

Exploring the effects of digital market adaptability on supply chain innovation



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Background: Theoretical advancement calls for exploring the drivers for supply chain (SC) innovation.

Aim: This study draws on the dynamic capability view, complex adaptive system and contingency theories to explore the effect of market intelligence, internal and supplier adaptability and digital orientation on SC innovation. Furthermore, the study examines the mediating role of internal and supplier adaptability and the moderating role of digital orientation on the association between the driving factors and SC innovation.

Setting: Survey data were collected from 224 hotel managers in the Tanzanian tourism industry.

Method: The structural equation modelling method was used to analyse data using smart-partial least squares-4 and statistical package for the social sciences softwares.

Results: Our findings reveal that market intelligence, internal adaptability and supplier adaptability are significant predictors of SC innovation in the Tanzanian hospitality context. Again, both internal and supplier adaptability partially mediate the relationship between market intelligence and SC innovation. In addition, except for market intelligence, digital orientation amplifies the positive relationship between internal and supplier adaptability and SC innovation.

Conclusion: Market intelligence, internal and supplier adaptability and digital orientation are critical for developing SC innovation.

Contribution: This study advances SC innovation theory within the hospitality sector by explicating how market intelligence is transformed into innovation through the conjoint and contingent capabilities of internal (intra-firm) and supplier (inter-firm) adaptability. It further establishes digital orientation as the pivotal moderator that conditions these adaptive mechanisms.

Keywords: market intelligence; internal adaptability; supplier adaptability; digital orientation; supply chain innovation; hotel sector.

Introduction

In today's digital business environment, it is crucial for companies to cultivate innovation in order to attain a sustainable competitive edge (Aziz et al. 2024; Elgarhy & Abou-Shouk 2023). Moreover, companies have realised the importance of joint efforts with their supply chain (SC) partners to develop innovative solutions for sustainable performance (Espino-Rodríguez & Taha 2022). This is conceived in the notion of SC innovation, which underlines radical or gradual improvements in SC process, technology or network that create new value for all SC partners (Tajeddini et al. 2024). Supply chain innovation has become a renowned topic in the manufacturing management literature. Surprisingly, little attention has been paid in the service industry, in particular, tourism and hospitality (Lelo de Larrea et al. 2021; Tajeddini et al. 2024). Further scholarly inquiry into SC innovation within the tourism and hospitality sector is imperative (Ku & Chen 2025).

The review of literature in hospitality management research has shown that researchers have examined innovation at the individual, team and organisational levels (Lee et al. 2021; Park, Lee & Back 2023), while disregarding innovation in the inter-organisation and SC context (Lelo de Larrea et al. 2021; So et al. 2022). While existing inquiries have limited tourism and hospitality innovation to the customer-organisation relationship, they have consequently overlooked other SC partners, such as suppliers (So et al. 2022). Nevertheless, market

intelligence capability has potential for enhancing service innovation (Elsharnouby & Elbanna 2021; Hoang et al. 2024). Yet, research on how market intelligence's dynamic capabilities (DCs) can be converted to enable SC innovation remains scarce.

Additionally, the firm's transformation capabilities, perceived as adaptability, are an important DC responsible for adjusting a firm's resources, structure and processes in response to long-term changes in the market environment (Yang, Huo & Gu 2022). Within the inter-organisational domain, contemporary theoretical developments indicate that adaptability manifests at both intra- and inter-organisational levels (Yang et al. 2022). In line with the complex adaptive system (CAS) view (Choi, Dooley & Rungtusanatham 2001), inter-organisational adaptability exhibits synergistic interdependencies and collaborative ties that encompass the focal entity and other members (suppliers) within the ecosystem, thereby enhancing organisational performance (Phadnis 2023).

Furthermore, digital orientation is widely regarded as a critical strategic resource for enhancing organisational performance in the current digital era. Consistent with the contingency theory (CT) of strategic orientation (Kindermann et al. 2021; Sousa & Voss 2008), digital orientation can facilitate innovation outcomes (Ardito et al. 2021; Fiorini et al. 2023).

This study draws on an exclusive survey of hotels in Tanzania. Hotels in this region underscore innovation excellence in service standardisation, quality assurance, readiness for product introduction and technology implementation (Njoroge, Anderson & Mbura 2019). Thus, the study advances both theoretical and practical understanding with the focus on three research inquiries:

- Do market intelligence, internal and supplier adaptability drive innovation of the hotel SC?
- Do internal and supplier adaptability mediate the association between market intelligence and SC innovation?
- Does digital orientation moderate the relationship between market intelligence, internal adaptability, supplier adaptability and SC innovation?

By addressing these questions, this research aims to extend existing theory and offer practical contributions to SC management in tourism and hospitality. Specifically, we introduce an integrated theoretical model that combines the perspectives of DC and CAS theories to explore drivers for SC innovation. Prior studies (Espino-Rodríguez & Taha 2022; Tajeddini et al. 2024) have relied on transactional cost, resource orchestration and information sharing theories to study innovation within the hotel SC. Our study offers a fresh perspective on how market intelligence, internal adaptability and supplier adaptability combine to drive SC innovation, viewed through both DC and CAS lenses. Complex adaptive system theory complements the DC

framework by enabling analysis of firm transformation and reconfiguration through intra- and inter-firm relational dynamics. Furthermore, grounded in the CAS and CT of strategic orientation, we examine mediation and moderation effects, thereby extending the literature on how inter-organisational adaptability and digital orientation synergistically drive SC innovation in the digital realm. This research is vital because it equips hotel managers with an integrated dynamic-capability and complex inter-organisational framework that pinpoints how market intelligence, digital orientation, internal adaptability and supplier adaptability must be jointly leveraged to generate SC innovation.

Literature review and hypotheses

Theoretical foundation

The literature conceptualises DC as the firm's capacity to sense market opportunities and threats (Teece 2007). Dynamic capability theory is uniquely suited to the hospitality sector, where real-time market sensing is essential (Teece, Peteraf & Leih 2016). Hospitality firms exhibit strong market-sensing DCs, enabling them to capture and process data systematically and thus gain deep insights into volatile market demand, which in turn leads to the desired performance outcomes (Elsharnouby & Elbanna 2021; Hoang et al. 2024). This relevance suggests that the theory will illuminate market intelligence practices to convert fleeting demand signals into SC innovation.

The CAS theory posits self-organisation, emergent novelty and feedback loops as its principal adaptive mechanisms (Choi et al. 2001). Self-organisation denotes the capacity to reconfigure internal structures autonomously, thereby generating emergent interaction patterns aligned with novel external needs. Emergence and novelty arise from non-linear agent interactions and feedback loops, yielding innovative behaviours, functions or products (Rodríguez-Sanchez, Williams & Brotons 2017). From the perspective of CAS, adaptability arises from the dynamic interplay between an organisation's internal processes and its external interactions, including those with suppliers (Phadnis 2023). Therefore, this study uses CAS to examine how intra-organisational and inter-organisational (supplier) adaptability jointly enhance SC innovation, positing both forms of adaptability as critical CAS properties that enable such innovation.

The CT describes the optimal decision-making approaches for organisations based on contingency factors such as strategic orientation (Hussain & Malik 2022; Sousa & Voss 2008). Digital orientation, conceptualised as the strategic orientation, suggests that firms adapt and apply digital technologies to develop the desired outcome (Kindermann et al. 2021). Researchers have proposed that digital orientation can influence a firm's DCs towards organisational performance (Hussain & Malik 2022; Khin & Ho 2019). This study, therefore,

examines how the interaction of digital orientation with market intelligence, internal adaptability and supplier adaptability fosters SC innovation.

Supply chain innovation

Supply chain management philosophers Arlbjørn, De Haas and Munksgaard (2011) define SC innovation as:

... a change (incremental or radical) within the SC network, SC technology, or SC processes (or combinations of these) that can take place in a company function, within a company, in an industry or in a SC enhance new value creation for the stakeholder. (p. 8)

In essence, the principles comprising the theory of SC innovation are improvements in the SC process, technology or network that generate new value for all SC participants (Arlbjørn et al. 2011; Tajeddini et al. 2024). Service-sector operations diverge from manufacturing along four salient dimensions: the depth of customer co-production, the intolerance of quality deviations, the temporal indeterminacy of delivery schedules and the imperative of information fidelity (Brandon-Jones et al. 2016; So et al. 2022). In the hospitality sector, in particular, innovations necessitate coordinated integration among SC partners, inclusive of suppliers (Espino-Rodríguez & Taha 2022).

Market intelligence and supply chain innovation

Market intelligence, also known as 'market sensing', is the key DC that uncovers growth opportunities in the market environment before they become evident to others (Teece et al. 2016). Firms in the hospitality industry can use market intelligence to track competitors' moves, anticipate customer needs and feedback and build a customer-service database that enables innovation (Hoang et al. 2024; Pascual-Fernández et al. 2021). However, the context of SC innovation remains underdeveloped. Nevertheless, DC theory (Teece et al. 2016) posits that sensing capability enhances SC performance (Hussain & Malik 2022). Hotel market intelligence is not merely beneficial to the hotel itself; when it is systematically shared with collaborative partners, it can facilitate knowledge spillovers and co-creation that enable collaborative innovation across the entire SC system. Therefore, we pose the following hypothesis:

H1: Market intelligence capability is positively associated with SC innovation.

Inter-organisational adaptability and supply chain innovation

From an inter-organisational standpoint, adaptability may be operationalised along two distinct dimensions: internal adaptability, referring to adaptive capacities within the focal firm, and supplier adaptability, denoting adaptive capabilities achieved through collaborative supplier engagement. Internal adaptability indicates the ability of the focal firm within its boundary to integrate, adjust and reconfigure its internal resources, plans and operations in

response to long-term changes in the market (Yang et al. 2022). Firm-internal strategic resources and capabilities, such as strategic purchasing (Fiorini et al. 2023), information technology (IT) competencies (Dang-Van et al. 2024) and human capital (Luu 2021), constitute pivotal determinants of innovation performance within hospitality organisations. Researchers further stress that firm-internal dynamics oriented to marketing activities, employee responsiveness and organisational commitment to continually improve products and processes can accelerate service improvement (Pascual-Fernández, Santos-Vijande & López-Sánchez 2020; Tarí et al. 2024). A recent study by Begum et al. (2025) demonstrated that hotel managers' adaptive capabilities across market strategies, management systems and technology significantly contribute to product and process innovation.

Supplier adaptability refers to the capability of the focal firm in collaboration with its main supplier to reconfigure and amend supplier-related resources, practices and routines in response to long-term changes in the market environment (Ku 2023; Ku, Hsu & Wu 2020; Yang et al. 2022). Supplier adaptability emerges when buyers build strong relationships with their main suppliers and dedicate resources to relationship-specific investments that meet their requirements (Ku 2023; Ku et al. 2020). Consequently, suppliers that are equipped with responsiveness capabilities help speed up the procurement process, minimise delivery errors, improve resource-efficiency management and enhance financial performance (Ku et al. 2020). However, empirical understanding of how hospitality firms and their SC partners, suppliers in particular, co-adapt and transform to enable SC innovation remains nascent. By drawing on CAS, we can see that an adaptive SC whose performance is proportional to the diversity and interconnectivity of its existing partners and that follows a co-evolutionary pattern may achieve improved performance (Nair & Reed-Tsochas 2019). Thus, the adaptive capacity arising from: (1) intra-firm diversity in rules, such as routines, heuristics and schemas; and (2) inter-firm diversity in rules through supplier coupling increases the rate at which the SC system generates and selects novel, actionable schemas, thereby fostering SC innovation. Hence, we hypothesise as follows:

H2: Both internal (intra-firm) adaptability ($H2_i$) and supplier (inter-firm) adaptability ($H2_s$) positively affect SC innovation.

The mediating role of internal and supplier adaptability

Theoretically, intelligence and sensing capabilities can drive transformation capabilities as they are characterised by pro-activeness, where a firm anticipates and prepares for potential business opportunities ahead of competitors (Teece 2018). Therefore, market intelligence is an antecedent of adaptability capabilities. Furthermore, our framework posits that market intelligence capability must be coupled with adaptability capabilities to produce SC innovation. We argue that market intelligence alone is insufficient for SC innovation; firms must also reconfigure

internal and supplier resources to effectively orchestrate the SC innovation process. An empirical study by Begum et al. (2025) reveals that hotel internal adaptive capability mediated the association between green training and innovation performance.

Furthermore, market intelligence provides firms with real-time data whose dissemination to suppliers elicits adaptive responses, enabling the reconfiguration of processes, products and location choices to converge with emergent market conditions. Again, supplier adaptability underpins eco-design, modular production and flexible sourcing, collectively constituting a catalyst for innovation. Extant empirical research has established supplier adaptability as a pivotal mediating mechanism through which diverse organisational practices enhance SC performance (Ku 2023; Ku et al. 2020). Similarly, supplier adaptability has the potential to translate market intelligence into actionable SC innovation. For instance, it can bridge the gap between information and implementation, ensuring that market insights do not remain static reports but evolve into DCs. Grounded in the adaptive co-evolution of the focal firm and its suppliers within a CAS (Nair & Reed-Tsochas 2019), this study conceptualises the dyadic adaptability nexus as a conduit through which market intelligence capabilities are converted into SC innovation. Through a CAS lens, market intelligence becomes SC innovation only when internal and supplier adaptability, via emergent, self-organising capacities to reconfigure routines and relationships, absorbs, translates and amplifies market signals into novel, system-wide solutions. Thus, we hypothesise that:

H3_a: Internal adaptability mediates the effect of market intelligence on SC innovation.

H3_b: Supplier adaptability mediates the effect of market intelligence on SC innovation

The moderating role of digital orientation

Khin and Ho (2019) define digital orientation as ‘a firm’s commitment toward the application of digital technology to deliver innovative products, services, and solutions’ (p. 181). Digital orientation is conceptually distinct from digital technology capability, as it emphasises an organisation’s strategic mindset, preparedness and proactive commitment to adopting and integrating digital technologies, rather than its mere technical proficiency or infrastructure (Hussain & Malik 2022; Nambisan, Wright & Feldman 2019). Accordingly, digital orientation comprises three main traits, including generativity, affordance and openness (Nambisan et al. 2019). Digital orientation, strategically cultivating organisational readiness for and commitment to technological initiatives, enhances firms’ innovation performance (Ardito et al. 2021; Fiorini et al. 2023). Digital orientation significantly moderates the positive relationship between SC agility and sustainable performance among pharmaceutical firms (Li & Thurasamy 2025). Digital orientation has the potential to amplify the nexus between market intelligence and SC innovation by accelerating the conversion of real-time market insights into technologically sophisticated and improved SC process.

Likewise, it can strengthen the link between internal and supplier adaptability and SC innovation by supplying the data visibility, platform integration and collaborative tools that let firms and suppliers jointly sense, test and scale new solutions. Thus, the following hypotheses are formulated:

H4_a: Digital orientation positively moderates the effect of market intelligence on SC innovation.

H4_b: Digital orientation positively moderates the effect of internal adaptability on SC innovation.

H4_c: Digital orientation positively moderates the effect of supplier adaptability on SC innovation.

The hypotheses listed here are summarised in Figure 1.

Methods

Sample and sampling procedure

This study applied a positivistic philosophy, favouring the gathering of quantitative data. A cross-sectional survey method was conducted on hotels in both Tanzania mainland and Zanzibar. Tanzania’s mainland, comprising 25 regions, has approximately 1424 hotels, while Zanzibar Island has around 336 hotels (Njoroge et al. 2019). We deliberately focused on Tanzania’s coastal and northern tourism circuit, composed of Dar es Salaam, Zanzibar, Arusha and Kilimanjaro regions, as they are the most populated tourist destinations with accommodation facilities (Njoroge et al. 2019). A similar classification was utilised by other studies on innovation management in the hotel industry, such as Njoroge et al. (2019) and Hoang et al. (2024). Thus, the study sampling frame comprises 839 hotels. We contacted all hotels by phone and email, inviting their management to participate in a survey. Out of these, 319 hotels expressed willingness to participate, whereby questionnaires were sent through their respective emails. The hotel was our unit of analysis, the hotel manager or SC officer was our unit of inquiry, and the questionnaires were self-administered. After two rounds of follow-ups via email and phone calls, we received 224 completed responses by December 2024, achieving a strong response rate of 70%, which is considered excellent for particular studies (Hair, Howard & Nitzl 2020).

To further assess whether the final sample size was sufficient, we applied Soper’s sample size calculator for structural equation models (SEMs) (Soper 2016). We set the expected

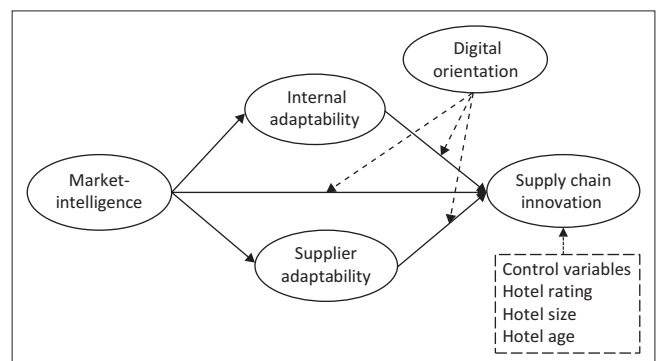


FIGURE 1: Conceptual model.

significance level at 5% and the desired statistical power level at 0.8, yielding a recommended sample size of not less than 112 (Soper 2016). Our final sample size of 224 surpasses the recommended threshold. The demographic information of the informant and the respective organisations is portrayed in Table 1.

Also, we evaluated the non-response bias. In doing that, we centred on the premise that late respondents serve as a proxy for non-respondents. Following the methodological recommendation by Hussain and Malik (2022), a Mann-Whitney U test was employed to ascertain significant differences between early and late respondents. Specifically, the first and last quartiles of responses were compared. The non-significant outcome of this test indicated that non-response bias was not a substantial threat to the validity of our findings.

Survey instruments and endogeneity

The measurement scale for market intelligence capability was borrowed from the study of Hoang et al. (2024). The respondents were asked to rate the level of their agreement that the firm can sense and acquire market information to explore potential innovations. Items for SC innovation were adapted from Lee, Lee and Schniederjans (2011) and Moberg et al. (2002). Respondents rated their agreement that the company pursues ongoing SC innovation via a seamless information system, modernised services and novel technological innovations. For internal adaptability, we utilised the scale of Yang et al. (2022) and Kump et al. (2019). Internal adaptability was assessed by asking respondents to rate their level of agreement that the firm's internal functions can adjust and transform their resources, processes and routines in reacting to changes. For supplier adaptability, we borrowed the items from Yang et al. (2022) and Ku (2023). The respondent was asked to rate their level of agreement that the firm can work with its major supplier to adjust and reconfigure supplier-related resources, processes and competencies when changes occur. Internal

adaptability and supplier adaptability are conceptualised and operationalised distinctively. Internal adaptability is measured by activities undertaken internally by the focal firm, while items for supplier adaptability measure activities that are jointly undertaken by the focal firm and its major supplier. For measuring digital orientation, the scale of Khin and Ho (2019) was used. The measurement scales were subjected to a team of three industry specialists and two university professors for aspect validity, specifically evaluating item clarity and relevance. The questionnaires were then pre-tested with 30 randomly selected hotels to confirm validity, as recommended by Perneger et al. (2015). All constructs were measured on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

To minimise the impact of demographic differences on SC innovation performance, hotel size, age and hotel category were controlled. Firm size was measured using the logarithm of the amount of investment capital, while firm age was based on years in operation. These control variables were included because they are often recommended to address endogeneity and are theoretically justified (Hoang et al. 2024; Tajeddini et al. 2024). However, our analysis reveals that these control variables exert no statistically significant influence on hotel SC innovation (see Equation 1):

$$(\beta_{\text{hotel size}} = 0.830, \beta_{\text{hotel age}} = 0.867, \beta_{\text{hotel category}} = 0.081, p > 0.05). \quad [\text{Eqn 1}]$$

Data analysis approach

The analytical procedure entails simultaneous examination of direct, mediating and moderating pathways specified within the hypothesised model. The Smart Partial Least Squares (PLS)-4 software was used to analyse the SEM for direct and indirect paths. Partial least squares structural equation modelling (PLS-SEM) was preferably suitable for this study compared to other methods, such as covariance-based SEM, for four main reasons. Firstly, this study aims to identify the antecedents of SC innovation, guided by a theoretically derived predictive model synthesised from extant research gaps. Aligned with the study's exploratory orientation, PLS-SEM is methodologically imperative (Hair et al. 2019, 2022). Secondly, given the model's focus on indirect effects, PLS-SEM is an appropriate estimator for mediation analysis (Nitzl, Roldan & Cepeda 2016). Thirdly, given the non-normal distribution of the data, PLS-SEM was deemed methodologically appropriate (Hair et al. 2019). Fourthly, as our study's dataset is relatively small, it renders PLS-SEM statistically appropriate (Hair et al. 2020; Nitzl et al. 2016). Partial least squares structural equation modelling has been similarly applied in prior hotel sector SC management research (Espino-Rodríguez & Taha 2022; Tajeddini et al. 2024).

Ethical considerations

An application for full ethical approval was made to the Open University of Tanzania, and ethics consent was received on 24 January 2024. The ethics approval number is OUT/DRPI./VOL.I/15.

TABLE 1: Informant and organisational demographics.

Variable	%
Informants	
General managers	37
SC and purchasing managers	63
Hotel experience (years)	
< 5	28
5–10	56
> 10	16
Hotels	
Five-star	14
Four-star	25
Three-star	61
Years in operation	
< 5	13
5–10	30
> 10	57
Investment capital (US\$ m)	
< 10	34
10–35	33
> 35	33

Results

Common method bias

We assessed the common method bias (CMB) as it is a critical concern for behavioural sciences research, and scholars should take measures to reduce it. In this research, we applied both procedural and statistical methods as proposed by Podsakoff, MacKenzie and Podsakoff (2012). In the procedural methods, we did not collect the personal information of the respondents, such as names, to ensure confidentiality and anonymity (Hoang et al. 2024). Also, we utilised the proximal separation method of independent and dependent constructs to mitigate the CMB as recommended by Podsakoff et al. (2012). In this method, we set far apart measurement of the predictor (independent) and criterion (dependent) variables in the questionnaire with filler tasks to prevent cross-cueing. In statistical methods, firstly, we assessed the CMB by using the 'technique of random dependent variable for lateral collinearity', which is calculated through the variance-based structural equation analysis (Kock 2017). The findings showed that the values for the variance inflation factor (Inner-VIF) ranged from 1.000 to 1.704, which is below the threshold (<3.3) (Kock 2017). When the VIF is below 3.3, each predictor retains at least 70% of its variance as unique, ensuring that the common-method component is sufficiently limited to preclude substantial bias in standard-error estimates or the suppression of genuine relationships. Secondly, we undertook the exploratory factor analysis using Harman's single-factor test in SPSS. The analysis revealed that a single factor was expected to account for 35.378% of the variance, which is less than the ceiling of 50% (Conway & Lance 2010). From these results, we concluded that there was no threat of CMB.

Measurement model evaluation

It is necessary to perform reliability and validity tests to ensure the accuracy of the indicators captured in the underlying theoretical constructs (Hair et al. 2022). Partial least squares structural equation modelling was used to measure internal consistency validity, indicator reliability, convergent validity and discriminant validity (Hair et al. 2019). The results in Table 2 show that the scores of outer loadings were greater than the minimum threshold (0.70), implying the acceptable indicators' reliability (Hair et al. 2022). Then we assessed the internal consistency of the model by observing Cronbach's alpha and composite reliability (Rho_a), whereby the scores were above 0.70, indicating satisfactory internal consistency reliability (Hair et al. 2019). Then, we measured the convergent validity of all reflective constructs by observing the average variance extracted (AVE), and the results were above the acceptable threshold of 0.50 (Hair et al. 2019). Then, we assessed the discriminant validity by observing the heterotrait-monotrait (HTMT) ratio. Contemporary PLS-SEM scholarship now favours HTMT over the conventional Fornell and Larcker (1981) criterion because the latter routinely fails to detect discriminant validity deficits in typical PLS contexts (Hair et al. 2022; Henseler, Ringle & Sarstedt 2015). Our analysis showed the values for HTMT were below 0.85, indicating that constructs are distinct from one another (Henseler et al. 2015) (see Table 3).

Structural model evaluation

The study employed two structural models. The first model assessed the direct and indirect impact of market intelligence on SC innovation via internal and supplier adaptability

TABLE 2: Construct validity and reliability.

Constructs with indicators	Loadings	Cronbach's alpha	Rho_a	AVE
Market intelligence	-	0.794	0.807	0.619
We acquire and use market information	0.811	-	-	-
We anticipate rivals' actions	0.874	-	-	-
We predict consumer demand	0.861	-	-	-
We establish database to serve customers	0.841	-	-	-
Internal adaptability	-	0.794	0.811	0.619
We can modify our internal employee to adapt to changes in the market	0.714	-	-	-
We can adjust functional plans to accommodate changes	0.774	-	-	-
We can change our company strategy in respect to external changes	0.875	-	-	-
We consistently pursue decisions on planned changes	0.775	-	-	-
Supplier adaptability	-	0.892	0.893	0.755
Our suppliers can modify products through inter-organisational system to meet our requirements	0.858	-	-	-
We and our major supplier can shorten lead times to better adapt to changes	0.881	-	-	-
We and our major supplier can adjust supplier-related processes to adapt to changes	0.860	-	-	-
We and our major supplier can adjust material volumes to adapt to changes	0.875	-	-	-
Digital orientation	-	0.837	0.838	0.754
Our solutions have superior digital technology	0.870	-	-	-
We readily accept digital technology in our organisation	0.859	-	-	-
We always look out for opportunities to use digital technology in our innovation	0.876	-	-	-
Supply chain innovation	-	0.857	0.864	0.701
We pursue new technological innovations	0.869	-	-	-
We pursue continuous innovation in the core process	0.836	-	-	-
We pursue an integrated information system with our main suppliers	0.768	-	-	-
We focus effectiveness of the process	0.870	-	-	-

AVE, Average Variance Extracted; Rho_a, composite reliability.

(mediated model), while the second model explored the interaction of digital orientation with market intelligence, internal and supplier adaptability on fostering SC innovation (moderated model). In the mediated model, a PLS-SEM algorithm was utilised to evaluate the model's predictive validity and capacity. Firstly, we examined the R^2 values, which indicate how much of the variance in the dependent variable is explained by the latent components extracted from the independent variables (Hair et al. 2022; Sarstedt et al. 2014). Thus, R^2 (the coefficient of determination) measures the in-sample predictive performance for every endogenous construct: 16% of the variance in internal adaptability ($R^2 = 0.164$), 20% of the variance in supplier adaptability ($R^2 = 0.202$) and 42% of the variance in SC innovation ($R^2 = 0.422$) are explained by their respective predictor variables. These results indicate that our dependent variables contain a significant degree of variance concerning the independent variables (Hair et al. 2020). Secondly, we assessed the f^2 effect, which measures whether omitting the construct significantly affects the dependent variables. All relationships in the mediated model demonstrate significant f^2 effect sizes, ranging from small (0.02–0.15) to medium (0.15–0.35) (Hair et al. 2020). Thirdly, we evaluated the Q^2 indices, which represent the measure of the model's predictive relevance. The results show that values for Q^2 ranged from 0.143 to 0.192, indicating that the model has sufficient predictive relevance (Hair et al. 2020). The Q^2 measure can also indicate out-of-sample predictive relevance (Hair et al. 2020; Sarstedt et al. 2014). Table 4 summarises the results for R^2 , f^2 and Q^2 .

Analysis of direct and mediation relationships

Partial least squares structural equation modelling was employed to test the proposed direct and indirect relationships through a one-tailed bootstrapping procedure with 10 000 resamples. The result of the direct effect of market intelligence on SC innovation was positive and significant ($\beta = 0.126$, $t = 1.824$, $p < 0.05$), hence supporting H1. Additionally, the effects of internal and supplier adaptability

TABLE 3: Heterotrait-Monotrait ratio.

Construct	D.O	I.A	M.I	S.A	Sc. I
D.O	-	-	-	-	-
I.A	0.506	-	-	-	-
M.I	0.472	0.483	-	-	-
S.A	0.693	0.428	0.501	-	-
Sc. I	0.731	0.596	0.483	0.631	-

M.I, market intelligence; I.A, internal adaptability; S.A, supplier adaptability; D.O, digital orientation; Sc. I, supply chain innovation.

TABLE 4: Structural model assessment.

Endogenous variables	Q^2 predict	R^2	R^2 adjusted	Paths (f^2)
I.A	0.143	0.167	0.164	I.A → Sc.I (0.140)
S.A	0.192	0.205	0.202	M.I → I.A (0.201)
Sc. I	0.173	0.430	0.422	M.I → S.A (0.258)
-	-	-	-	M.I → Sc.I (0.020)
-	-	-	-	S.A → Sc.I (0.196)

M.I, market intelligence; I.A, internal adaptability; S.A, supplier adaptability; Sc. I, supply chain innovation.

on SC innovation were statistically significant ($\beta = 0.318$, $t = 5.067$, $p < 0.000$) and ($\beta = 0.384$, $t = 5.12$, $p < 0.000$), respectively, thus supporting H2_a and H2_b. These results highlight that internal and supplier adaptability have a stronger effect on SC innovation than market intelligence does. This shows that while market intelligence is necessary, firms' internal and external integration and reconfiguration are indispensable for SC innovation in Tanzania's hospitality sector.

The analysis of the indirect effect of internal and supplier adaptability on the relationship between market intelligence and SC innovation was statistically significant ($\beta = 0.130$, $t = 3.579$, $p < 0.000$) and ($\beta = 0.174$, $t = 4.368$, $p < 0.000$), respectively. Therefore, H3_a and H3_b were accepted. These findings signify that although market intelligence capability can significantly influence SC innovation, its effect is partially mediated by internal and supplier adaptability. Table 5 presents the results of the direct and mediated models.

Analysis of moderation effects

To conduct the moderation analysis, we followed the work of Hoang et al. (2024), utilising structural equation modelling in SPSS. The coefficients of the interaction terms and the results from simple slope analyses (Preacher, Curran & Bauer 2006) assessed the associations between market intelligence, internal adaptability, supplier adaptability and SC innovation at low and high digital orientation. Contrary to expectations, digital orientation did not significantly moderate the effect of market intelligence on SC innovation ($\beta = 0.112$, $p > 0.05$). Consequently, H4_a is rejected. This null result suggests that digital orientation is not a necessary complement to market intelligence in the specific context of SC innovation, perhaps because intelligence already contains actionable, market-specific cues that bypass the need for digital mediation. Nevertheless, the interaction coefficient of digital orientation and internal adaptability on SC innovation is significantly positive ($\beta = 0.132$, $p < 0.05$). Also, the interaction effect between digital orientation and supplier adaptability on SC innovation was positive and statistically significant ($\beta = 0.151$, $p < 0.05$). Figure 2 and Figure 3 show that a higher level of digital orientation significantly strengthens the positive association between internal adaptability and SC innovation (Figure 2) and between supplier adaptability and SC innovation (Figure 3). The findings highlight the strategic significance of the firm's digital orientation as a critical

TABLE 5: Results of the direct and mediated model.

Paths	β	STD	T statistics	Hypothesis results
Direct effects				
M.I → Sc. I	0.126*	0.069	1.824	H1 supported
I.A → Sc. I	0.318***	0.063	5.067	H2 _a supported
S.A → Sc. I	0.384***	0.075	5.120	H2 _b supported
Indirect effects				
M.I → I.A → Sc. I	0.130***	0.036	3.579	H3 _a supported
M.I → S.A → Sc. I	0.174***	0.040	4.368	H3 _b supported

β , standardised path coefficient; STD, standard deviation; M.I, market intelligence; I.A, internal adaptability; S.A, supplier adaptability; Sc. I, supply chain innovation.

*, $p < 0.05$, ***, $p < 0.001$.

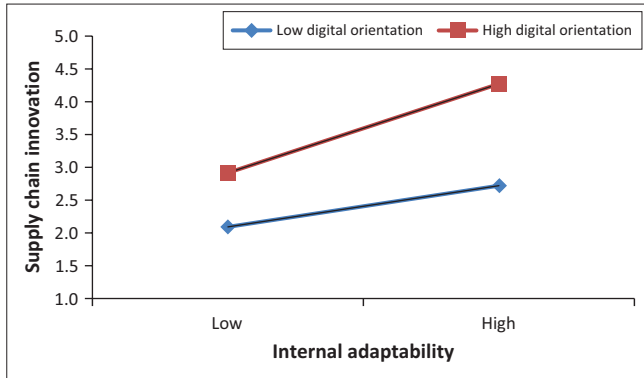


FIGURE 2: Moderating the effect of digital orientation on the relationship between internal adaptability and supply chain innovation.

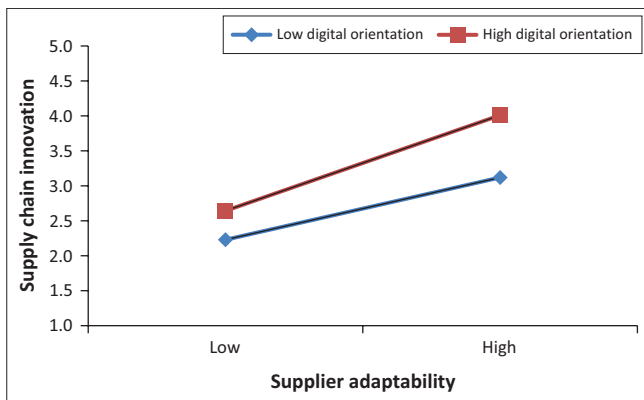


FIGURE 3: Moderating the effect of digital orientation on the relationship between supplier adaptability and supply chain innovation.

TABLE 6: Moderation model.

Paths	β	S.E	Hypothesis results
Interaction effects			
D.O \times M.I \rightarrow Sc. I	0.112 <i>n.s</i>	0.064	H4 _a rejected
D.O \times I.A \rightarrow Sc. I	0.132*	0.076	H4 _b supported
D.O \times S.A \rightarrow Sc. I	0.151*	0.053	H4 _c supported

β , standardised path coefficient; S.E, standard error; M.I, market intelligence; I.A, internal adaptability; D.O, digital orientation; S.A, supplier adaptability; Sc. I, supply chain innovation; n.s, not significant.

*, $p < 0.05$.

enabler in enhancing both internal and external (supplier) adaptability, thereby fostering enhanced capabilities for advancing SC innovation. Table 6 reports the hypothesis tests for the model's moderating effect.

Discussion

This study empirically investigates the influence of market intelligence on SC innovation, with internal adaptability and supplier adaptability treated as distinct, sequential mediators. Furthermore, the investigation examines the extent to which firms' digital orientation moderates the associations among market intelligence, internal adaptability, supplier adaptability and SC innovation. Empirical evidence supports the positive relationship between market intelligence and SC innovation in the Tanzanian hotel sector. This finding partially concurs with the prior works, which revealed that market intelligence capability positively influences hotel competitive advantage (Elsharnouby & Elbanna 2021) and service innovation

(Hoang et al. 2024). While previous studies were based on innovation at the firm level, this study distinguishes itself by concentrating on innovation at the inter-organisational level and shows that market intelligence capability is still a significant enabler.

Furthermore, the study statistically substantiates a significant positive effect of internal adaptability on SC innovation. This empirical evidence statistically validates the CAS claim that endogenous, distributed adaptation drives supply-network transformation by linking intra-firm resource reconfiguration to measurable system-level innovation. Moreover, our predictive path was confirmed about the positive link between supplier adaptability and SC innovation. Similarly, these findings underscore the potential of CAS's view (Choi et al. 2001), which emphasises reconfigurations and transformation of both internal (focal firm) and external (supplier)-related resources and capabilities as the essential enabler for SC innovation. The results partially corroborate extant literature, indicating that hotels' internal adaptive capabilities enhance environmental product and process innovation (Begum et al. 2025) and sustain competitive positioning amid adversity (Shi et al. 2021).

Moreover, internal and supplier adaptability significantly and partially mediated the indirect relationship between market intelligence and SC innovation. The outcomes underscore that both internal and supplier adaptability are active translators of organisational capabilities in enhancing superior performance. These findings concur with those of Begum et al. (2025), who showed that hotels' internal adaptive capability serves as the mediating mechanism through which green training influences both green-process and green-product innovation. Similarly, these results support a previous study, which showed that supplier adaptability mediates the relationship between restaurant firms' product-development efficiency and SC performance (Ku et al. 2020).

Although we hypothesised that digital orientation would amplify the effect of market intelligence on SC innovation, the interaction term was non-significant. The findings lend greater support to a universalistic interpretation, positing that market intelligence is equally effective in driving innovation in the hotel sector (Hoang et al. 2024), regardless of digital orientation. Nevertheless, industry heterogeneity of our sample likely attenuated the conditional effect, rendering it statistically non-significant (Bordian et al. 2024). The insignificant moderating influence of digital orientation has also been corroborated in prior investigations (e.g. Hussain and Malik (2022) and Tajeddini et al. (2024)) that examined the nexus between diverse managerial practices and hotel performance. Nonetheless, this study underscores the strategic importance of digital orientation, manifested in its moderating influence on both intra-organisational and inter-organisational (supplier) adaptability, in facilitating SC innovation. We concur with the prevailing scholarly

consensus that digital orientation catalyses all forms of organisational flexibility, adaptation and change, thereby facilitating superior performance outcomes (Ardito et al. 2021; Rupeika-Apoga, Petrovska & Bule 2022; Wang, Liu & Lei 2024).

Theoretical contribution

This research advances literature on SC innovation in the hospitality context in three facets. Firstly, it fills a gap in the literature by examining SC innovation as an SC level phenomenon, whereas prior studies have focused primarily on intra- and inter-organisational innovations (Lee et al. 2021; Lelo de Larrea et al. 2021; Park et al. 2023; So et al. 2022). Likewise, by investigating SC innovation in the hotel SC, we answer Lelo de Larrea et al.'s (2021) call to address this knowledge gap in the hospitality and tourism context.

Secondly, the study extends the stream of market intelligence literature as the antecedents for SC innovation. Prior hospitality management inquiry (Tajeddini et al. 2024) focused on resource orchestration and strategic information exchange capabilities as predictors for SC innovation. Additionally, the study advances internal and supplier adaptability as enablers for SC innovation. Previous studies have restricted adaptability as an expediter for firm agility and resilience, responsible for reacting to SC disruption (Erol et al. 2024; Hussain & Malik 2022; Ku 2023; Shi et al. 2021). By integrating DC and CAS theory, this study frames the collective role of market intelligence and internal and supplier adaptability as organisational DCs, both internal and external, that critically determine SC innovation, thereby contributing to the literature.

Thirdly, this is one of the earliest studies to unpack the dual effect of internal and supplier adaptability on the innovation framework in the hotel SC. This dual mediation mechanism expands the empirical reach of CAS theory (Choi et al. 2001), by foregrounding the co-evolutionary, interdependent and adaptive dynamics between the focal firm and its suppliers within the SC system, thereby enabling opportunistic responses and innovation outcomes. Furthermore, this study operationalises adaptability through the distinct yet complementary dimensions of internal and supplier adaptability, thereby redressing the knowledge gap identified by Phadnis (2023).

Fourthly, this is the pioneer study to test the moderating role of digital orientation on the association between market intelligence, internal and supplier adaptability and SC innovation. Our study even departs from prior investigations where digital orientation was interacted with resource orchestration capabilities and strategic information exchange on influencing SC innovation (Tajeddini et al. 2024) or between SC agility and firm resilience (Hussain & Malik 2022). Grounded in CT, this study advances the literature by unfolding how digital orientation interacts with internal and supplier adaptability to catalyse innovation within hospitality SC.

Practical implications

Initially, our research informs managers that market intelligence capability is a vital organisational asset for hospitality companies seeking to innovate along their SC. The study suggests that hospitality companies should develop market sensing capabilities through a tailored intelligence programme that facilitates the identification, collection and analysis of market-related information and design activities to cultivate that information to create innovative solutions. Marketing or SC teams should be equipped with basic market-monitoring tools and free analytics plugins so they can capture real-time customer signals, spot emerging needs and adjust tactics to drive innovation in hotel SC.

Our research also highlights the importance of managers adjusting and modifying internal and supplier-related resources, competencies and processes in collaboration with key suppliers as a keystone for fostering SC innovation. For instance, managers are encouraged to improve their IT competencies in purchasing and supply management, for example, by using e-sourcing, enterprise resource planning (ERP) systems, cloud-based inventory tools, Internet of Things (IoT) sensor dashboards and barcode or QR-code modules, to boost their innovative capabilities. Also, managers should be informed that, by coaching, incentivising and supporting their key suppliers, they can retool production lines, substitute materials and shorten lead times quickly enough to foster innovation across the hotel SC.

In addition, focusing on digital technology is an essential strategy for hospitality firms competing in dynamic markets. Thus, hospitality firms should embrace digital technologies that enable them to adjust internal resources, such as information management systems and IT infrastructure, to support technological innovation. Also, managers are encouraged to integrate and deploy advanced ITs, such as electronic data interchange (EDI), web-based collaboration platforms or cloud-based procurement dashboards that enable seamless information exchange with SC partners, thereby cultivating SC innovation.

Conclusion

This study investigates how SC innovation emanates in the milieu of Tanzania's hospitality industry. Our empirical findings advance current literature regarding drivers for SC innovation and establish that market intelligence, internal and supplier adaptability are vital enablers. We also show that internal and supplier adaptability act as the catalytic mechanism for market intelligence, while digital orientation amplifies the efficacy of internal and supplier adaptability in driving SC innovation. In light of the recent scholarly interest in uncovering SC innovation in hospitality and tourism literature, our findings provide valuable theoretical insights.

Limitations and suggestions for future studies

This study is not without limitations; accordingly, it proposes several empirical and methodological refinements for future research. Firstly, future research could adopt a longitudinal design to capture the dynamic nature of adaptability and innovation over time. Secondly, scholars are advised to integrate the upstream supply-chain tier that encompasses customer adaptability into the model, recognising customers as prospective collaborators in augmenting hotel innovation performance. Thirdly, although the selected research context is appropriate, the generalisability of the findings could be enhanced through the comparative analysis of multiple empirical settings. Finally, the model's validity should be assessed within an alternative service sector to extend its domain of application.

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Competing interests

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Authors' contributions

B.C.M. and H.G. contributed equally in conceptualising and writing this research article.

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Data availability

The data that support the findings of this study are openly available from the corresponding author, B.C.M., upon reasonable request.

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