

The Effect of Organizational Capabilities on Competitive Advantage: An Empirical Study of Yemeni Private Hospitals

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Abstract:

Drawing on the resource-based view and the resource-based theory of the firm, this study investigates the effect of organizational capabilities, together with their dimensions (human, physical, and marketing capabilities), on competitive advantage and its dimensions (quality, cost efficiency, and customer responsiveness) in private hospitals. The study adopts a quantitative, descriptive-analytical approach and employs partial least squares structural equation modeling (PLS-SEM) using SmartPLS 4.0 and SPSS 28. The population consists of 75 private hospitals located in Sana'a, the capital of Yemen, of which 15 hospitals (20 percent) were surveyed. A census sample of 376 managers, deputy managers, and heads of technical and administrative departments was approached, yielding 354 valid responses after outlier screening. The results reveal that organizational capabilities exert a strong and significant effect on competitive advantage ($\beta = 0.463$, $t = 9.112$, $p < 0.001$). At the dimensional level, human capabilities demonstrate the strongest effect ($\beta = 0.333$, $t = 6.645$, $p < 0.001$), followed by physical capabilities ($\beta = 0.322$, $t = 7.415$, $p < 0.001$) and marketing capabilities ($\beta = 0.303$, $t = 6.315$, $p < 0.001$). The measurement model satisfies all reliability and validity criteria (composite reliability = 0.785–0.922; AVE = 0.530–0.755; HTMT < 0.90), and the model exhibits substantial explanatory and predictive power (R^2 for competitive advantage = 0.746; $Q^2 = 0.591$). The study contributes to the literature by providing empirical evidence from a developing-country healthcare context and offers practical implications for hospital managers seeking to configure organizational capabilities as a source of competitive advantage.

Keywords: organizational capabilities; competitive advantage; human capabilities; physical capabilities; marketing capabilities; private hospitals; resource-based view; PLS-SEM; Yemen

1. Introduction

The healthcare industry has undergone unprecedented transformation over the past two decades, driven by intensifying competition, technological advancement, rising patient expectations, and increasingly scarce financial resources (Agwunobi & Osborne, 2016). In this turbulent environment, private hospitals in developing countries face a dual challenge: they must deliver high-quality care that satisfies patients while sustaining financial viability against both public-sector institutions and rival private providers. Scholars have long argued that competitive advantage does not arise from a favorable industry structure alone, but increasingly from the internal resources and capabilities that a firm possesses and deploys (Barney, 1991; Peteraf, 1993; Teece et al., 1997; Wernerfelt, 1984). Within this resource-based tradition, organizational capabilities—the routinized capacity of a firm to deploy, integrate, and reconfigure its resources—are considered the proximate mechanism through which resources are converted into superior market positions and sustained performance (Barney & Hesterly, 2012; Grant, 1996; Makadok, 2001).

Despite the maturity of the capability literature, two empirical gaps motivate this study. First, although the capability–performance nexus has been examined extensively in manufacturing and small- and medium-sized enterprises (Duah et al., 2024; Fabrizio et al., 2022; Samadi et al., 2023), evidence from the healthcare sector in developing countries remains thin, with recent hospital-based studies confined largely to Southeast Asia (Tj et al., 2025). Second, the organizational capability construct is frequently treated as unidimensional, which conceals the distinct—and potentially unequal—contributions of human, physical, and marketing capabilities to competitive advantage. Knowing which capability dimension matters most is of direct strategic value: hospitals operate under binding budget constraints, and investment in the wrong capability dimension wastes scarce resources, whereas prioritized investment in the capability with the largest marginal effect on competitive advantage yields the greatest strategic return.

Accordingly, this study addresses two research questions: (1) Does the overall level of organizational capabilities exert a significant effect on competitive advantage in private hospitals? (2) Which capability dimension—human, physical, or marketing—most strongly contributes to competitive advantage? To answer these questions, the study draws on data collected from 354 senior managers and department heads across 15 classified private hospitals in Sana'a, the capital of Yemen—a context marked by protracted crisis, institutional volatility, and a rapidly expanding private healthcare

market. The analysis employs partial least squares structural equation modeling (PLS-SEM), which is well suited to complex multidimensional models and predictive theory testing (Hair et al., 2017, 2021; Shmueli et al., 2019).

This study makes three contributions. Theoretically, it extends the resource-based view (RBV) by operationalizing organizational capabilities as a multidimensional second-order construct and by estimating the relative weights of its human, physical, and marketing dimensions as separate determinants of competitive advantage. Empirically, it provides rare evidence from Yemen, a conflict-affected setting in which capability development under resource scarcity has been little studied. Managerially, it offers hospital administrators an empirically grounded prioritization of capability investments linked to the differentiated dimensions of competitive advantage (quality, cost efficiency, and customer responsiveness).

The remainder of the paper is organized as follows. Section 2 presents the theoretical background and hypotheses. Section 3 describes the methodology. Section 4 reports the results of the measurement and structural models. Section 5 discusses the findings in light of prior literature, and Section 6 concludes with implications, limitations, and avenues for future research.

2. Theoretical Background and Hypothesis Development

2.1 The resource-based foundations of competitive advantage

The strategic management literature offers two complementary perspectives on the origins of competitive advantage. The positioning school, pioneered by Porter (1980, 1985), locates advantage in the structure of the industry—five competitive forces that determine the profitability of positions occupied by firms. The resource-based view, initiated by Wernerfelt (1984) and consolidated by Barney (1991) and Peteraf (1993), locates advantage inside the firm. According to Barney's (1991) VRIO logic, a resource or capability confers sustained competitive advantage only if it is valuable, rare, difficult to imitate, and non-substitutable; Peteraf (1993) adds that ex post limits to competition (resource immobility and imperfect imitability) and ex ante limits to competition (resource heterogeneity) are required to prevent rivalry from eroding rents.

Capabilities extend this logic one step further. Whereas resources are inputs, capabilities are the organizational and managerial processes that coordinate, integrate, and deploy those inputs productively (Grant, 1996; Teece et al., 1997). Makadok (2001) distinguishes between resource picking—the managerial activity of acquiring superior resources—and capability building—

the design of organizational systems that raise the productivity of acquired resources—showing that capability-building mechanisms generate rents that are more durable because they are embedded in organizational routines and are causally ambiguous to imitators. In service-intensive industries such as healthcare, where employees themselves constitute the primary production factor and services are produced and consumed simultaneously, the conversion of resources into advantage depends especially heavily on human, physical, and marketing capabilities (Agwunobi & Osborne, 2016).

2.2 Organizational capabilities and their dimensions

Organizational capabilities have been defined as the firm's capacity to perform a coordinated deployment of resources toward a desired end state, embodied in organizational routines and processes (Amit & Schoemaker, 1993; Teece et al., 1997). In the present study, organizational capabilities are conceptualized as a multidimensional second-order construct comprising three first-order dimensions, consistent with capability taxonomies employed in recent empirical research (Samadi et al., 2023; Vieira et al., 2026).

Human capabilities refer to the knowledge, skills, experience, and behavioral competencies of the workforce, as well as the organization's capacity to recruit, develop, and retain qualified personnel. Human capital has repeatedly been identified as the core engine of competitive advantage in hospitals, since the quality of medical and administrative staff directly shapes service quality and patient outcomes (Tj et al., 2025; Ulrich & Lake, 1991). Physical capabilities encompass the tangible resource base of the organization: medical equipment, buildings, information systems, and the infrastructure that enables service delivery. Physical assets set the technical ceiling of what a hospital can offer, and their modernity and availability differentiate providers in capital-intensive medical markets (Agwunobi & Osborne, 2016). Marketing capabilities capture the organization's ability to identify patient needs, design service offers, communicate value, and manage relationships—capabilities that, according to meta-analytic evidence spanning 25 years of research, significantly enhance firm performance (effect size = 0.31, $p < 0.001$) across all their dimensions (Vieira et al., 2026).

2.3 Competitive advantage in healthcare

Competitive advantage denotes a value-creating position that a firm attains relative to rivals and that competitors find difficult to replicate (Barney, 1991; Porter, 1985). In healthcare settings, competitive advantage is customarily operationalized through three generic manifestations: quality,

reflected in clinical excellence, patient safety, and service standards; cost, reflected in efficiency, price competitiveness, and optimized resource utilization; and customer responsiveness, reflected in the speed, accessibility, and personalization of care (Porter, 1985). These three dimensions align with Porter's (1985) differentiation and cost-leadership logics, augmented by the responsiveness imperative that is particularly salient in service contexts where patients choose providers based on experience.

2.4 Hypothesis development

The general proposition that organizational capabilities drive competitive advantage is well supported theoretically. The RBV posits that inimitable organizational routines transform resources into superior value (Barney, 1991), and empirical syntheses confirm that capabilities outperform mere resource possession in explaining sustained performance (Fabrizio et al., 2022; Makadok, 2001; Teece et al., 1997). In hospitals specifically, dynamic and organizational capabilities have been framed as the mechanism by which healthcare providers achieve competitive advantage amid difficult operating environments (Agwunobi & Osborne, 2016). In knowledge-intensive firms, organizational capabilities have likewise been shown to be decisive drivers of performance outcomes (Samadi et al., 2023). Hence:

H1. Organizational capabilities have a significant positive effect on competitive advantage in private hospitals.

Within the multidimensional conceptualization, each capability dimension is expected to contribute distinctively. Human capabilities constitute the service encounter itself in healthcare, and studies of Indonesian hospitals demonstrate that human capital significantly shapes competitive advantage and business performance (Tj et al., 2025). Physical capabilities provide the tangible foundation—equipment, facilities, technology—without which quality and scope of services cannot be delivered (Samadi et al., 2023). Marketing capabilities enable hospitals to sense patient needs, position services, and capture value, with meta-analytic evidence confirming their robust performance effects (Vieira et al., 2026; Duah et al., 2024). Accordingly:

H2. The dimensions of organizational capabilities—human, physical, and marketing capabilities—each exert a significant positive effect on competitive advantage.

3. Methodology

3.1 Research design

The study adopted a quantitative, descriptive-analytical approach to examine the phenomenon as it occurs in reality and to quantify the effect of organizational capabilities, at both the aggregate and dimensional levels, on competitive advantage. Data were collected through a structured questionnaire administered to senior managers in private hospitals in Sana'a, Yemen, and analyzed using SPSS version 28 for descriptive statistics and data screening, and SmartPLS version 4.0.8.6 for measurement-model assessment and hypothesis testing via PLS-SEM (Hair et al., 2017, 2021).

3.2 Population and sample

The study population comprised 75 private hospitals in Sana'a, classified into four categories by the national regulatory authority: 10 Class A, 37 Class B, 26 Class C, and 2 Class D hospitals. A stratified sampling approach was used to select 15 hospitals, representing 20% of the total population, with the selected hospitals comprising two Class A, eight Class B, and five Class C hospitals. No Class D hospital was included in the selected sample.

A census approach was then applied to the eligible managerial staff within the 15 selected hospitals, including hospital directors, deputy directors, and heads of technical and administrative departments. This process yielded a gross sample of 376 respondents. Following data screening, six responses identified as statistically implausible and four incomplete responses were excluded, resulting in 354 valid questionnaires for the final analysis. The resulting valid response rate was 94.1%.

3.3 Measurement instrument

The questionnaire comprised three sections: demographic and organizational characteristics; items measuring the study variables; and the seven-point Likert scale (1 = strongly disagree to 7 = strongly agree). Items were developed from the theoretical framework and validated instruments from prior studies, then validated through expert-panel content validity (face and content validity), and through construct validity using Pearson correlations among items and dimensions. The instrument measured organizational capabilities through three dimensions (human, physical, and marketing capabilities) and competitive advantage through three dimensions (quality, cost efficiency, and customer responsiveness).

3.4 Data quality procedures

Following established PLS-SEM protocols (Hair et al., 2021; Mishra et al., 2020), data quality was evaluated on five fronts. Missing data accounted for less than 1 percent of all responses and were excluded listwise. Outlier analysis identified implausible responses removed prior to analysis. Harman's single-factor test revealed that the first unrotated factor explained 41.87 percent of the variance, below the 50 percent threshold, indicating that common method bias is unlikely to threaten the findings (Podsakoff et al., 2003). Normality diagnostics showed skewness values between -0.532 and -0.652 and kurtosis values between 0.064 and 0.387, confirming approximate normality. The non-parametric PLS-SEM approach is robust to such mild departures regardless (Hair et al., 2017).

3.5 Analytical strategy

PLS-SEM was selected for three reasons consistent with Hair et al. (2017, 2021): the model's complexity (a second-order exogenous construct with three first-order dimensions linked to a second-order endogenous construct), the theory-testing purpose of the research, and the predictive orientation of the analysis. Following the two-stage evaluation protocol, the measurement model was assessed first (indicator loadings, composite reliability, convergent validity, and discriminant validity via HTMT and Fornell-Larcker criteria), and then the structural model (path coefficients, R^2 , f^2 , and Q^2 via bootstrapping with 5,000 subsamples).

4. Results

4.1 Descriptive findings

The final sample of 354 respondents represented a cross-section of hospital leadership: directors (15 respondents), deputy directors (27), heads of technical departments (212), and heads of administrative departments (122) across 15 private hospitals. Overall, the sampled hospitals reported high levels of both focal constructs. Organizational capabilities attained a grand mean of 3.963 (SD = 0.602) on the seven-point scale, which respondents rated as high. Among its dimensions, physical capabilities ranked first ($M = 4.143$; $SD = 0.516$; relative importance = 82.9 percent), followed by human capabilities ($M = 4.045$; $SD = 0.689$; 80.9 percent), and marketing capabilities ($M = 3.701$; $SD = 0.884$; 74.0 percent). This ranking indicates that marketing capability is comparatively the weakest dimension among Yemeni private hospitals, suggesting underinvestment in market intelligence and value communication relative to tangible infrastructure. Competitive advantage also scored highly overall ($M = 4.101$; $SD = 0.552$; relative importance = 82.0 percent), with

customer responsiveness leading ($M = 4.152$; $SD = 0.583$), followed by quality ($M = 4.127$; $SD = 0.612$) and cost efficiency ($M = 4.024$; $SD = 0.651$).

4.2 Measurement model assessment

Both constructs were modeled as reflective first-order indicators aggregated into second-order reflective constructs. As reported in Table 1, all item loadings exceeded the 0.708 threshold, composite reliability (CR) values ranged from 0.785 to 0.922 (within the 0.70–0.95 bounds), and average variance extracted (AVE) values ranged from 0.530 to 0.755, exceeding the 0.50 requirement. Cronbach's alpha values (0.777–0.917) corroborated internal consistency. Discriminant validity was established through the heterotrait–monotrait ratio of correlations (HTMT), with all inter-construct ratios below the conservative 0.90 cutoff (Henseler et al., 2015), and confirmed by the Fornell–Larcker criterion (Fornell & Larcker, 1981).

Table 1. Reliability and convergent validity of the study constructs

Construct	Cronbach's α	Composite reliability	AVE
Human capabilities	0.826	0.841	0.595
Physical capabilities	0.777	0.785	0.530
Marketing capabilities	0.917	0.922	0.755
Organizational capabilities (second-order)	0.827	0.831	0.744
Quality	0.858	0.861	0.639
Cost efficiency	0.838	0.840	0.608
Customer responsiveness	0.859	0.864	0.543
Competitive advantage (second-order)	0.877	0.879	0.803

4.3 Structural model and hypothesis testing

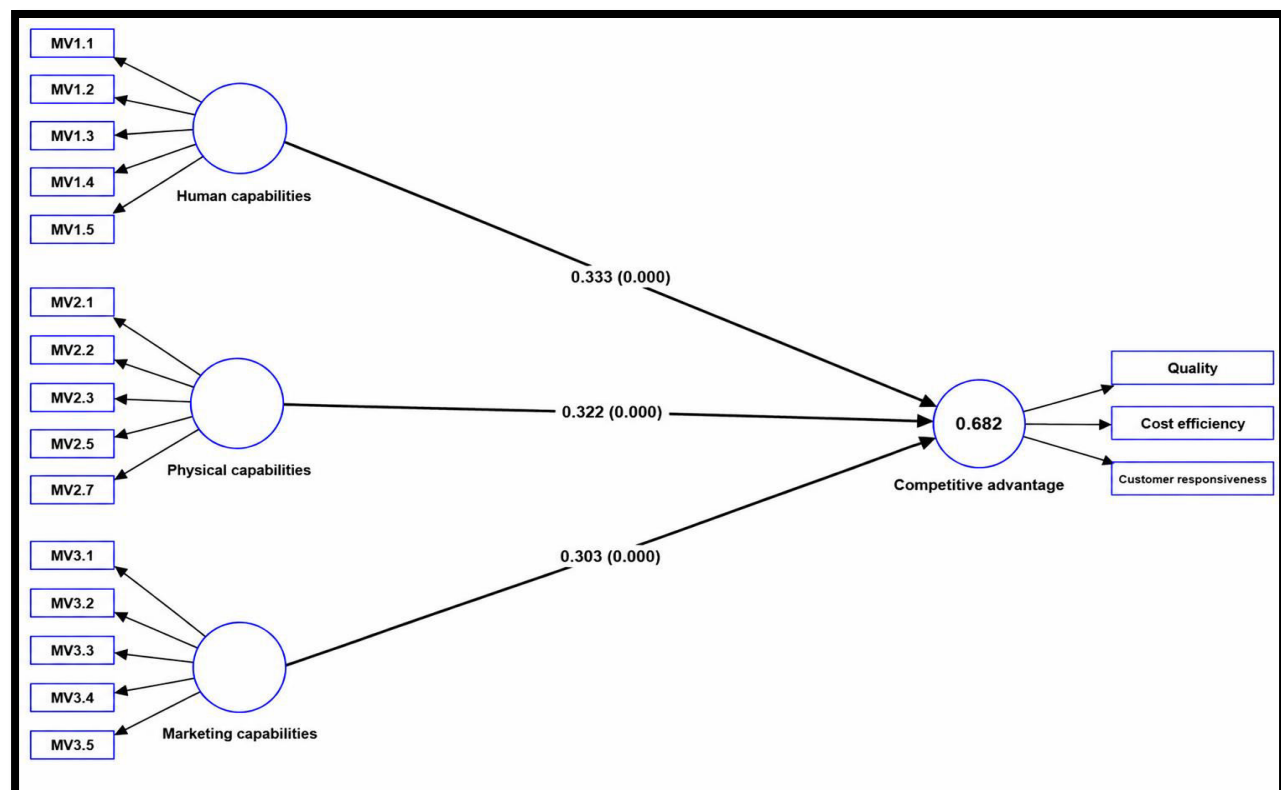
The structural model was evaluated with bootstrapping (5,000 subsamples). Collinearity was not a concern ($VIF = 2.760$; tolerance = 0.362), and no collinearity problems were detected among the capability dimensions (all $VIF < 5$). The model exhibited substantial explanatory power, explaining 74.6 percent of the variance in competitive advantage ($R^2 = 0.746$). The effect size of organizational capabilities was large ($f^2 = 0.290$), and predictive relevance was confirmed for competitive advantage ($Q^2 = 0.591$).

Table 2. Structural path results

Hypothesized path	β	SE	t-value	p-value	Result
Organizational capabilities → Competitive advantage	0.463	0.051	9.112	< 0.001	Supported

Table 3. Dimensional effects of organizational capabilities on competitive advantage (H2)

Path	β	SE	t-value	p-value	Rank
Human capabilities → Competitive advantage	0.333	—	6.645	< 0.001	1
Physical capabilities → Competitive advantage	0.322	—	7.415	< 0.001	2
Marketing capabilities → Competitive advantage	0.303	—	6.315	< 0.001	3

**Figure 1.** Structural Model of Hypothesis 2

Hypothesis 1 is supported: organizational capabilities significantly and positively affect competitive advantage ($\beta = 0.463$, $t = 9.112$, $p < 0.001$). Hypothesis 2 is likewise supported at the dimensional level: human capabilities exhibit the strongest effect on competitive advantage ($\beta = 0.333$, $t = 6.645$, $p < 0.001$), followed by physical capabilities ($\beta = 0.322$, $t = 7.415$, $p < 0.001$) and marketing capabilities ($\beta = 0.303$, $t = 6.315$, $p < 0.001$), with all three effects significant at $p < 0.001$.

4.4 Robustness and control assessments

The robustness of the findings was examined against organizational characteristics. Independent-samples t-tests revealed no significant differences in respondents' evaluations of organizational capabilities according to hospital age (all $p > 0.15$), and one-way ANOVA indicated that hospital size (measured by staff headcount) did not significantly differentiate these evaluations ($F = 1.352$, $p = 0.260$). These null effects reinforce the generalizability of the capability–advantage mechanism across hospitals of varying maturity and scale.

5. Discussion

The central aim of this study was to determine whether, and how, organizational capabilities translate into competitive advantage in private hospitals. The empirical answer is unequivocal: organizational capabilities exert a substantial and statistically robust effect on competitive advantage ($\beta = 0.463$, $p < 0.001$), corroborating the theoretical core of the resource-based view that inimitable organizational routines—not market position alone—generate superior value (Barney, 1991; Peteraf, 1993; Wernerfelt, 1984). The finding resonates with Makadok's (2001) synthesis, which predicts that capability-building mechanisms create rents that are causally ambiguous and therefore durable, and with the recent systematic review of small and medium-sized enterprises by Fabrizio et al. (2022), which concludes that capabilities directly and indirectly shape competitive advantage across contexts. Extending this literature, the present evidence demonstrates that the capability mechanism is equally operative in a crisis-affected, service-dominant healthcare market, where institutional volatility arguably elevates the value of internally embedded routines. It also converges with evidence from knowledge-based firms, where organizational capabilities decisively drive performance outcomes (Samadi et al., 2023), and from hospital settings in Indonesia, where organizational capability dimensions significantly shape competitive advantage (Tj et al., 2025).

Three findings merit particular discussion. First, the dimensional hierarchy—human ($\beta = 0.333$) > physical ($\beta = 0.322$) > marketing ($\beta = 0.303$)—confirms the primacy of human capabilities in healthcare. Because hospital services are produced and consumed simultaneously by patients interacting with clinical and administrative staff, the knowledge, skills, and behaviors of employees permeate every touchpoint of quality and responsiveness; this aligns with evidence from Indonesian hospitals showing that human capital significantly shapes competitive advantage and business performance (Tj et al., 2025). The descriptive finding that physical capabilities score highest in absolute terms ($M = 4.143$) while marketing capabilities score lowest ($M = 3.701$), yet human capabilities still dominate the structural effects, suggests that Yemeni hospitals have invested more heavily in tangible infrastructure than in people or market intelligence, and that human capability—the scarcest and hardest-to-imitate asset in a conflict economy—delivers the greatest marginal return to competitive advantage. This pattern echoes Amit and Schoemaker's (1993) caution that resources only become advantageous when organizational routines effectively deploy them.

Second, the physical capability dimension, though second in effect size, warrants attention because of the gap between its descriptive prominence and its structural weight. Hospitals in the sample report comparatively strong physical capabilities (relative importance = 82.9 percent), yet the corresponding effect on competitive advantage ($\beta = 0.322$) is marginally weaker than that of human capabilities. This pattern is consistent with the RBV prediction that tangible assets are easier to imitate and purchase than socially complex human routines, so that equipment alone generates less durable advantage (Barney, 1991; Makadok, 2001). In practice, this means that newly installed medical technology confers advantage only while it remains rare; as competitors acquire similar equipment, the differentiating effect erodes unless physical assets are coupled with the human skills required to exploit them.

Third, the marketing capability dimension, despite scoring lowest in absolute terms ($M = 3.701$; relative importance = 74.0 percent), exerts a significant effect on competitive advantage ($\beta = 0.303$, $p < 0.001$). This is a strategically important finding: marketing capability is both the weakest and the most underappreciated driver of advantage in the sampled hospitals. Meta-analytic evidence across 25 years of research confirms that marketing capabilities robustly enhance firm performance (effect size = 0.31, $p < 0.001$) across all their dimensions (Vieira et al., 2026), and marketing capability has been identified as a determining factor of competitive advantage and as a

mechanism whose orchestration translates into superior performance (Duah et al., 2024). The large standard deviation of the marketing scale ($SD = 0.884$) further indicates substantial variation across hospitals, implying that professionalizing patient-needs assessment, service positioning, and value communication represents an accessible, high-return opportunity for currently underperforming hospitals.

Finally, the explanatory and predictive performance of the model ($R^2 = 0.746$ for competitive advantage; $Q^2 = 0.591$) substantially exceeds the thresholds conventionally regarded as substantial in PLS-SEM research (Hair et al., 2017, 2021; Shmueli et al., 2019), indicating that the capability–advantage mechanism accounts for the lion's share of variation in hospital competitive positioning. The null findings for hospital age and size further strengthen the internal validity of the mechanism: the effect of capabilities on advantage does not depend on the maturity or scale of the institution, implying that the capability imperative applies to small specialty clinics and large multispecialty hospitals alike.

5.1 Theoretical implications

The study advances theory in three ways. It operationalizes organizational capabilities as a reflective-reflective second-order construct whose dimensions (human, physical, marketing) are validated with strong reliability and convergent validity—a measurement contribution relevant to future PLS-SEM applications. It provides, for the first time to our knowledge, a dimensional decomposition of the capability–advantage relationship in a developing-country hospital context, demonstrating that the three capability dimensions contribute unequally and identifying human capabilities as the leading driver. It locates the capability–advantage relationship in a conflict-affected developing economy, extending the generalizability of the RBV beyond the stable institutional environments in which most prior evidence originates (Agwunobi & Osborne, 2016; Teece et al., 1997).

5.2 Practical implications

For hospital administrators, the findings suggest a clear investment logic. Because human capabilities most strongly drive competitive advantage, hospitals should prioritize staffing quality, continuous clinical and managerial training, retention mechanisms, and performance-based rewards, particularly in contexts where skilled migration depletes the talent pool. Because physical capabilities score highest in absolute terms yet contribute marginally less to advantage, capital expenditure in medical equipment should be evaluated not

merely by its modernity but by the human skills required to exploit it, ensuring that technology investments are matched with training and clinical governance. Finally, because marketing capabilities scored lowest yet remain significant drivers of advantage, hospitals should professionalize patient-needs assessment, service positioning, and communication, converting currently latent market intelligence into an active source of differentiation.

5.3 Limitations and future research

Several limitations qualify the findings. The cross-sectional design precludes causal inference; longitudinal and panel designs would strengthen causal claims. The sample is restricted to private hospitals in Sana'a, limiting external validity to public hospitals and to other regions of Yemen or other countries; replication in different healthcare systems would be valuable. The self-reported, perceptual measures of competitive advantage, while standard in the field, could be complemented by objective performance indicators (occupancy rates, patient outcomes, financial ratios). Finally, future studies could examine moderating contingencies—environmental turbulence, regulatory pressure, and digital transformation—that may condition the capability–advantage relationship, and could decompose competitive advantage further by estimating the effect of each capability dimension on each advantage dimension.

6. Conclusion

This study set out to examine the effect of organizational capabilities, through their human, physical, and marketing dimensions, on competitive advantage and its quality, cost efficiency, and customer responsiveness dimensions in private hospitals. Using PLS-SEM on a valid sample of 354 senior managers across 15 classified private hospitals in Sana'a, Yemen, the study established that organizational capabilities significantly and substantially enhance competitive advantage ($\beta = 0.463$, $p < 0.001$), that human capabilities are the strongest dimensional driver ($\beta = 0.333$), followed by physical ($\beta = 0.322$) and marketing capabilities ($\beta = 0.303$), and that the model explains a substantial share of the variance in competitive advantage ($R^2 = 0.746$). The findings validate the resource-based logic in a hospital context under resource-scarce, crisis-affected conditions, and they provide managers with an empirically grounded prioritization of capability investments. By developing deployable human, physical, and marketing capabilities—and by investing first in the human dimension—private hospitals can construct competitive positions that rivals find difficult to replicate.

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Disclosure Statement

The authors declare that there are no conflicts of interest regarding the publication of this research. All data and materials used in this study are accurately reported, and no financial or personal relationships have influenced the results or interpretation of the study.

Ethical approval and consent to participate

This study was conducted in accordance with ethical standards and received approval from the relevant institutional review board. All participants were fully informed about the purpose of the study, and their participation was voluntary. Written or verbal informed consent was obtained from all participants prior to data collection, and confidentiality and anonymity were strictly maintained throughout the research process..

Availability of data and materials

The data supporting the findings of this study are available from the corresponding author and can be shared upon reasonable request.

Author contribution

Al-Bahri developed the study concept, designed the methodology, collected and analyzed the data, and prepared the manuscript. Al-Ashwal provided supervision, offered critical feedback, and guided the research process. Both authors have reviewed and approved the final version of the manuscript.

Conflict of interest

The authors confirm that there are no conflicts of interest related to this study.

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