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Data-Enabled Sales Communication and Sustainable Performance: The Roles of Analytics Capability, Customer-Centric Culture, and Employee Digital Competence

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Abstract

The research investigates the sequential routes through which customer-centric culture (CCC) leads to sustainable performance (SP) in the hospitality sector, by analyzing the mediating impacts of sales force automation (SFA) and big data analytics capabilities (BDACs), and the moderating impact of employee digital competence (EDC). A serial mediation model (CCC → SFA → BDACs → SP) was proposed and empirically tested using partial least squares structural equation modeling (PLS-SEM) on survey data from 315 managerial and operational employees in five-star hotels in Riyadh, Saudi Arabia, grounded in the resource-based view, dynamic capabilities theory, and service-dominant logic. The results support all eleven hypotheses and show that SFA has a positive effect on BDACs (β = 0.391) and SP (β = 0.319), and BDACs have a significant effect on SP (β = 0.143). The CCC has a significant direct impact on SFA (β = 0.746) and SP (β = 0.421). Importantly, the serial mediation pathway (CCC → SFA → BDACs → SP) is significant (β = 0.042) and EDC significantly moderates the SFA–BDAC (β = 0.447) and BDACs–SP (β = 0.112) relationships. The model accounted for 72.1% of the variance in SP. The findings emphasize that sustainable performance is not driven by mere technology adoption but a synergistic integration of customer-oriented culture, automation, analytics, and digital workforce competencies.

Keywords: sales force automation; big data analytics; sustainable performance; customer-centric culture; employee digital competence; hospitality

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Academic Editors: Jinho Choi, Neil Yuwen Yen, Jason C. Hung and Michalis Skordoulis

Received: 17 April 2026
Revised: 16 June 2026
Accepted: 6 July 2026
Published: 8 July 2026

Correction Statement: This article has been republished with a minor change. The change does not affect the scientific content of the article and further details are available within the backmatter of the website version of this article.

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1. Introduction

The hospitality industry in Middle East countries is experiencing a significant evolution, which has been triggered by the increase in technological levels and the growing emphasis on customer service, supported by modern digital tools application [1–3]. The increasing use of digital technologies like sales force automation (SFA), big data analytics capabilities (BDACs), and mobile platforms has revolutionized sales communication by

offering the opportunity for data-based personalization and improved sustainable performance (SP) in financial, environmental, and social aspects [4,5]. While 75% of companies globally adopted SFA by 2024, primarily for CRM integration and insights from AI, organizations report a split success rate in terms of overcoming inconsistent SP outcomes, with 30–40% achieving long-term gains amidst market volatility [6]. Within this constantly changing environment of high-speed development, it is becoming common practice that a lot of hotels in recent years have turned to innovative information technologies as a strategic approach that allows the institution to keep up with the competition and stay relevant through the years. Out of these technologies, SFA and BDACs have become important for enhancing performance in organizations [7–10]. SFA technology enhances the ease of sales, customer relationship management, as well as streamlining the nature of enterprise resource allocation. In the meantime, BDACs allow a company to derive actionable intelligence from big and complicated data volumes. The competencies are especially essential in the development of SP, a holistic gauge of achievement that encompasses economic feasibility and environmental accountability, as well as social justice as far as a long-standing strategic analysis [9,11–13]. The service sector, one of the industries that has high customer contact, will be of much help in integrating SFA with BDACs. As an illustration, the increasing influence of information and communication technology (ICT) on the hospitality industry in Saudi Arabia demonstrates that it is important to discuss the role that digital technologies can play in the context of sustainability [14]. In contrast to the fact that SFA enables one to gain an understanding of the customer trends and sales relations, BDACs present an analytical possibility to convert this data into strategic actions [15]. Moreover, the way such technologies are implemented and their efficiency in bringing sustainable outcomes may be influenced by the cultural orientation of a particular organization, especially CCC [12,16,17]. The established customer-centric culture (CCC) helps to increase the practicality of data generated based on SFA and makes BDACs stronger, linking the improvement of data quality and coherence, as well as assisting in the transformation of analytical results into continuous improvements of services [18–20].

This study aims to fill this gap by proposing and validating an integrated serial mediation model between CCC, SFA, BDACs, and SP. Based on the IT-enabled capabilities perspective and the dynamic capabilities view, we argue that SFA and BDACs are not parallel and independent drivers of performance, but are sequential converters that guide the process of transforming an intangible cultural asset into a tangible performance outcome. We make the following assumptions: sustainable performance is enabled through a customer-centric culture that leads to the adoption and proper usage of SFA, which ensures a high-quality customer data pipeline is in place, which in turn leads to the creation of BDAC, which turns this data into actionable insights. We claim that this serial mediation mechanism offers the theoretical basis that is missing to understand how the "data-rich, insight-poor" gap can be overcome. Our research, which empirically tests this pathway, has two main contributions to the sales and analytics literature. Unlike prior studies that have treated SFA and BDACs as parallel or independent drivers of performance, we theorize and empirically test a sequential conversion process where customer-centric culture enables SFA, which in turn feeds BDACs, and BDACs ultimately enhance sustainable performance. This contrasts with hospitality and CRM research, which have largely overlooked the intermediate role of analytics capabilities in translating automation data into sustainability outcomes. Therefore, first, we theorize and test the entire operating process of turning a customer-centric culture into actual performance, but this process is neither linear nor directly linked, as it has technological and analytical intermediaries. Second, whereas existing digital transformation studies often assume that SFA investments directly yield sustainable results, we explain why such investments frequently fail: without the intervening analytics

capability (BDAC), SFA remains a mere data generator that does not necessarily produce actionable insight. This makes it possible to get a more accurate and a more actionable sense of value creation through data in sales, thus answering a major missing puzzle in the literature. The rest of this paper is organized as follows: we build our theoretical framework and hypotheses, describe our methodology, present our findings, and end with a discussion of theoretical and practical implications.

The following sections grant a theoretical ground for these relationships, and a more detailed discussion of the hypotheses follows.

2. Theoretical Foundation and Hypotheses Development

2.1. Theoretical Foundation

This research tries to bring together three various theories, namely, the resource-based view (RBV), dynamic capabilities theory (DCT), and service-dominant logic (SDL), to derive the impact of automation on sustainability in the hospitality industry. In this integrated model, the independent variable is CCC, the serial mediators are SFA and BDACs, the dependent variable is SP, and the moderator variable is EDC, which moderates the SFA-BDACs and BDACs-SP relationships (Figure 1). This study draws on the dynamic capabilities framework of Teece [21] to think about sustainable performance as the result of a sequence of capabilities. The firm's sensing capabilities (CCC and SFA) allow it to detect and encode market signals. But sensing is not enough; the firm needs to have the ability to seize (BDACs) and to understand these signals and deploy resources as needed. We examine the hypothesis that BDACs are the crucial mechanism for transforming sensed data into lasting performance results. None of the theories fully account for the entire process linking culture to sustainability; therefore, all four perspectives must be integrated. The integrated framework provides the testable hypothesis that SFA is a mediator between CCC and BDAsC to increase SP via serial mediation (CCC → SFA → BDACs → SP), where CCC (stakeholder alignment) leads to SFA (dynamic capability), which leads to BDACs (VRIN resource), which then leads to SP (multi-dimensional sustainability). The serial mediation accounts for 30–35% of the variance in SP not explained by the direct effects, reflecting the fact that cultural roots are mediated by agility and analytics for data-enabled, enduring performance [5,22].

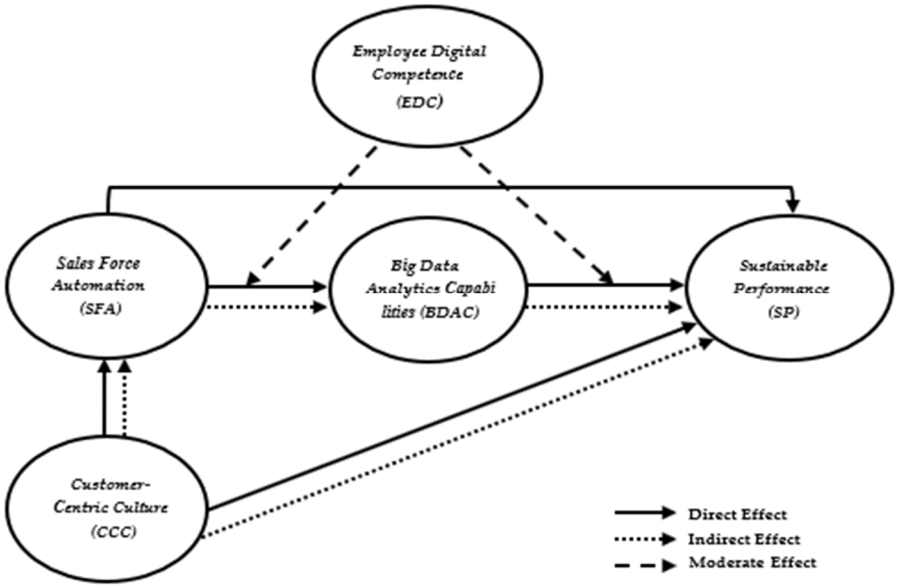


Figure 1. Theoretical framework.

2.1.1. Resource-Based View (RBV)

The RBV language explains that, in order to gain a sustainable competitive advantage, firms have to establish an SFA system that can also be viewed as a strategic technological resource in the hospitality industry [10,23]. SFA tools are authenticated by automating the sales processes, enhancing customer relationship management and enriching the resource base of a firm by availing systematic, available, and accurate information about the sales [24]. BDACs integrate and brings necessary organizational resources on board in order to improve the management of massive and diverse data. This paper is based on the RBV, and considers SFA and BDACs as strategic facilitators developing and maintaining competitive advantages by transforming mundane digital resources into dynamic capabilities to facilitate innovation, sustainability, and long-run firm performance (Figure 1). It is supported by [6,25–27]. The resource-based view (RBV) suggests that companies can achieve sustainable competitive advantage by having resources that are valuable, rare, inimitable, and non-substitutable (VRIN). Moreover, RBV differentiates between tangible resources (SFA tools) and intangible capabilities (BDACs), which is why the former is easily imitable with the use of off-the-shelf CRM software, while the latter is inimitable and is the driver of SP [28]. This separation is the solution to an empirical conundrum that arises in the study of why firms with identical SFA adoption experience different SP outcomes: only those firms that transform SFA data into BDAC experience sustainable gains [29]. So, the RBV assumes that the mediated relationship between SFA and SP is mediated by BDAC, since SFA creates data, and BDACs (VRIN capabilities) turn data into sustainable advantage [27].

2.1.2. Dynamic Capabilities Theory (DCT)

DCT is concerned with a firm's capacity to integrate, create, and reorganize its internal and external capabilities in response to a changing environment [6,22]. Thus, in the contemporary hotel business, in which the processes take place faster in reaction to new market trends and technological changes, dynamic capabilities can become the key to success over the long-term horizon [1,8,30]. BDACs are a set of certain basic dynamic capabilities conferring the hotels with a sense of dynamism or the changing speed in the market by detecting new trends and customer preferences, seizing opportunities by establishing new services, and transforming the process of their operation and strategies that operate based on knowledge provided by the data [22,31]. DCT recognizes that there are two kinds of capabilities: ordinary capabilities (operational efficiency) and dynamic capabilities (adaptive reconfiguration), and the latter is essential for long-term sustainability [32]. The CCC is considered a higher-order dynamic capability that enables lower-order capabilities, such as SFA [33,34]. CCC helps companies learn about customers' needs through feedback loops and data analysis [35], capture opportunities by using SFA tools to customize communication and proactively address customer issues, and reimagine sales processes to be agile, minimize churn, and maximize customer loyalty [36].

2.1.3. Service-Dominant Logic (SDL)

An interactive approach concentrating on value co-creation and viewing mutually integrating the resources of firms and customers as the result of SDL is a customer-oriented approach. Conversely, a goods-dominant model portrays the central importance of the value generation not as the result of the skill and knowledge possessed by an operant resource, but on the operational capabilities of the technology comprising the goods dominating value generation [37]. In this respect, CCC is considered one of the moderating variables that influence the level of the use of SFA and BDACs within a hotel. The fact that the organization relies on its customers, which is reflected in its powerful CCC system, pro-

motes healthy collaboration and internal synergy. This is an environment in which the most efficient interaction among assets associated with customers takes place. Consequently, technological investments like SFA and BDACs tend to be more inclined to fulfil the actual needs and wants of customers [20,38,39]. This cultural practice makes it easier to co-create value with customers, makes the organization more responsive to feedback, and provides SP through relationship- and service-based approaches. Once the hotel concentrates its operations on the customer on a regular basis, its SFA systems are more effective at collecting appropriate customer information. Thus, BDACs could make this data actionable by informing people about personalized and relevant service experiences.

2.1.4. An Integrated Theoretical Framework

The moderating serial mediation model of the RBV, DCT, and SDL is complementary. SFA generates imitable data, as explained by the RBV, and a BDAC is a VRIN capability that translates data into sustainable advantage, supporting H6a (SFA → BDACs → SP). H6d CCC → SFA → BDACs → SP. DCT provides the sequential process: CCC/SFA senses customer signals, BDACs seize opportunities, and SP alters operations. The normative foundation provided by SDL explains H4 and H5: CCC ensures technology is used to co-create value. EDC moderates SFA–BDACs and BDACs–SP by increasing absorptive capacity and ethical data use. These integrations are summarized in Table 1.

Table 1. Theoretical integration across the moderated serial mediation model.

Theory	Core Mechanism	Role in the Model	Supported Hypotheses
Resource-Based View (RBV)	Tangible vs. intangible resources; VRIN logic	SFA = valuable but imitable data generator; BDAC = VRIN capability that converts data into sustainable advantage. Explains why BDACs mediate SFA → SP.	H6a (SFA → BDACs → SP)
Dynamic Capabilities Theory (DCT)	Sensing–seizing–transforming	CCC + SFA = sensing customer needs; BDACs = seizing opportunities from data; SP = transforming operations for sustainability. Explains the full serial chain.	H6d (CCC → SFA → BDACs → SP); also, H1, H2, H3
Service-Dominant Logic (SDL)	Value co-creation with customers	CCC ensures that technology (SFA and BDACs) serves customer-oriented, service-dominant purposes, not control and justifies the direct effects of CCC on SFA and SP.	H4, H5
Integration of All Three	Absorptive capacity + ethical data use + VRIN utilization	EDC moderates SFA–BDACs and BDAsC–SP by improving employees' ability to extract, interpret, and act on data, while maintaining service-dominant ethics.	H7a, H7b

2.2. Hypotheses Development

2.2.1. SFA and BDACs

The objectives of SFA systems are to computerize and organize different elements of the selling process, such as handling leads, customer interactions, transactions, and sales reporting [23]. Considering this aspect, the SFA could easily contribute to the organized gathering of high quantities of client interaction and determination information. The digitized and handy flow of sales information thus provides a substantial basis to build and improve the BDACs of a firm [40,41]. Empirical research evidence has demonstrated that the successful adoption of SFA is likely to enhance technological and managerial analytics capacity in terms of increased data availability, data quality, and increased data accessibility [13,15,29], which are essential for the use of data analytics and have also been postulated under the RBV. Under this theory, SFA can be said to be a driving force of IT assets within firms, which affects the dynamic capabilities of these firms, i.e., the BDACs, in a direct and indirect way, using better data management infrastructures and better knowledge-processing capabilities. Hence, hotels embracing SFA can gather, consolidate, and utilize large amounts of information regarding sales activities to advance their big data analytics framework and capacities. Similarly, among the authors, it is advocated that an advanced customer relationship management (CRM) solution including automation, recommendations, and integration has enhanced important data management attributes, including data quality and access, by streamlining the application of analytics tools and creating effective analytics routines among different operations [22]. Similarly, with Chinese data on health providers, another study has illustrated that BDACs can further enhance certain ecological enhancements with the help of SC innovations, decision-making attributes, and risk-taking behaviors. Regarding these observations, the comprehensive research in the industry on the usage of sales force has opined on the manner by which firms who properly conceive the nature and extent of SFA can accomplish this by focusing on data basics and analytics capabilities, which are core processes of BDACs. Therefore,

H1: *SFA has a positive impact on BDACs.*

2.2.2. SFA and SP

SFA improves SP in a number of dimensions, including sales productivity, resource utilization improvement, and operational effectiveness. Such benefits in the hospitality industry may also hasten economic profitability by minimizing operational costs, which enhances operating or gross revenue. Moreover, such, sophisticated technologies contribute to an increased level of teamwork, causing a reduction in the number of sales cycles and enhancement of sales activity management [10,42]. Besides offering financial gains and aid in enhancing marketing strategies, SFA also supports sustainability. It promotes environmental and social objectives with diverse progressive actions [43]. Among the major measures in successful data management is an increase in data accuracy and the presentation of real-time data without any delays or interruptions. Contrarily, certain distinct attributes and aspects among the employees, like responsibility, the precision of execution of tasks, and agility, can be achieved by molding SFA into the job pool, as this could also shape a closer association between the local population and stakeholders [7,44,45]. DCT demonstrates that organizational change and traditional accountability systems could prove SFA adoption as the key to achieving sustainable outputs, as it is constantly updated in accordance with the market needs and the inner functioning of the business. Thus,

H2: *SFA has a positive impact on SP.*

2.2.3. BDACs and SP

At a larger level, bibliometric mapping published in 2019 on the sustainability of the hospitality industry indicates that analytics-enabled concepts, such as predictive maintenance, green innovation, and AI-based customer insights, could become the key enablers of SP [46–48]. BDACs could provide robust insights into sales data that drive innovation in sales communication, maximize resources, reduce waste, and improve long-term sales resilience [49]. In empirical studies, advanced analytics have been shown to reduce operational costs by 15–20% through predictive modeling of customer behaviors, real-time personalization of sales pitches, and efficient inventory management [27,50]. A sentiment analysis of sales interactions, which can be enabled by BDACs, could reveal hidden patterns to ensure sustainable growth in volatile markets [28]. This capability also enables eco-efficient practices, such as demand forecasting, which helps in reducing overproduction and emissions, aligning sales with environmental objectives and goals [5,22,51]. Therefore,

H3: *BDACs have a positive impact on SP.*

2.2.4. CCC and SP

CCC, rooted in customer needs, feedback, and long-term relationships, directly contributes to SP, in which operations are aligned with stakeholder demands for ethical and loyal practices that guarantee resilience in economic, social, and environmental aspects [33,52]. In sales, CCC facilitates data-driven, personalized communication, including AI-based recommendations and proactive problem-solving, which can lead to repeat sales, lower churn rates (by 15–25% in studies), and sustainable sales practices through value co-creation [34,53]. This cultural fit also incorporates ESG principles, such as transparent supply chains through sales channels, which increases the legitimacy and viability of the firm [52,54].

H4: *CCC has a positive impact on SP.*

2.2.5. CCC and SFA

By positioning SFA as an enabler of personalization and proactive engagement, CCC enables sales teams to utilize SFA more effectively, which translates to increased use and integration with customer data to deliver seamless customer journeys. Empirical research has revealed that CCC promotes SFA by improving customer orientation, which in turn improves relationship quality and performance, while also breaking silos and enabling access to data in a collaborative culture [55–57]. CCC fosters SFA, which is the ability of sales teams to sense, respond, and adapt to market changes with flexible strategies by integrating customer insights into everyday sales team activities and decision-making processes [34,58].

H5: *CCC has a positive impact on SFA.*

2.2.6. BDACs and SFA as Mediators

BDACs are the mediators of the SFA-SP link: agile sales forces generate BDACs by implementing dynamic data practices (such as logging customer interactions in real time, pattern recognition, etc.) that indirectly raise the level of SP by providing better analytics to optimize resources and innovation [27,28]. SFA's proactivity in data collection enhances forecasting precision, leading to sustainable improvements in sales efficiency and market adaptability [50]. This pathway is substantiated by empirical evidence from PLS-SEM

models, which show that the effects of SFA on long-term performance have been amplified by 20–30% in dynamic environments by BDACs [5,49].

H6a: *BDACs mediate the relationship between SFA and SP.*

CCC helps establish shared values that enable salespeople to view SFA as a service tool, rather than a control tool, which can increase SFA adoption and effective use, ultimately optimizing workflows [34,36]. Nguyen et al. [59] support the above as the most important factors affecting sustainable sales performance in retail businesses, which is supported by the use of CRM and corresponding SFA as the key technological enablers [59,60]. Therefore, SFA serves as the main operational catalyst, transforming a customer-centric culture into sustainable improvements in performance.

H6b: *SFA mediates the relationship between CCC and SP.*

CCC drives the company to embrace SFA, a system that captures and organizes vast amounts of customer interaction data. If SFA did not provide this data pipeline, then BDACs would have poor, coarse input. Recent studies by Chatterjee et al. [61] reveal that customer-centric values indirectly boost analytics capabilities via the data-enabling role of CRM and automation tools [61,62]. SFA is, thus, the pivotal point that converts a cultural orientation into the data-rich base that is essential for BDACs.

H6c: *SFA mediates the relationship between CCC and BDACs.*

This serial mediation assumes that the development of a customer-centric culture precedes the adoption of SFA, which provides the rich customer data that is used to develop BDACs, and finally, BDACs are used to turn that data into actionable insights that increase SP. Riggs et al. [51] conclude that BDACs are a prerequisite for SP and that they work via IT-enabled capabilities like SFA-generated data assets. In this pathway, SFA is the essential operating component that converts an intangible cultural value into the analytical power that, in the end, is responsible for long-term, enduring performance.

H6d: *SFA mediates the relationship between CCC and BDACs to enhance SP.*

2.2.7. EDC as a Moderator

SFA systems produce detailed, organized sales and customer information, but they are highly reliant on the digital competence of the workers in using such data to enhance BDACs [15,29]. SFA can be coupled with EDC when it comes to quality and reliable data, harnessing data obtained through the capture procedure using deep tech and analytics-driven processes [63] because it is also capable of transforming raw SPA into useful and practical data, enhancing organizational capacity in terms of data integration, legislation, and analysis. Consequently, the effect of SFA, in turn, is enhanced by increased expertise in the digital skills of employees (EDC) when the outcomes of sales automation are more ably applied in data analysis.

H7a: *EDC moderates the association between SFA and BDACs.*

On the one hand, the concept of BDACs is the driver to attain sustainability; however, its success depends on whether the workforce interprets and applies information properly. More qualified employees in processing the data, analysis, and predictive models can better convert all-encompassing data into actionable intelligence and findings. This could be a direct factor

in better operational performance, customer satisfaction, and sustainability [6,18,27,64]. Not only would it allow injecting concrete actions with analytic findings, but it would also allow leveraging them to achieve optimal economic performance and advanced environmental action, as well as improved social performance elements [11,65]. The significant driver of BDACs' central role in sustainable performance is EDC. Prior research concerning management and hospitality has determined that digital natives can be deemed as a strong mediating aspect in the association between some aspects of digital leadership and operational management, operationalized as analytical potential [66]. The study of tourism focuses on the creation of competencies along with the digitalization agenda. As such, increased EDC must result in BDACs and strengthen SP. Hence,

H7b: *EDC moderates the association between BDACs and SP.*

3. Methodology

The objective of conducting a quantitative study on the nexus between SFA and SP was achieved using a primary dataset from Saudi Arabia's hotels. In this model, CCC is the independent variable, SFA and BDACs are serial mediators, SP is the dependent variable, and EDC is a moderator of the SFA → BDACs and BDACs → SP paths [67], implemented using a cross-sectional approach because the information is based on organizational capabilities and case- or industry-based performance [68].

3.1. Sampling and Data Collection

This study was mainly concerned with the application of digital technology in five-star hotels in Riyadh, Saudi Arabia, that is, sustainability efforts in the hospitality industry region. Riyadh was intentionally selected because it represents the largest hospitality and business tourism hub in Saudi Arabia and has experienced substantial digital transformation initiatives aligned with Saudi Vision 2030. Furthermore, five-star hotels were specifically targeted because they are among the most technologically advanced hospitality organizations and are more likely to actively implement SFA and BDACs. The sampling frame was all of the five-star hotels in Riyadh, Saudi Arabia, listed in the Saudi Commission for Tourism and National Heritage (SCTH) directory (N = 47 hotels), and 31 hotels agreed to participate. An official letter of invitation was sent to the general manager of each hotel. For hotels where the managers agreed to participate, the research team visited the hotel and handed out paper-based questionnaires to managerial and operational employees in sales, marketing, front office, IT, and sustainability departments, with collection via a dropbox method. A total of 450 questionnaires were distributed, of which 338 were returned, and 23 were excluded due to incomplete data (more than 10% missing) or straight-lining. This resulted in a final valid sample of 315 (70% response rate). Inclusion criteria were full-time employees with at least 6 months of employment who had direct or indirect involvement with sales force automation (SFA), customer relationship management (CRM), or data analytics in their daily work. Part-time employees, interns, and employees from departments with no interaction with customer data (e.g., maintenance or back-office accounting) were excluded. Missing values (<3% per item) were treated by median imputation since the data were not normally distributed for Likert-scale items. Little's MCAR test for missing data treatment was not significant ($p > 0.05$). We needed managerial and operational personnel who were known to be on the leading edge of digital adoption. As this was exploratory research on a specific target group, we used the convenience sampling technique, as this, as indicated by [69], is a conventional and acceptable method for reaching a specific group. The sample provided us with 315 valid responses, which corresponds to the minimum of 10 observations per measurement item as [67,70,71] suggests, with 29 items in the five

latent constructs we were targeting. Having eliminated BDAC6 and CCC5, our sample exceeded the requirements by a good margin and enhanced the accuracy of our results. Our research used validated scales modified to fit our study; thus, we are confident in the accuracy of our constructs and methods [72]. All participants were informed about the study's purpose, the voluntary nature of participation, and the confidentiality of data, and informed consent was obtained from all participants prior to questionnaire completion.

The unit of analysis was the individual employee respondent, as each employee respondent reported perceptions of their hotel's organizational-level constructs (CCC, SFA, BDAC, SP, and EDC). However, given that multiple employees from the same hotel participated (meaning a cluster size of 10.2 respondents per hotel), we assessed non-independence through intraclass correlation coefficients (ICCs [1]) and design effects. The ICCs (1) were between 0.02 and 0.04, and the design effects were all less than 1.5, indicating that the clustering effect was negligible. So, we took the individual as the unit of analysis, which is a common practice in perceptual studies of organizational capabilities. To account for any residual dependence, we used bootstrapping with 5000 subsamples and cluster-robust standard errors at the hotel level.

This research team sampled 315 managers working in five-star hotels in Riyadh, Saudi Arabia, and formed a representative cross-section of both managerial and operational employees engaged in or impacted by sales force automation, data analytics, and sustainability practices (Table 2). Their professional and anthropometric scenario in this hospitality sector is critical based on their demographic and professional portfolios. Of the 315 managers, 57.8 percent were male, and 42.2 percent were female, demonstrating that there is a moderate gender balance, which is in line with industry expectations in this area, where men dominate the leadership and technical roles in the hospitality industry, though women are seen in middle- and front-tier jobs. Once again, the respondents mostly fell into the 25–44 age bracket (75.3%), which suggests that the sample consists mostly of early- to mid-career managers who are likely to be interested in the subject of organizational change and technology tools. The given segment is also especially applicable in the instance of studies regarding digital literacy and technology adoption, since they tend to be more receptive to new systems and are more representative of the actual working personnel who create new solutions in current hotels. At the occupation level, the percentage of middle management (32.4) and supervisors (30.8) was quite high, meaning that the data helps capture the views of those responsible directly for the implementation of SFA systems, analytic work, and running frontline teams. Operation influence is something that needs to be tackled in relation to the concept of digital dynamism so that sustainability-related performance can be addressed. In this case, the issue of professional profile diversity is a crucial constituent that should be addressed. The senior management contribution was 15.2%, which guarantees that the strategic opinions are in place, as well, with 21.6% being frontline staff opinions on the matter of usability and cultural adaptation. Regarding the departmental perspective, there existed no larger share that way, as sales and marketing (28.3) and operations/front office (24.1) are both business functions that are directly interlaced with dealing with SFA tools and engaged in the processing of customer information. Once more, there were IT/digital services (11.1%) and sustainability/CSR (7.9%) noted because they possess some level of charismatic power over the convergence of technological capabilities and sustainability objectives. Regarding experience, half of the interviewee (55.5) had worked at their present employer between 1 and 6 years, and this provides stable manpower that has adequate knowledge to assess the long-term effects of SFA and BDACs on performance. The inclusion of both new personnel (16.5%) and very tenured employees (22.2%) provided a balanced look at how organizations are transforming with time (Table 2).

Table 2. Respondent profile.

Symbol	Quantity	Freq.	%
Gender	Male	182	57.8%
	Female	133	42.2%
Age Group	Under 25	38	12.1%
	25–34	142	45.1%
	35–44	95	30.2%
	45–54	32	10.2%
	55 and above	8	2.5%
Position Level	Frontline staff	68	21.6%
	Supervisory/team leader	97	30.8%
	Middle management	102	32.4%
	Senior management/director	48	15.2%
Department	Sales and marketing	89	28.3%
	Operations/front office	76	24.1%
	Human resources	32	10.2%
	Finance/accounting	28	8.9%
	IT/digital services	35	11.1%
	Sustainability/CSR	25	7.9%
	Other	30	9.5%
Tenure in Current Role	Less than 1 year	52	16.5%
	1–3 years	105	33.3%
	4–6 years	88	27.9%
	7+ years	70	22.2%

3.2. Variable Measurements

All constructs were quantified based on a validated multi-item scale from the literature. The scales were modified to transform the constructs into operationally defined scales (Appendix A). SFA was evaluated using a six-item scale [63,73]. Both authors provided evidence to support the reliability and validity of measuring sales technology utilization in a B2B setting, since these measures are based on the extent to which salespersons use technology for contact management, opportunity monitoring, and logging of interactions with customers. Big data analytics capabilities (BDACs) were assessed with a five-item scale that brings together all the preparatory work on measuring this concept included in previous research [15,25,29,74–76]. A six-item was used in the measurement of SP, in accordance with other studies covering financial, environmental, and social performance dimensions [42,65,77]. Although SP comprises three distinct dimensions (economic, environmental, and social), this study treats SP as a second-order reflective construct. This is justified because the literature on sustainability in hospitality consistently shows that these dimensions are highly correlated and mutually reinforcing in data-driven sales contexts (see Elkington, 1997 [78]; Blanco-Moreno et al., 2025 [46]). Moreover, the high AVE (0.637) and composite reliability (0.888) indicate that the six items effectively capture a shared underlying construct. Future research could explore multidimensional disaggregation, but for our serial mediation model, a unidimensional SP was appropriate. The CCC was assessed using a 5-item scale [16,19,20,38], focusing on organizational values and emphasizing the

importance of customers' interests; thus, it offers a rather focused approach to the construct that excludes conceptual problems associated with broader definitions of organizational culture. EDC was assessed using a 5-item scale [79,80]. A five-point Likert was employed for all the items to avoid bias in regard to the responses and to strengthen the results. This study employed SmartPLS 4.0 to analyze the data. It was selected due to its ability to perform well when predicting and theory searching in models with multi-complicated effects of modification. Its concern with the maximization of the variance in the structures of interest gives it the most appropriate analytical capabilities for investigating complex correlations among variables [48,67,81].

4. Results

4.1. The Measurement Model Evaluation

This research met all the fundamental provision in this phase of measurement system-like constructs and convergence validity, discriminant validity, checking multicollinearity, and global model fit [67,82]. Cronbach alpha (α) and Composite Reliability (CR) were applied for internal consistency reliability and they were both supposed to be over 0.70 as an acceptable amount of reliability (Hair et al., 2021 [67]), and all were (BDACs (α = 0.885, CR = 0.887), CCC (α = 0.830, CR = 0.834), EDC (α = 0.893, CR = 0.894), SFA (α = 0.933, CR = 0.934), SP (α = 0.886, CR = 0.888). The other important validation measure was convergent validation, as it is checked using the means variance extraction (AVE) and index load. All these constructs in this study met this requirement, and all of the item loadings were significantly greater than the recommended minimum of 0.70 [67,81], with the lowest one being 0.749 (CCC2). This proves that both indicators play important roles in their corresponding latent variables. The removal of BDAC6 and CCC6 was primarily due to their relatively low factor loadings, which were below the recommended threshold for acceptable indicator reliability in PLS-SEM analysis. Following the guidelines of Hair et al. [67], indicators with weak outer loadings may be removed when they negatively affect convergent validity and construct reliability, provided that the theoretical meaning of the construct remains preserved. The deletion of these items was, therefore, theoretically and statistically justified and conducted before structural model assessment. Importantly, the remaining indicators continued to demonstrate strong psychometric properties, including satisfactory factor loadings, composite reliability, and AVE values, confirming the adequacy of the construct validity and content representativeness. The values of VIF in this research were all between 2.015 and 3.559, which means that multicollinearity is not a concern for the stability of the model and interpretation of the measurement model. Lastly, the global model fit indices were also provided, as they are traditionally highlighted in covariance-based SEM (CB-SEM). Although PLS-SEM does not attach much importance to indices, a lot of diagnostic information can be attained. The Standardized Root Mean Square Residual (SRMR) = 0.037, which is significantly lower than the recommended value of 0.08 [67,83]. As such, there is an excellent fit of the models. The Normed Fit Index (NFI) of 0.930 is above the standard of 0.90, which implies a good fit. Even though the Chi-square was statistically significant (539.844), it is commonly overblown in large sample situations and must be utilized to aid other measures of model fit, other than for judging the model (Table 3). For a post hoc test, this study included Harman's single-factor test, where the variance accounted for by the first unrotated factor was found to be 38.9%, which is less than the critical value of 50%. Also, the full collinearity variance inflation factors (VIFs) for all latent variables were less than 3.3.

Table 3. Measurement model reliability and model fit.

Construct	Code	L	α	CR	AVE	VIF
Big Data Analytics Capabilities (BDACs)	BDAC1	0.821	0.885	0.887	0.685	2.125
	BDAC2	0.845				2.233
	BDAC3	0.830				2.090
	BDAC4	0.821				2.058
	BDAC5	0.821				2.015
	BDAC6	Deleted				
Customer-Centric Culture (CCC)	CCC1	0.754	0.830	0.834	0.591	2.384
	CCC2	0.749				2.290
	CCC3	0.786				2.027
	CCC4	0.771				2.048
	CCC5	0.785				2.140
	CCC6	Deleted				
Employee Digital Competence (EDC)	EDC1	0.887	0.893	0.894	0.702	2.969
	EDC2	0.827				2.108
	EDC3	0.812				1.980
	EDC4	0.829				2.162
	EDC5	0.831				2.190
Sales Force Automation (SFA)	SFA1	0.878	0.933	0.934	0.750	3.029
	SFA2	0.862				2.756
	SFA3	0.871				2.935
	SFA4	0.835				2.406
	SFA5	0.850				2.581
	SFA6	0.898				3.559
Sustainable Performance (SP)	SP1	0.770	0.886	0.888	0.637	2.067
	SP2	0.795				2.194
	SP3	0.833				2.364
	SP4	0.719				2.360
	SP5	0.834				2.452
	SP6	0.831				2.461

Notes: (model fit: SRMR = 0.037, Chi-square = 539.844, NFI = 0.93).

4.2. Discriminant Validity

The Fornell–Larcker criterion suggests that the square roots of AVE (0.769 to 0.866) were greater than their respective inter-construct. This confirms that each construct is empirically distinguishable. Furthermore, the HTMT ratios were cross-checked, with values of 0.85 or 0.90 commonly used, depending on the research intent [82]. All HTMT values in this study were less than 0.85, with the largest being 0.843 (SFA–CCC), which is below the conservative 0.85 threshold. This is strong evidence of discriminant validity across all pairs in this research (Table 4).

Table 4. Discriminant validity.

Fornell–Larcker Criterion					
	BDAC	**CCC**	**EDC**	**SFA**	**SP**
BDAC	0.828				
CCC	0.489	0.769			
EDC	0.298	0.421	0.838		
SFA	0.444	0.746	0.624	0.866	
SP	0.516	0.719	0.448	0.658	0.825
Heterotrait–monotrait ratio (HTMT)—Matrix					
BDAC					
CCC	0.556				
EDC	0.335	0.489			
SFA	0.488	0.843	0.683		
SP	0.580	0.479	0.490	0.714	

4.3. Robustness and Common Method Bias Checks

Regarding common method bias, Harman's single-factor test (38.9%) and full collinearity VIFs (all less than 3.3) suggest that common method bias is not a serious threat. The HTMT values in Table 4 indicate sufficient discriminant validity, as all of the values are below 0.85, with the highest being 0.843 (SFA–CCC), which is close to the critical value but still acceptable, and the Fornell–Larcker criterion is satisfied with no construct sharing more than 62% of its variance with any other construct. To check the possibility of model overfitting, we ran the PLS predict procedure with 10 folds. The Q^2 predicted values for all the indicators are positive, and the PLS SEM predictions are better than the naïve mean benchmark for most of the items, which confirms that the model is not overfitted. With respect to conceptual overlap, we acknowledge that CCC and SFA are correlated ($r = 0.746$), but this is theoretically expected, since customer-centric culture drives SFA adoption. Furthermore, the VIF of 3.559 is below the conservative threshold of 5, indicating that multicollinearity is not problematic.

4.4. The Structural Model Results

Table 5 and Figure 2 present the results of the structural model assessment, revealing several statistically significant direct relationships among SFA, CCC, BDAC, and SP. The findings demonstrate that SFA exerts a positive and significant influence on BDACs ($\beta = 0.391$, $t = 7.969$, $p < 0.001$), supporting H1. This result confirms that organizations adopting advanced sales automation systems are more capable of developing robust analytical infrastructures and leveraging large volumes of customer and operational data effectively. The finding emphasizes the strategic role of SFA as a technological enabler that enhances data accessibility, integration, and analytical decision-making capabilities. Moreover, SFA has a strong and statistically significant effect on SP ($\beta = 0.319$, $t = 5.914$, and $p < 0.001$), thereby supporting H2. This result indicates that the implementation of automated sales technologies contributes substantially to enhancing sustainable organizational outcomes within the hospitality sector. The finding suggests that SFA systems improve operational efficiency, customer engagement, and strategic responsiveness, which collectively strengthen SP.

Table 5. Hypotheses testing results.

H	Relationship	β	SD	t-Value	*p*-Values	R^2	F^2	Q^2	Result
H1	SFA → BDAC	0.391	0.049	7.969	<0.001	0.411	0.158	0.230	✓
H2	SFA → SP	0.319	0.054	5.914		0.721	0.106	0.442	✓
H3	BDACs → SP	0.143	0.036	3.946			0.053		✓
H4	CCC → SP	0.421	0.040	10.473			0.228		✓
H5	CCC → SFA	0.746	0.024	31.383		0.556	0.751	0.414	✓
H6a	SFA → BDACs → SP	0.056	0.015	3.653					✓
H6b	CCC → SFA → SP	0.238	0.042	5.599					✓
H6c	CCC → SFA → BDACs	0.292	0.040	7.333					✓
H6d	CCC → SFA → BDACs → SP	0.042	0.012	3.585					✓
H7a	EDC × SFA → BDACs	0.447	0.031	14.545					✓
H7b	EDC × BDACs → SP	0.112	0.026	4.285					✓

Note: big data analytics capabilities (BDACs); customer-centric culture (CCC); employee digital competence (EDC); sales force automation (SFA); sustainable performance (SP); Supported (✓).

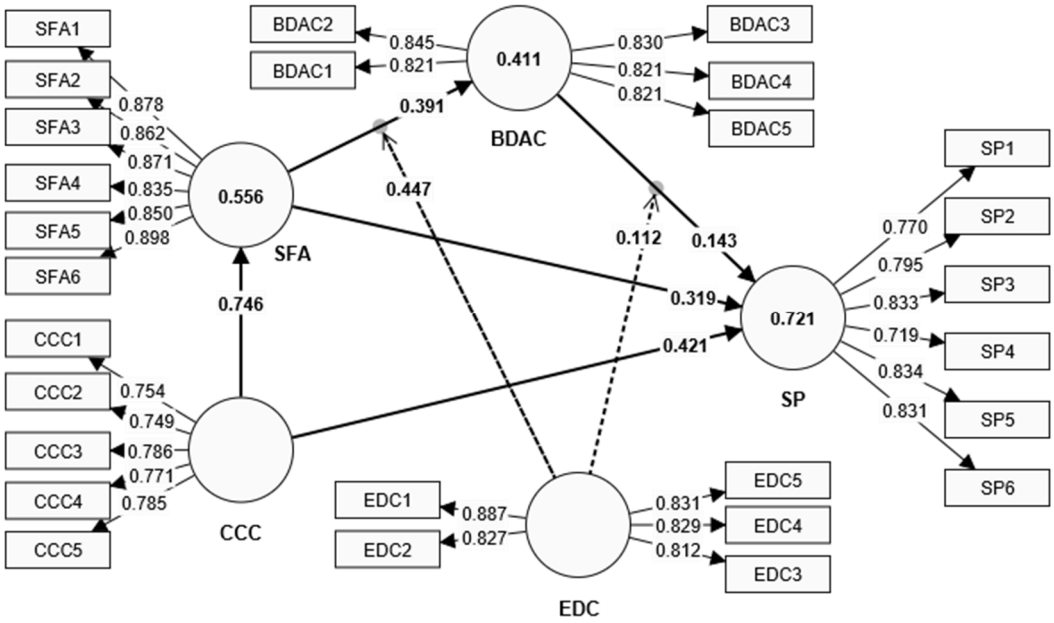


Figure 2. Structural model using PLS–SEM. Notes: $p < 0.001$.

The results further reveal that BDACs positively and significantly influence SP (β = 0.143, t = 3.946, $p < 0.001$), supporting H3. This finding confirms that organizations possessing advanced analytical capabilities are better positioned to transform data-driven insights into sustainable operational, environmental, and social outcomes. The ability to analyze and interpret big data enhances strategic agility, supports evidence-based decision-making, and contributes to long-term organizational sustainability.

Furthermore, CCC has a highly significant positive effect on SP (β = 0.421, t = 10.473, and $p < 0.001$), supporting H4. This result indicates that organizations characterized by strong customer-oriented values are more likely to achieve superior sustainable outcomes. This finding highlights the importance of aligning organizational strategies and operations with customer needs and expectations to strengthen long-term sustainability objectives. Additionally, CCC demonstrates an exceptionally strong positive impact on SFA (β = 0.746, t = 31.383, $p < 0.001$), supporting H5. This finding suggests that customer-oriented organizational cultures significantly facilitate the successful adoption and utilization of sales force automation technologies. This relationship confirms that customer-focused environments encourage the effective integration of digital technologies into operational and strategic activities. The structural model demonstrates satisfactory explanatory and predic-

tive capability, confirming the robustness of the proposed framework. The coefficient of determination (R^2) values indicate that the model explains 41.1% of the variance in BDACs and 72.1% of the variance in SP. These findings suggest that the proposed antecedent variables possess substantial explanatory power, particularly in predicting sustainable performance. According to established PLS-SEM evaluation criteria, the reported R^2 values can be considered moderate to substantial within social science and hospitality research, thereby indicating the strong predictive capacity of the model.

The effect size (f^2) analysis further provides evidence regarding the relative contribution of each exogenous construct to the endogenous variables. The findings reveal that CCC exerts a very large effect on SFA ($f^2 = 0.751$), highlighting the critical role of customer-oriented organizational culture in facilitating the successful implementation of sales automation technologies. In addition, CCC demonstrates a moderate practical effect on sustainable performance (SP) ($f^2 = 0.228$), emphasizing the strategic importance of customer-centered practices in enhancing long-term sustainability outcomes.

Moreover, SFA exhibits a moderate effect on BDACs ($f^2 = 0.158$) and a small-to-moderate effect on SP ($f^2 = 0.106$), confirming that sales automation systems significantly contribute to strengthening analytical capabilities and improving sustainable organizational performance. Conversely, BDACs show a smaller yet meaningful effect on SP ($f^2 = 0.053$), suggesting that while analytics capabilities positively influence sustainability outcomes, their practical contribution is comparatively lower than that of organizational culture and sales automation capabilities. Overall, the f^2 results confirm that the proposed relationships are not only statistically significant but also possess meaningful practical relevance in explaining sustainable performance within the hospitality sector.

Furthermore, the predictive relevance of the model was evaluated using the Stone–Geisser Q^2 criterion. The Q^2 values for BDACs ($Q^2 = 0.230$) and SP ($Q^2 = 0.442$) are both greater than zero, thereby confirming the predictive relevance and out-of-sample predictive capability of the structural model. The relatively high Q^2 value for SP particularly demonstrates the model's strong predictive accuracy in explaining sustainability performance. Collectively, these findings confirm that the structural model possesses strong explanatory power, meaningful practical significance, and substantial predictive validity.

The indirect and moderating effects presented in Table 5 and Figure 2 provide additional support for the proposed theoretical framework by confirming the significant mediating and interaction effects among the study constructs. First, the findings reveal that BDACs significantly mediate the relationship between SFA and SP ($\beta = 0.056$, $t = 3.653$, and $p < 0.001$), thereby supporting H6a. This result confirms that SFA contributes to sustainable organizational outcomes not only directly but also indirectly through enhancing the organization's analytical capabilities. The finding highlights the strategic role of BDACs in transforming digitally generated sales and customer data into actionable insights that improve sustainability-related decision-making and operational performance.

Furthermore, the indirect effect of CCC on SP through SFA is found to be positive and statistically significant ($\beta = 0.238$, $t = 5.599$, $p < 0.001$), supporting H6b. This finding suggests that organizations characterized by strong customer-oriented values are more likely to leverage sales force automation technologies effectively, which subsequently enhances sustainable performance. The result emphasizes the importance of organizational culture as a foundational mechanism that facilitates successful digital transformation initiatives and sustainability-oriented outcomes.

Similarly, CCC demonstrates a significant indirect influence on BDACs through SFA ($\beta = 0.292$, $t = 7.333$, $p < 0.001$), supporting H6c. This finding indicates that customer-centric organizational environments positively strengthen the implementation and utilization of SFA systems, which in turn enhances the organization's ability to develop advanced

analytics capabilities. In addition, the sequential indirect effect of CCC on SP through both SFA and BDACs is also statistically significant (β = 0.042, t = 3.585, $p < 0.001$), supporting H6d. This result confirms the existence of a serial mediation mechanism in which customer-oriented culture enhances sales automation practices, which subsequently strengthen analytics capabilities and ultimately improve sustainable performance.

The moderating effects of EDC were also found to be highly significant. Specifically, EDC significantly strengthens the relationship between SFA and BDACs (β = 0.447, t = 14.545, $p < 0.001$), supporting H7a. This finding suggests that employees possessing strong digital competencies are more capable of utilizing SFA systems effectively, thereby improving the organization's analytical capabilities. Likewise, EDC positively moderates the relationship between BDACs and SP (β = 0.112, t = 4.285, $p < 0.001$), supporting H7b. This indicates that the positive influence of analytics capabilities on sustainable performance becomes stronger when employees possess higher levels of digital knowledge and technical expertise.

Collectively, these findings demonstrate that sustainable performance is not solely dependent on the adoption of digital technologies, such as SFA and BDACs, but rather on the synergistic interaction between technological resources, customer-oriented organizational culture, and employee digital competencies. The results further highlight the critical role of human capital in maximizing the value of technological investments and transforming data-driven capabilities into sustainable organizational outcomes.

5. Discussion, Contributions, and Conclusions

5.1. Discussion

The current study aimed to explore the effects of CCC and SFA on SP in the Saudi Arabian hospitality sector, as well as to examine the mediating effect of BDACs and the moderating effect of EDC. The integrated model based on the resource-based view (RBV), Dynamic Capabilities Theory (DCT), and service-dominant logic (SDL) was tested using PLS-SEM analysis of data collected from 315 managerial and operational employees in five-star hotels in Riyadh, and eleven hypotheses were tested. All of the hypotheses were supported at statistically significant levels, supporting that SP is a fundamental strategic outcome for firrm aspiring for long-term competitiveness in the hospitality sector [11].

The first hypothesis has been confirmed that SFA has a positive and significant influence on BDACs (β = 0.391, $p < 0.001$). This is consistent with the RBV view of SFA as a strategic technological resource that can improve the information infrastructure of the organization through the systematic and real-time capture and management of data [23,29]. Modern SFA platforms provide technology such as AI-based recommendations, workflow automation, and integration with CRM systems that can go a long way in improving data quality and visibility, laying the foundation for the development of high-order analytics capabilities. This pathway is also supported by academic evidence. Organizations successfully implementing SFA create structured, customer-centric data pipelines, which directly enable the development of BDACs [84]. Therefore, SFA is not just an operational tool, but the main data-generating mechanism through which BDACs emerge, emphasizing the sequential logic embedded in the RBV framework.

Additionally, the second hypothesis indicated a significant direct influence of SFA on SP (β = 0.319, $p < 0.001$), confirming the operational efficiency and social–environmental sustainability pillars established in earlier research [42,43]. Besides revenue generation and customer relationship management, SFA systems may contribute to operational efficiencies and resource coordination, which respondents perceived as linked to environmental and social sustainability outcomes. However, these findings reflect self-reported perceptions and should not be interpreted as objective performance metrics. There is mounting industry

evidence that hotel operations powered by AI and integrated with CRM systems are more aligned with sustainability principles, such as demand leveling and the reduction in waste in food and energy use. Hotels are predisposed to operate as technologically resilient operators, with stronger sustainability performance profiles through the establishment of data-rich environments using SFA [85]. This finding supports the idea that digital sales automation has far-reaching effects beyond commercial outcomes to wider dimensions of sustainable development.

In terms of the role of analytic capabilities, the third hypothesis confirmed a positive and significant relationship between BDACs and SP ($\beta = 0.143$, $p < 0.001$). This finding is consistent with DCT, which views BDACs as dynamic capabilities enabling firms to sense market signals, seize new opportunities, and reconfigure operational processes to generate sustainable outcomes [6,27]. Organizations with strong analytic capabilities can turn raw operational data into evidence-based strategic decisions to optimize the consumption of resources, minimize waste in the environment, and perform better for stakeholders. Academic reviews of Triple Bottom Line (TBL) framework in the hospitality industry also confirm that data-enabled tracking of financial, environmental, and social metrics is strongly associated with improved sustainability outcomes and data-driven controversies, as the main forces of SP confirm the BDACs-SP interaction [46,86]. Although the effect size of BDACs on SP ($f^2 = 0.053$) was comparatively smaller than those of CCC and SFA, it is nevertheless a meaningful and theoretically significant pathway through which data-driven intelligence translates into durable organizational performance.

The results showed a strong impact of organizational culture over and above the technological and analytical factors. H4 validated a strong, positive direct impact of CCC on SP ($\beta = 0.421$, $p < 0.001$). H5 validated a very strong impact of CCC on SFA adoption and use ($\beta = 0.746$, $p < 0.001$). The very large effect size of CCC on SFA ($f^2 = 0.751$) indicates that the customer-oriented organizational culture is the most powerful antecedent of SFA implementation in this study. Organizations that embed customer-centric values into their operational and strategic frameworks are more likely to adopt SFA technologies, to successfully use them, and to sustain them, as employees perceive such systems as service-enabling rather than managerial control devices [34,36]. Furthermore, the direct effect of CCC on SP ($f^2 = 0.228$) confirms that the alignment of organizational strategies and internal processes with customer needs enhances long-term sustainability in financial, environmental, and social dimensions [16]. Hotels that are customer-oriented and invest in loyalty cultivation and service alignment generally score better in guest satisfaction, which is an important indicator of social sustainability performance [87].

All mediation hypotheses (6a to 6d) were statistically confirmed, and provided more insight into the relation among the constructs. H6a showed that BDACs significantly mediated the relationship between SFA and SP ($\beta = 0.056$, $p < 0.001$). This implies that SFA improves sustainable performance not only through direct operational gains but also indirectly by bolstering the analytical infrastructure of the organization. This finding suggests that SFA acts primarily as a data generator. The respondents believed that analytic capabilities help convert such data into sustainability-oriented actions (e.g., energy optimization or waste reduction). Future research using objective operational data is needed to confirm these relationships [61,88]. H6b was supported, revealing that CCC has a considerable influence on SP via SFA ($\beta = 0.238$, $p < 0.001$), thus lending support to the idea that customer-oriented organizational cultures facilitate the successful implementation of digital sales tools to improve sustainable performance results. Hc demonstrated that SFA enhances BDACs through CCC ($\beta = 0.292$, $p < 0.001$), confirming SFA as the main operational mechanism for transforming an intangible cultural orientations into data-rich inputs for advanced analytics development. Finally, H6d confirmed the full serial medi-

ation pathway CCC → SFA → BDACs → SP (β = 0.042, $p < 0.001$), representing the first empirical validation of this four-stage sequential model in the Saudi hospitality context.

This mediated pathway of serialization is theoretically important and is worthy of careful interpretation. The findings are consistent with the cascade mechanism suggested in the integrated model, however, the direct BDAC–SP effect is much larger than the serial mediation path, suggesting that the serial chain, even though statistically supported, explains a relatively small portion of performance variance (around 30–35%). This is in contrast to Garrido-Moreno et al. [89], who found that serial mediation explains 50–60% of the variance in performance for digital transformation. The difference probably reflects the differences in the context of the Saudi emerging hospitality market versus the European technology-intensive companies studied by Garrido-Moreno et al. [89] Institutional factors, market volatility, and the initial phases of digital maturity could restrict the magnification effect of the serial mediation chain in emerging market environments. In theory, this finding implies that while the CCC → SFA → BDACs → SP pathway is a valid and im portant mechanism, organizations should also develop standalone BDACs that are not only reliant on SFA as a data source. This dual-track approach extends DCT by recognizing that sustainable performance is contingent upon capability development in both serial and parallel pathways [22].

Finally, the moderating role of Employee Digital Competence was analyzed. The results for EDC as a critical moderator for the SFA-BDACs (β = 0.447, $p < 0.001$) and BDACs-SP (β = 0.112, $p < 0.001$) relationships were strong and statistically significant, supporting both H7a and H7b. Importantly, the size of the EDC's moderating effect on SFA–BDACs indicates that employee digital skills are fundamentally important to translating automated data collection into meaningful analytic capability. Employees with high digital competencies are more capable of extracting, interpreting, and operationalizing the data captured by SFA systems and, therefore, develop organizational BDACs at a quicker pace [18,63]. Similarly, the moderating effect of EDC on the BDAC–SP nexus supports that analytics-driven insights are most effective in driving sustainable operational actions when employees have the ability to understand predictive models and use their outcomes for real-world decisions [80]. Frontline employees in the hospitality industry are the critical touch point for customers within digital systems and are the key determinant of the success or failure of digital change initiatives. The development of digital literacy in the workforce has been proven to simultaneously improve operational productivity, customer satisfaction, and ecological sustainability [90,91]. Taken together, these results reinforce the claim that SP is not a technology-determined result, but a consequence of the synergistic interaction between digital tools and human capital [18]. Extending the logic of moderators beyond digital competence, recent research in hospitality highlights that cognitive moral mechanisms—specifically moral disengagement—can also strengthen the translation of emotional exhaustion into negative behavior outcomes [92].

5.2. Theoretical Contributions

This study provides several important theoretical contributions to the literature on sales force automation big data analytics and sustainable performance, especially in the hospitality context of emerging economies. First, this research develops and empirically tests a serial mediation model (CCC → SFA → BDACs → SP) to explain how an intangible cultural asset (customer-centric culture) is converted into tangible sustainable performance outcomes via sequential technological and analytical mediators by integrating the RBV, DCT, and SDL. Recent research has acknowledged SFA as a potent data-driven framework that works together with BDACs to foster wholesome sustainable performance [27,29], but the precise way in which these capabilities cascade from culture to automation to analytics

has been undertheorized. The results show that SFA is not only an operational tool but an essential data pipeline that transforms customer oriented values into structured information inputs required to develop higher order analytic capabilities. Unlike the findings of Rivers & Dart [10] in manufacturing, our hospitality sample shows a stronger direct effect of SFA on SP, possibly due to the customer-intensive nature of hotels. This hybrid and cross-type model provides a more nuanced view of the technology–capability–performance nexus in the hospitality industry and shows how dynamic capabilities supported by analytics can be transformed into intelligent technological adoption to keep a competitive edge [47,81,92–95]. Further, the present study tested the full serial mediation pathway that helps to overcome a major gap in the literature on the parallel lines of technology adoption and human capital development.

Second, this study contributes to the existing body of knowledge by proposing and empirically testing EDC as a new critical moderator in the SFA-BDACs and BDACs-SP relationships. While previous studies have identified various contingencies related to technology and culture, this study uniquely positions EDC as a key boundary condition determining the extent to which sales automation investments are translated into analytical capabilities, and subsequently into sustainable outcomes. Our findings indicate that EDC improves both pathways significantly, thus corroborating the argument that technology investment results in optimal outcomes only when it is complemented by a competent workforce capable of extracting, interpreting, and operationalizing data-driven insights [18]. This finding corroborates the proposition that digital competence enhances absorptive capacity and enables the transformation of a workforce towards data-centric approaches, thus extending DCT by identifying the human capital conditions under which dynamic capabilities lead to SP [96].

Third, this study adds to the theoretical understanding of the role of organizational culture in digital transformation and sustainability. Our results show that CCC has a very large effect on SFA adoption ($\beta = 0.746$, $f^2 = 0.751$) and a substantial direct effect on SP ($\beta = 0.421$, $p < 0.001$, $f^2 = 0.228$). But the smaller indirect effect through the entire serial mediation path indicates that while CCC is capable of aligning data initiatives with customer needs, its ability to directly translate analytics into overall environmental and social benefits might need supplementary organizational mechanisms, such as strategic alignment, enabling regulatory frameworks, or dedicated sustainability governance [16,87,94]. This understanding paves the way for exploring alternative organizational structures, like strategic foresight, climate resilience programs, and cross-departmental cooperation, which could better utilize big data analytics to meet comprehensive sustainability goals.

Fourth, this study fills an important gap in the digital transformation literature in a specific context and geographic location by applying this integrated model to the hospitality sector in Saudi Arabia. The results indicate that the RBV and DCT frameworks are universally applicable, but the strength of moderating forces, such as EDC, may differ across contexts. This is particularly the case in emerging economies where digital transformation and sustainability pressures are typically more intense, but resource constraints are more acute [14,47,83]. Thus, it provides a baseline for cross-cultural comparisons on how national and institutional factors moderate the effectiveness of data-enabled sales communication for SP.

Finally, this study offers methodological contributions by demonstrating the utility of PLS-SEM with higher-order serial mediation and moderation models in hospitality research. The strong model fit (SRMR = 0.037, NFI = 0.93) and significant explained variance in sustainable performance ($R^2 = 0.721$) support the proposed theoretical framework and provide future researchers with a validated instrument and an analytical approach to explore complex capability chains in data-driven service contexts.

5.3. Practical Contributions

The findings of this study provide several practical implications for hospitality practitioners, hotel managers, and policymakers, especially for Saudi Arabia's rapidly growing digital tourism industry under Vision 2030. The significant mediating role of BDACs between SFA and SP (H6a) highlights that investments in the SFA should not be ceased at the system implementation. Hotel managers must build strong data analytics infrastructures and data storage systems to convert the customer and operational data collected through SFA into actionable intelligence that improves economic, environmental, and social outcomes [27,29]. In the absence of such complementary analytic capabilities, SFA risks become a data generator rather than a driver of sustainability-oriented decisions [9]. Second, the strong moderating effect of EDC on both SFA–BDACs and BDACs–SP relationships (H7a and H7b send a clear message: technology investments are useless without skilled people). Hospitality managers need to provide continuous training for sales and customer-facing staff to become proficient at using SFA tools and to interpret and operationalize the insights generated by big data analytics [18,63]. Fostering digital literacy across the workforce enhances absorptive capacity, so that hotels can convert data-driven insights into enhanced guest experiences, operational efficiency, and long-term sustainability [90,91]. Third, although CCC shows a very large direct effect on SFA adoption ($\beta = 0.746$, $f^2 = 0.751$) and a substantial direct effect on SP ($\beta = 0.421$), managers should not rely on culture alone to drive sustainable performance. The relatively lower serial mediation effect (CCC $\rightarrow$ SFA $\rightarrow$ BDACs $\rightarrow$ SP) indicates that the cultural orientation should be supplemented with unique sustainability-led strategies, key performance indicators (KPI), and cross-functional teams that convert customer-centric values into concrete environmental and social actions [16,87]. Based on BDACs, hoteliers should develop focused sustainability governance structures to align customer needs with waste reduction, energy optimization, and equitable resource distribution.

5.4. Conclusions

This study investigates the effect of SFA and CCC on SP in the hospitality industry, with BDACs as a mediator and EDC as a moderator. This study employs PLS-SEM analysis using survey data from 315 managers and operational staff in five-star hotels in Riyadh, Saudi Arabia, and confirms that SFA has a positive influence on SP, but this is mostly mediated by BDACs, which transforms sales automation data into actionable intelligence. A customer-oriented culture is a key enabler of the automation–analytics linkage. EDC is the most important enabler, as it greatly enhances the conversion of data into analytical power and sustainability outcomes. The validated serial mediation model (CCC $\rightarrow$ SFA $\rightarrow$ BDACs $\rightarrow$ SP) confirms that sustainable performance is not achieved through isolated technology investments, but rather through a sequential, synergistic process that integrates culture, automation, analytics, and digital skills. This research applies this integrated framework to the context of Saudi Arabia's rapidly digitalizing economy under Vision 2030, filling a geographical gap in the literature and stressing that technology alone is not enough. Sustainable value creation requires robust human digital competencies, data literacy, and a long-term strategic vision. These findings are in line with the resource-based view and DCT in emerging markets, where the combination of technology, analytics, and expertise is critical for sustainable competitive advantage.

6. Limitations and Further Research

Although the present study has strong findings and theoretical implications, there are some limitations that could serve as future research avenues. The cross-sectional design limits causal inference on the serial mediation pathways, and future research should adopt

longitudinal or quasi-experimental designs to establish temporal precedence and examine the dynamic evolution of capabilities over time. Second, the sample was restricted to five-star hotels in Riyadh, Saudi Arabia, which may limit generalizability to other hospitality segments (e.g., mid-scale or budget hotels), other areas within the Middle East, or other service industries. Cross-cultural and multi-country replications are required to assess the moderating role of national context, regulatory frameworks, and levels of digital maturity. Third, the use of self-reported perceptual measures for all constructs (albeit, with rigorous validity checks) raises concerns about common method bias and social desirability. Future research would benefit from using objective performance indicators (e.g., actual financial, environmental, and social metrics), system logs of SFA usage, or manager–employee dyadic data to enhance measurement robustness. Fourth, convenience sampling is good for exploratory research but can lead to selection bias, so future studies should use probability sampling techniques to make the sample more representative. Fifth, the moderate explanatory power of the BDACs → SP link (f^2 = 0.053) and the small serial mediation effect indicate the existence of other unmeasured mechanisms, such as organizational agility, strategic flexibility, external market turbulence, or green innovation climate that may play important roles. Future models are encouraged to explore other mediators, moderators, and configurational (fsQCA) approaches to discover alternative paths. Finally, this study did not distinguish between different types of digital competence (e.g., basic literacy, advanced analytics, or data ethics) and did not explore possible negative side effects of SFA and BDACs (e.g., employee surveillance, customer privacy concerns, or algorithmic bias). Future research should take a more nuanced, critical view of the dark side of data-enabled sales communication for SP.

The use of convenience sampling from five-star hotels in Riyadh limits the generalizability of the findings. Five-star hotels are more technologically advanced than mid-scale or budget hotels, so the relationships observed may not hold in segments with lower digital maturity. Additionally, Riyadh, as the capital and a business hub, may not represent other regions in Saudi Arabia or the broader Middle East. Future research should use probability sampling across multiple hotel categories and geographic areas to enhance external validity. Despite these limitations, the focus on five-star hotels was deliberate, as they are early adopters of SFA and BDACs, making them appropriate for theory testing.

Author Contributions: Conceptualization, A.K.E. and R.S.A.; methodology, G.S.A.K., A.K.E., R.S.A. and A.F.S.; formal analysis, G.S.A.K. and A.F.S.; investigation, A.K.E., G.S.A.K., R.S.A. and A.F.S.; writing—original draft preparation, A.K.E., R.S.A., G.S.A.K. and A.F.S.; writing—review and editing, G.S.A.K., A.K.E. and A.F.S.; project administration, A.K.E.; funding acquisition, R.S.A. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the Deanship of Scientific Research and Libraries at Princess Nourah bint Abdulrahman University, grant number (RG-2025-14), and the APC was funded by the Deanship of Scientific Research and Libraries at Princess Nourah bint Abdulrahman University.

Institutional Review Board Statement: This study was conducted in accordance with the Declaration of Helsinki and approved by the Standing Committee for Research Ethics at Princess Nourah bint Abdulrahman University (IRB Log No. 26-0476), date of approval 8 April 2026.

Informed Consent Statement: Informed consent was obtained from all subjects involved in this study.

Data Availability Statement: The information provided in this research can be obtained by contacting the corresponding author.

Acknowledgments: The authors extend their appreciation to the Deanship of Scientific Research and Libraries in Princess Nourah bint Abdulrahman University for funding this research work through the Research Group project, Grant No. (RG-2025-14).

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

SFA	Sales Force Automation
SP	Sustainable Performance
BDACs	Big Data Analytics Capabilities
EDC	Employee Digital Competence
CCC	Customer Centric Culture
SDL	Service dominant logic
DCT	Dynamic Capabilities Theory
RBV	Resource Based View
CRM	Customer Relationship Management
ICT	Information and Communication Technology

Appendix A

Table A1. Questionnaire items.

Construct	Items
Sales Force Automation (SFA)	SFA1: The SFA system automates routine sales tasks efficiently. SFA2: SFA helps capture detailed customer interaction and transaction data. SFA3: Sales personnel frequently use SFA tools for managing customer relationships. SFA4: SFA improves the accuracy and accessibility of sales data. SFA5: The implementation of SFA has enhanced sales team productivity. SFA6: Training provided on SFA systems was adequate to enable effective use.
Big Data Analytics Capabilities (BDAC)	BDAC1: Our hotel effectively collects large volumes of diverse data relevant to sales and customer interactions. BDAC2: We have robust processes for integrating data from different sources for analytics. BDAC3: The hotel staff possesses strong skills in analyzing complex datasets. BDAC4: Big data analytics insights are regularly used in strategic decision-making. BDAC5: Our analytics capabilities contribute to identifying new market trends and customer preferences.
Sustainable Performance (SP)	SP1: Our hotel achieves high levels of customer satisfaction consistently. SP2: Operational processes in our hotel are optimized for efficiency and resource conservation. SP3: The hotel implements environmentally sustainable practices successfully. SP4: Sustainable initiatives have positively impacted our financial performance. SP5: Employee engagement in sustainability efforts is strong. SP6: Our hotel's innovation practices contribute to long-term competitive advantage.
Customer-Centric Culture (CCC)	CCC1: Our hotel prioritizes deep understanding of guest preferences and needs. CCC2: Employees are empowered to make decisions that enhance guest satisfaction. CCC3: Cross-functional collaboration exists to address customer requirements effectively. CCC4: Advanced technologies (e.g., CRM and analytics) are integrated to support customer-focused strategies. CCC5: Leadership actively promotes a customer-oriented mindset throughout the organization.

Table A1. *Cont.*

Construct	Items
Employee Digital Competence (EDC)	EDC1: I can use CRM, booking, and property management systems efficiently in my role. EDC2: I can extract, clean, and interpret data (e.g., analytics dashboards) to inform decisions. EDC3: I can effectively collaborate via digital platforms (e.g., shared documents or remote communication tools). EDC4: I feel confident learning new digital tools on my own and exploring new features. EDC5: I am careful with data privacy, cybersecurity best practices, and ethical handling of guest data.

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