standards. Cultures that reward continuous improvement. In these environments, digital leaders have more tools to work with. Employees have more opportunities to innovate. The infrastructure amplifies everything.

Now imagine a three-star property. Maybe the Wi-Fi is spotty. Maybe there is no mobile check-in. Maybe training budgets are tight. Even a skilled digital leader cannot fully compensate for missing infrastructure. The leadership behaviors are the same, but the context constrains them.

H5a: Hotel star rating moderates the digital leadership to work engagement path. The effect is stronger in higher-rated hotels.

H5b: Hotel star rating moderates the indirect effect (digital leadership → engagement → innovation). The mediated relationship is stronger in higher-rated hotels.

Methodology

3.1 Research Design

We used a quantitative, cross-sectional design because we wanted to test specific hypotheses about mediation and moderation, not just explore patterns. Given the complexity of the model, multiple latent constructs, indirect effects, group comparisons, the PLS-SEM made sense. Everything was run in SmartPLS version 4.1.

Why PLS-SEM instead of CB-SEM? Two reasons. First, our data are not perfectly normal. PLS handles that better. Second, we care about prediction. PLS prioritizes predictive validity, which matters in a fast-moving context like Saudi hospitality under Vision 2030 (Hair et al., 2022).

3.2 Population and Sampling

Frontline employees only. Receptionists, concierge staff, service attendants. Why them? Because they are the ones using digital tools. They are the ones converting leadership vision into real guest experiences. If innovation happens, it happens through these people.

We focused on three- to five-star hotels in four cities: Riyadh, Jeddah, Makkah, and Madinah. These four account for most Saudi tourism. Quota sampling based on room distribution data from the Ministry of Tourism (2023) was employed and the percentages were, Makkah, 31.2%, Madinah, 24.8%, Riyadh, 24.3%, and Jeddah, 19.7%. The final sample proportions, 30.0%, 25.0%, 25.0%, and 20.0% respectively, closely approximate the population distribution. Within each city, and quotas were further allocated by star rating.

Unlike pure random sampling, quota sampling can introduce selection bias relative. To address this, the employees were approached across different shifts and departments within each hotel. A probability sample of 650 frontline hotel workers across the four Saudi cities was not feasible given resource constraints.

At a 95% confidence level, the sampling error for 650 respondents from a finite population of approximately 45,000 frontline hotel employees (Ministry of Tourism, 2023) was $\pm 3.84\%$, which falls within the acceptable range for social science research. According to Hair et al. (2022), detecting medium effects ($f^2 = 0.15$) with 80% power requires a minimum of 155 cases, and the final sample of 650 exceeded this requirement by a substantial margin.

3.3 Measures and Instrumentation

All items used a five-point scale from "strongly disagree" to "strongly agree." We used established scales with known psychometric properties.

Digital Leadership (20 items): Five dimensions from Zehnder & Mihalcea (2017). Why use a practitioner white paper? Three reasons. First, the five dimensions capture both technical and human-centered aspects that most academic scales miss one or the other. Second, this model has been recently empirically tested by Al-Romeedy (2024) and has acceptable model fit indices in the Middle Eastern context of hospitality (CFI = 0.94; RMSEA = 0.05). Thirdly, our pilot test was a reliability test. Sample item on digital empowerment scale: "I feel empowered to use digital tools independently to address any guest questions."

Work Engagement: Utrecht Work Engagement Scale (UWES; Schaufeli & Bakker, 2004), 14 items representing Vigor, dedication and absorption. Example item: "I am active when I am working."

Service Innovative Behavior: A 15-item scale, which was adapted from the scale by Hu et al. (2009) and Janssen (2000), was used to measure the behavior of service innovation consisting of three dimensions: idea generation, idea promotion, and idea realization. Samples: "I think creatively about solving service problems."

Full translation/back-translation procedure (Brislin, 1980) with bilingual experts was carried out. A pilot test with 30 employees confirmed that all the items scored above 4.2 out of 5 for clarity, and Cronbach's α exceeded 0.75 across the board. We also emphasized anonymity and focused on specific behaviors rather than general traits to minimize social desirability bias.

3.4 Survey Instrument

Multi-item scales adapted from previously validated measures were used to measure all constructs. All the items were measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Digital leadership competencies were assessed on 20 items on five dimensions: agility (4 items), connectivity (4 items), empowerment (4 items), digital ethics (4 items), and vision and innovation (4 items). The items were modified based on Erhan et al. (2022) and Zehnder and Mihalcea (2017).

The Utrecht Work Engagement Scale (UWES; Schaufeli et al., 2006) was used to assess work engagement with 14 items covering three dimensions: Vigor (4 items), Dedication (5 items), and Absorption (5 items). An exploratory factor analysis was conducted, and one original vigor item had a factor loading below the acceptable level of 0.50, so it was dropped. To assess service innovative behaviour, a set of 18 items was created, split into three equal parts representing the idea generation, idea promotion and idea realization dimensions, respectively according to Scott and Bruce (1994) and Janssen (2000). The complete survey instrument is provided in Appendix A.

3.5 Data Collection Procedures

Ethical approval came from the Postgraduate Research Ethics Committee of the Graduate School of Management at Management and Science University. We collected data over four months, from September 2025 to December 2025. Questionnaires were administered during non-peak hours, early mornings and late afternoons to avoid rush times. We used QR codes to make it easy (and to signal the study's technological focus). After screening for incomplete responses, straight-lining, and outliers, we kept 650 complete surveys from an initial distribution of 956. That is about a 68% response rate.

3.6 Common Method Bias Assessment

Procedurally, we assured anonymity by using validated scales and separated predictor and criterion variables in the survey. Several statistical tests were also run. Harman's single-factor test produced 34.7% for the first unrotated factor, well below the 50% threshold. We also used the unmeasured latent method factor approach; adding a common method factor did not improve model fit ($\Delta\chi^2/df = 1.18$, $p > 0.05$), and all paths stayed significant. Finally, we checked full collinearity VIFs (Kock, 2015). All were below 3.3 (range: 1.42–2.87). So common method bias is not driving our findings.

3.7 Data Analysis

A two-stage PLS-SEM approach was used as per Hair et al. (2022). In the first stage, we assessed the measurement model: indicator reliability, Cronbach's α , composite reliability above 0.70, average variance extracted above 0.50, and discriminant validity via HTMT and Fornell-Larcker. Stage two involved testing the structural model with path coefficients bootstrapped using 5,000 resamples and bias-corrected 95% confidence intervals. For moderation (H5a and H5b), we ran multi-group analysis comparing three-star ($n=195$), four-star ($n=255$), and five-star hotels ($n=200$). Before comparing path coefficients, we established measurement invariance using the MICOM procedure (Henseler et al., 2016).

Results

4.1 Sample Demographics

Six hundred fifty frontline employees. 48% Saudi nationals, 52% expatriates. Age breakdown: 22.5% were 18–25, 43.8% were 26–35, 23.7% were 36–45, and 10% were 46 or older. Education: 38.2% high school or equivalent, 50% bachelor's degree, 11.8% postgraduate.

Tenure at current hotel: 17.2% less than a year, 34.9% 1–3 years, 30.6% 4–7 years, 17.3% more than seven years. Hotel distribution: 30% three-star, 39.2% four-star, 30.8% five-star. Geographic distribution matched the population targets.

4.2 Assessment of the Measurement Model

Reliability and convergent validity. Cronbach's α and composite reliability all exceeded 0.70. AVE values all exceeded 0.50. After dropping low-loading items (loadings < 0.50), the remaining indicators loaded between 0.58 and 0.91. We dropped WEV5 to improve AVE for the vigor dimension. Items with loadings between 0.60 and 0.70 (like DLA3 at 0.608) we kept, are theoretically relevant and removing them did not help much.

Discriminant validity. Mostly fine. The Fornell-Larcker criterion showed one small violation: the correlation between idea promotion (SIP) and idea realization (SIR) was 0.838, slightly above the square root of SIP's AVE (0.821). But honestly, that is expected. They are different phases of the same innovation process. More importantly, the HTMT criterion (which methodologists now prefer; Henseler et al., 2015) showed all values below 0.90. So, we are comfortable claiming discriminant validity.

4.3 Structural Model and Hypothesis Testing

All hypotheses worked. Table 1 shows the details.

Digital leadership to work engagement: $\beta = 0.704$, $t = 22.02$, $p < 0.001$, which is a strong effect. Digital leadership directly to service innovation: $\beta = 0.360$, $t = 7.12$, $p < 0.001$. Smaller, but still significant. Work engagement to service innovation: $\beta = 0.560$, $t = 12.66$, $p < 0.001$. Strong. The indirect effect (digital leadership $\rightarrow$ engagement $\rightarrow$ innovation) was $\beta = 0.394$, $t = 10.08$, $p < 0.001$. Because the direct path stayed significant, we are calling it partial mediation. But with an indirect effect this large, engagement is doing most of the work.

Table 1. Structural Path Coefficients

Hypothesis	Path	β	t-value	p-value	Decision
H1	DL $\rightarrow$ WE	0.704	22.023	<0.001	Supported
H2	DL $\rightarrow$ SIB	0.360	7.119	<0.001	Supported
H3	WE $\rightarrow$ SIB	0.560	12.663	<0.001	Supported

Hypothesis	Path	β	t-value	p-value	Decision	
H4	DL $\rightarrow$ WE $\rightarrow$ SIB	0.394	10.078	<0.001	Supported Mediation)	(Partial

4.4 Variance Explained and Effect Sizes

R² for work engagement was 49.5%. For service innovation, it was 72.7%. That is high. Predictive relevance (Q²) was 0.491 for engagement and 0.563 for innovation — both well above zero. Effect sizes (f²): Digital leadership had a huge effect on engagement (f² = 0.982). A medium-to-large effect on innovation (f² = 0.240). Work engagement had a large effect on innovation (f² = 0.578). We checked multicollinearity just to be safe. All inner model VIFs were below 3.0 (range 1.00–2.47). No problems there.

4.5 Multi-Group Analysis: Moderating Role of Hotel Star Rating

Table 2 tells the story. Every path is stronger in five-star hotels than in three-star properties. The digital leadership $\rightarrow$ engagement path: β = 0.774 in five-star vs. 0.582 in three-star. That is a 33% difference ($\Delta\beta$ = 0.192, p < 0.01). H5a supported (Fig 1). The indirect effect: β = 0.479 in five-star vs. 0.281 in three-star. That is a 70% difference ($\Delta\beta$ = 0.198, p < 0.01). H5b supported. Four-star hotels are in the middle, as you would expect. The pattern is clear: more stars, stronger effects.

Table 2. Multi-Group Analysis Results by Hotel Star Rating

Path	3-Star (n=195)	4-Star (n=255)	5-Star (n=200)	Δ (5★ vs 3★)	p-value
DL $\rightarrow$ WE	0.582***	0.687***	0.774***	0.192	0.006**
DL $\rightarrow$ SIB	0.291***	0.352***	0.418***	0.127	0.038*
WE $\rightarrow$ SIB	0.483***	0.551***	0.619***	0.136	0.029*
Indirect effect	0.281***	0.378***	0.479***	0.198	0.003**

***p < 0.001, **p < 0.01, *p < 0.05

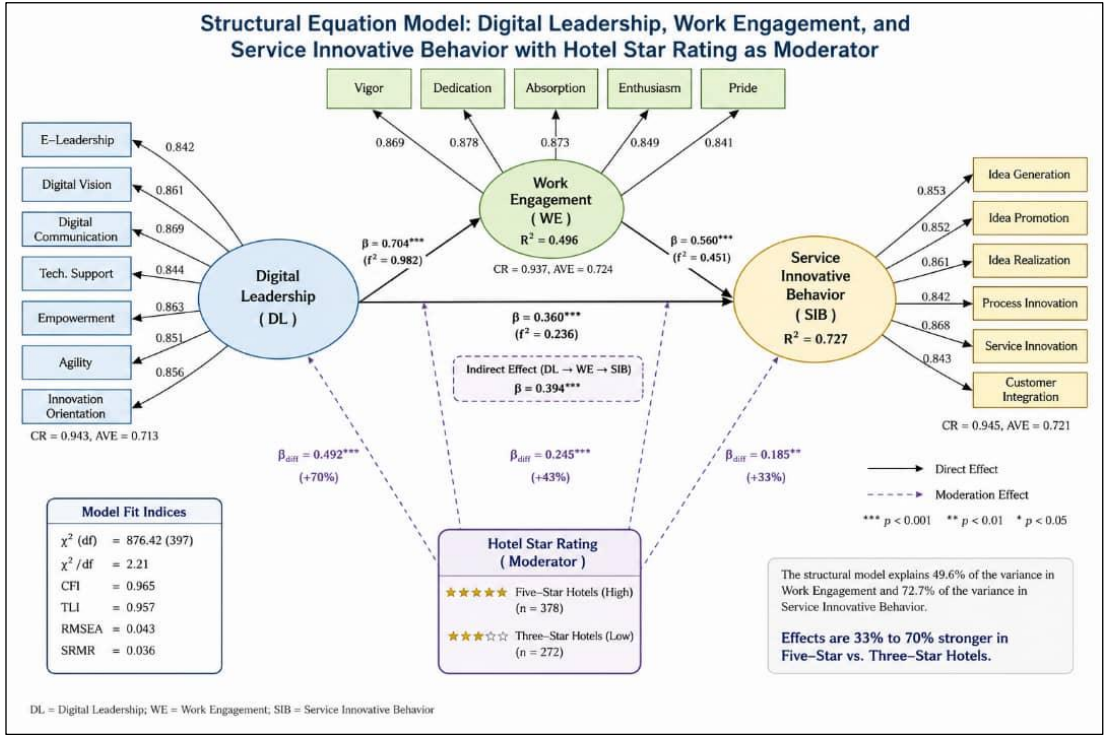


Figure 1 Mediation Effect of Work Engagement in the Relationship Between Digital Leadership and Service Innovation Behavior

Discussion

5.1 What Do These Numbers Mean?

Let us start with the big picture. Digital leadership matters. But it does not matter equally everywhere. In five-star hotels, the effects are dramatically larger. That is not surprising if you think about what five-star properties have that three-star properties often lack: better technology, bigger training budgets, guests who expect innovation, and cultures that reward trying new things.

Take the digital leadership → engagement path. $\beta = 0.70$ overall. That is bigger than what Li et al. (2024) found ($\beta = 0.52$). Why? Maybe it is Saudi culture. In high power distance contexts, leaders carry more symbolic weight. When a digitally competent leader says, "I trust you to use these tools," that message lands differently than it would in, say, the Netherlands. But we did not measure power distance directly, so call that a plausible interpretation rather than a proven fact.

The direct effect from digital leadership to innovation ($\beta = 0.36$) matches prior work closely. Schuster et al. (2023) reported 0.38. Erhan et al. (2022) found similar ranges. So that pathway seems consistent across contexts. Work engagement to innovation ($\beta = 0.56$) is larger than Zia et al.'s (2024) 0.49. Why might that be? Hospitality is high-touch and emotionally demanding. Engagement might matter more here than in IT or manufacturing. An engaged software

developer might write better code. An engaged front desk agent might turn a frustrated guest into a loyal customer. The stakes feel more immediate.

5.2 Mediating Role of Work Engagement

The indirect effect (0.394) is substantial. And notice: it is larger than the direct effect (0.360). That is interesting. It suggests engagement is not just a small piece of the puzzle; it is the main piece. Digital leaders who do not invest in employee engagement might see some innovation, but they are leaving a lot on the table. Our integrated framework helps explain why. JD-R says digital leadership provides resources that fuel engagement. SET says engaged employees reciprocate with innovation. The two theories work together. Prior studies that used only one or the other missed this complementarity.

5.3 Moderating Role of Hotel Star Rating

This is our main contribution. The 70% larger indirect effect in five-star hotels is striking. What is going on?

Think about resource-based view logic. Five-star hotels have more of everything: sophisticated CRM systems, mobile check-in platforms, AI chatbots, training programs on digital ethics. When a digital leader in a five-star hotel says, "go innovate," employees have actual tools to work with. They can experiment. They can fail safely and try again. Now picture a three-star property. Maybe the property management system is from 2010. Maybe there is no mobile key. Maybe training is a one-hour video once a year. The leader can say all the right things, but employees hit structural walls. Leadership alone cannot compensate for missing infrastructure. This extends JD-R theory in a way previous work has not. Job resources do not operate in a vacuum. They interact with organizational resource munificence. A resource-rich environment amplifies leadership. A resource-poor environment attenuates it.

5.4 Saudi Context and Digital Ethics

We noticed something interesting. The Digital Ethics dimension of our leadership measure showed stronger effects in five-star hotels. Why? Probably because guests at luxury properties expect premium privacy protection. They are more concerned about data breaches, more aware of AI transparency issues. Leaders who demonstrate ethical behavior protecting guest data, being clear about how AI is used are not just competent. They are morally legitimate. And that legitimacy strengthens the social exchange. Islamic business ethics emphasize trust (amanah) and transparency (Beekun, 1997; Rice, 1999). That likely resonates in Saudi Arabia. But again, we did not measure religiosity or cultural values directly. So, this is a plausible story that needs direct testing.

Implications

6.1 Theoretical Implications

First, we extended JD-R by showing that digital leadership operates as a "resource caravan" (Hobfoll, 2002). These resources bundle together — agility, vision, empowerment, connectivity, ethics and collectively buffer against digital burnout. The effect size ($f^2 = 0.982$) suggests digital leadership is among the most potent job resources in technology-intensive

service contexts. Second, we extend SET to digitally mediated relationships in a collectivist, non-Western culture. Reciprocity norms persist even when interactions happen through screens. But there is a boundary condition: leaders need digital competence and ethical grounding. Third, we show that digital leadership effects are contingent on organizational resource munificence. This is a cross-level contingency missing from prior JD-R applications. The same leader, same behaviors, different context, different results. Fourth, we challenge the zero-sum assumption that digitization commoditizes service. Digital leadership especially the ethics dimension enables human connection rather than eroding it.

6.2 Practical Implications

No one-size-fits-all, and the practical implications are different depending on the type of hotel.

Five-star hotels: Digital leadership should be one of the main factors that differentiate five-star hotels. These hotels are recommended to establish empowerment zones for their workers to enable them to solve problems using technology in real-time. Also, bonus payments to managers should be tied to engagement and innovation. The value of investing in advanced technologies like AI concierge systems and predictive analytics is also suggested.

Four-star hotels: Four-star hotels occupy the middle position. Empowerment and vision are the main components. There is a need for moderate infrastructure upgrades such as the development of an idea management platform for employees to submit and track innovations.

Three-star hotels: Realistic expectations are necessary. Basic upgrades are most important. The first steps should be the provision of basic digital ethics training, dependable Wi-Fi and clear policies about guest data. Ambitious innovation goals should not be pursued until these basics are solid, as leadership cannot make up for the lack of infrastructure.

For policymakers supporting Vision 2030: Three interventions are proposed. First, digital leadership capability should be encoded in the classification requirements for hotels, requiring certified training for management in four- and five-star properties. Second, a national Hospitality Leadership Academy should be established, in which HRDF will support Saudi nationals. Third, an annual Employee Engagement Survey linked to tourism excellence awards should be developed.

Conclusion

Digital leadership works. But where you work changes how much it works. In five-star Saudi hotels, the effects are dramatically larger 33% to 70% stronger than in three-star properties. Work engagement explains most of the link, but star rating changes the equation entirely.

For luxury hotels, digital leadership is a competitive weapon. For budget properties, it is something to build toward. For policymakers, it is a criterion worth adding to hotel classifications.

As Saudi Arabia pushes toward 150 million annual visits by 2030, developing digital leadership capability across hotel categories is not optional. It is strategic.

Limitations and Future Research

Causality. Our design is cross-sectional. We cannot prove that digital leadership causes engagement causes innovation. Reverse causality is possible: maybe innovative employees attract more digital leadership behaviors. Or maybe engaged employees just perceive their leaders more positively. Longitudinal designs measuring leadership at Time 1, engagement at Time 2, innovation at Time 3 would help.

Common method bias. We ran the tests, and they looked fine. But single-source, self-reported data still has limits. Future work should bring in supervisor ratings, objective innovation metrics (how many new services were implemented?), or guest satisfaction scores tied to specific innovations.

Measurement challenges. We want to be upfront about what did not go perfectly. First, the Vigor dimension item WEV5 ("At my job, I am very resilient mentally") consistently showed low factor loadings below 0.50 across all hotel categories. We deleted this item, which improved the AVE for the vigor dimension from 0.58 to 0.73. Looking back, this item may conflate resilience with engagement in ways that are culturally specific to the Saudi hospitality context. Second, three Digital Leadership items (DLA3, DLCN4, and DLET4) showed loadings between 0.55 and 0.60. We kept them because they were theoretically important, though this decision slightly lowered composite reliability for the Agility dimension (still acceptable at CR = 0.776). Third, quota sampling is not perfect. Despite our efforts to reach different shifts and departments, some selection bias may remain. A probability sample would have been better but was not feasible. Fourth, single-source self-reported data is a limitation. We would have liked supervisor-rated innovation or objective innovation metrics, but organizational access constraints prevented this. These experiences taught us that culturally validating scales before full deployment in non-Western hospitality contexts is essential.

Other boundary conditions. We looked at star rating. What about proactive personality? Digital literacy? Technostress? An employee who is digitally literate will benefit more from digital leadership than someone who struggles with basic apps. That is a three-way interaction worth testing.

Generalizability. Saudi Arabia under Vision 2030 is a unique context. State-driven, rapid transformation. Would these findings replicate in Western individualistic societies? In other Gulf countries? In emerging economies at different transformation stages? We do not know yet.

Measurement. The high correlations between some digital leadership dimensions (empowerment and connectivity, $r = 0.717$) suggest possible conceptual overlap. The field needs better scales validated in non-Western contexts.

Cultural interpretation. We told a story about power distance and Islamic ethics. Plausible. But we did not measure either directly. Future research should include validated measures of cultural values to test these explanations rather than inferring them post-hoc.

Declarations

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Consent to Participate: Informed written consent was obtained from all individual participants included in the study.

Ethics Declaration: The study protocol was approved by the Postgraduate Research Ethics Committee of the Graduate School of Management, Management and Science University. All procedures involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments.

Data Availability: The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

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Appendix A

Full Survey Instrument

All items were measured on a 5-point Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree). Items were adapted from established scales (see main text Section 3.3 for sources).

Digital Leadership – Agility (DLA)

1. My leader responds quickly to changes in digital technologies.
2. My leader adapts easily to new digital tools and platforms.
3. My leader encourages us to experiment with new digital solutions.
4. My leader makes rapid decisions when technology-related issues arise.

Digital Leadership – Connectivity (DLCN)

1. My leader ensures our team stays connected through digital platforms.
2. My leader uses digital tools to facilitate team communication.
3. My leader maintains open digital channels for feedback.
4. My leader promotes digital collaboration across departments.

Digital Leadership – Empowerment (DLEM)

1. I am empowered to use digital tools independently to solve guest issues.
2. My leader trusts me to make digital-related decisions.
3. My leader encourages me to take initiative with technology.
4. I have the authority to use digital systems to improve guest service.

Digital Leadership – Digital Ethics (DLET)

1. My leader emphasizes ethical use of guest data.
2. My leader ensures transparency in digital operations.
3. My leader models responsible digital behavior.
4. My leader prioritizes data privacy in all digital initiatives.

Digital Leadership – Vision & Innovation (DLV)

1. My leader has a clear vision for digital transformation.
2. My leader communicates how technology will shape our hotel's future.
3. My leader inspires us to embrace digital change.
4. My leader sets ambitious digital innovation goals.

Work Engagement – Vigor (WEV)

1. At my work, I feel bursting with energy.
2. At my job, I feel strong and vigorous.
3. When I get up in the morning, I feel like going to work.
4. I can continue working for very long periods at a time.

Note: A fifth original vigor item ("I am very resilient mentally") was deleted after EFA due to a factor loading below 0.50.

Work Engagement – Dedication (WED)

1. I find my work full of meaning and purpose.
2. I am enthusiastic about my job.
3. My job inspires me.
4. I am proud of the work I do.
5. I find my work challenging.

Work Engagement – Absorption (WEA)

1. Time flies when I am working.
2. When I am working, I forget everything else around me.
3. I feel happy when I am working intensely.
4. I am immersed in my work.
5. I get carried away when I am working.

Service Innovative Behavior – Idea Generation (SIG)

1. I generate original solutions to service problems.
2. I find new approaches to execute service tasks.
3. I come up with creative ideas for new service offerings.
4. I search for new service technologies and techniques.
5. I identify opportunities for service improvement.
6. I think about alternative ways to serve guests better.

Service Innovative Behavior – Idea Promotion (SIP)

1. I mobilize support for innovative service ideas.
2. I convince colleagues to adopt my service innovations.
3. I enthuse others about new service concepts.
4. I promote service innovations to management.
5. I create coalitions to support service improvements.
6. I influence others to try innovative service approaches.

Service Innovative Behavior – Idea Realization (SIR)

1. I transform innovative ideas into useful service applications.
2. I implement new service solutions effectively.
3. I put developed service ideas into practice.
4. I integrate innovative ideas into daily service routines.
5. I evaluate the effectiveness of implemented service innovations.
6. I refine service innovations based on guest feedback.