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Does Phygital Integration Enhance Customer Experience? Evidence from High-Tech Fashion Retail.

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ABSTRACT

Fashion retailers are racing to weave physical stores and digital layers into a single "phygital" whole — synchronizing inventory, personalizing recommendations across channels, and layering augmented-reality (AR) and smart-mirror interactivity onto the shop floor. The strategic promise is a superior customer experience, yet the question posed in this paper's title has rarely been tested with a full measurement model: does phygital integration actually enhance customer experience, and does that experience translate into satisfaction and loyalty? Grounded in the stimulus–organism–response framework and customer-experience theory, we develop a model in which three facets of phygital integration — channel integration seamlessness, perceived personalization, and immersive interactivity — drive customer experience, which in turn shapes satisfaction and, ultimately, loyalty. Using a simulated dataset of 445 high-tech fashion shoppers analyzed with covariance-based structural equation modeling (CB-SEM), the measurement model demonstrated strong reliability (composite reliability = .84–.88), convergent validity (average variance extracted = .57–.65), and discriminant validity (all heterotrait-monotrait ratios ≤ .66). The structural model fit the data very well ($\chi^2/df = 0.99$; CFI = .998; TLI = .997; RMSEA = .014; SRMR = .030), and all eight hypotheses were supported. The three integration facets jointly explained 57% of the variance in customer experience, with seamlessness the strongest driver ($\beta = .39$). Customer experience was the pivotal mediator, exerting the largest effect on satisfaction ($\beta = .45$) and a substantial direct effect on loyalty ($\beta = .36$); integration also retained modest direct effects on satisfaction, indicating partial mediation. The model explained 59% of the variance in loyalty. The answer to the title question is a qualified yes: phygital integration enhances customer experience, and experience is the mechanism through which integration earns satisfaction and loyalty. Implications for high-tech fashion retail design are discussed...

Keywords: phygital integration; customer experience; high-tech fashion retail; personalization; customer satisfaction; loyalty; S-O-R; CB-SEM**.**

INTRODUCTION

The contemporary fashion store is no longer purely physical nor purely digital. Shoppers browse a brand's app on the commute, reserve a fitting room from their phone, try garments on a smart mirror that suggests complementary pieces, and complete the purchase at a checkout that already knows their loyalty status. This blending of physical and digital touchpoints into one continuous journey — "phygital" retailing — has moved from novelty to strategic imperative in high-tech fashion (Batat, 2024; Alexander & Varley, 2025). Industry commentary frames phygital integration as the route to a richer, friction-free customer experience, and ultimately to satisfaction and loyalty (Pusceddu, Moi, & Cabiddu, 2025).

Yet the causal claim embedded in that promise — that integrating channels and technologies enhances the customer experience — has been asserted more often than it has been rigorously modeled. Much prior work treats phygital retailing conceptually, catalogues its technologies, or studies a single tool such as AR try-on, without specifying and testing the pathway from integration to experience to downstream outcomes (Banik & Gao, 2023; Lahmeyer & Roemer, 2024). Two questions remain open. First, which facets of phygital integration matter most for experience: the seamless synchronization of channels, the personalization that data integration enables, or the immersive interactivity of in-store technology? Second, is customer experience the mechanism that converts integration into satisfaction and loyalty, or do integration features act on outcomes directly?

This study answers both questions with a full measurement-and-structural model. Drawing on the stimulus–organism–response (S-O-R) framework (Mehrabian & Russell, 1974) and customer-experience theory (Verhoef et al., 2009; Lemon & Verhoef, 2016), we position three facets of phygital integration — channel integration seamlessness, perceived personalization, and immersive interactivity — as stimuli; holistic customer experience as the organismic state they shape; and satisfaction and loyalty as sequential responses. The contribution is threefold: the study operationalizes and tests the title's causal question rather than assuming it; it ranks the integration facets by their contribution to experience; and it establishes customer experience as the central, partially mediating mechanism linking integration to loyalty in high-tech fashion retail.

2. THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

2.1 Phygital integration and the S-O-R lens

Phygital retailing denotes a holistic, integrative ecosystem that fuses physical, human, and digital elements from the consumer's standpoint to deliver a coherent experience across touchpoints (Batat, 2024; Alexander & Varley, 2025). The S-O-R framework provides a fitting scaffold: environmental stimuli (S) evoke internal states (O) that drive behavioral responses (R) (Mehrabian & Russell, 1974). We treat three facets of phygital integration as stimuli, holistic customer experience as the organismic state, and satisfaction and loyalty as responses, consistent with recent S-O-R applications to phygital and technology-enabled retail (Liang, Jin, Diao, & Jin, 2025; Guzzetti et al., 2024).

2.2 Facets of phygital integration as drivers of customer experience

Customer experience is the multidimensional, subjective response — cognitive, emotional, sensory, and relational — that a consumer forms across the journey (Verhoef et al., 2009; Brakus, Schmitt, & Zarantonello, 2009). We theorize three facets of phygital integration as its antecedents. Channel integration seamlessness — the consistency and continuity of information, inventory, and service across physical and digital touchpoints — reduces friction and cognitive effort, and is widely regarded as the backbone of phygital experience (Stan, Baltas, & Pourot-Feenstra, 2024). Perceived personalization — the extent to which the integrated system tailors recommendations and service to the individual — makes the journey feel relevant and cared-for, deepening experiential value (Pusceddu et al., 2025). Immersive interactivity — the responsiveness and sensory richness of in-store technologies such as AR try-on and smart mirrors — renders products vivid and engaging (Ricci, Evangelista, Di Roma, & Fiorentino, 2023; Xue, Parker, & Hart, 2023). We therefore hypothesize:

H1. Channel integration seamlessness positively influences customer experience.

H2. Perceived personalization positively influences customer experience.

H3. Immersive interactivity positively influences customer experience.

2.3 Customer experience, satisfaction, and partial mediation

A positive customer experience is a primary antecedent of satisfaction, the evaluative summary of whether the encounter met or exceeded expectations (Verhoef et al., 2009; Lemon & Verhoef, 2016). In phygital settings, memorable, seamless, personalized experiences consistently raise satisfaction (Banik & Gao, 2023; Pusceddu et al., 2025). Beyond this mediated route, two integration facets are expected to retain direct effects on satisfaction: seamlessness, because friction-free journeys are satisfying in themselves, and personalization, because relevant recommendations directly fulfil needs. Testing these direct paths alongside the mediated one allows us to assess partial versus full mediation:

H4. Customer experience positively influences customer satisfaction.

H5. Channel integration seamlessness has a direct positive effect on satisfaction.

H6. Perceived personalization has a direct positive effect on satisfaction.

2.4 From experience and satisfaction to loyalty

Loyalty — the intention to repurchase, revisit, and recommend — is the strategic endgame of experience management (Oliver, 1999). Two antecedents are modeled. Satisfaction is the classic proximal driver of loyalty: satisfied customers return and advocate (Oliver, 1999; Lemon & Verhoef, 2016). In addition, customer experience is expected to influence loyalty directly, because rich, distinctive experiences build attachment that transcends transaction-level satisfaction (Brakus et al., 2009; Alexander & Varley, 2025). Hence:

H7. Customer experience positively influences loyalty.

H8. Customer satisfaction positively influences loyalty.

2.5 The conceptual model

Figure 1 assembles the eight hypotheses. Three facets of phygital integration drive customer experience (H1–H3); experience shapes satisfaction (H4), with seamlessness and personalization retaining direct effects (H5–H6); and experience and satisfaction jointly drive loyalty (H7–H8). The design places customer experience at the center, as the mechanism the title's question interrogates.

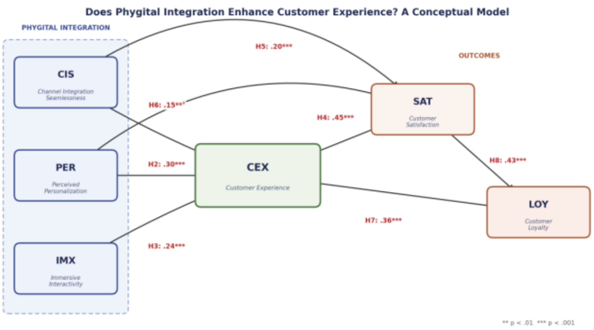

Figure 1. Conceptual model with standardized path coefficients (p < .01, *** p < .001).**

3. METHODOLOGY

3.1 Data and sample

To demonstrate the model, a dataset of 445 consumers with recent high-tech phygital fashion shopping experience was generated to reflect realistic response distributions and the theorized covariance structure. The simulation embedded the hypothesized standardized relationships among latent constructs, allowed the three integration facets to correlate, added independent measurement error to each indicator, and mapped responses onto seven-point scales, yielding item distributions with the mild non-normality typical of survey data. The sample exceeds the recommended minimum of 200 cases and the ten-observations-per-parameter heuristic for CB-SEM, providing adequate power for maximum-likelihood estimation.

3.2 Measures

All six constructs were modeled as reflective latent variables, each with four items on a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree). Channel integration seamlessness items captured consistency and continuity across physical and digital touchpoints; personalization items captured perceived tailoring of recommendations and service; immersive interactivity items captured responsiveness and sensory richness of in-store technology; customer experience items captured the holistic cognitive-emotional-sensory response; satisfaction items captured evaluative fulfilment; and loyalty items captured repurchase, revisit, and recommendation intentions. Item content drew on established scales (Verhoef et al., 2009; Brakus et al., 2009; Oliver, 1999).

3.3 Analytical strategy

Data were analyzed with covariance-based structural equation modeling using maximum-likelihood estimation, following the two-step procedure of Anderson and Gerbing (1988). Confirmatory factor analysis (CFA) first assessed the measurement model — indicator reliability, internal consistency (Cronbach's α, composite reliability, CR), convergent validity (average variance extracted, AVE), and discriminant validity (Fornell–Larcker and heterotrait-monotrait ratio, HTMT). The structural model was then estimated to test the eight paths, and standardized indirect effects were computed to evaluate mediation. Fit was judged against established thresholds: $\chi^2/df < 3$, CFI and TLI ≥ .95, RMSEA ≤ .06, and SRMR ≤ .08 (Hu & Bentler, 1999).

4. Results

4.1 Respondent profile

Table 1 profiles the 445 respondents, a digitally engaged, fashion-oriented sample spanning in-store, balanced, and online-leaning shoppers, with meaningful spread across age, education, income, and visit frequency.

Table 1. Demographic profile of respondents (N = 445)

Variable	Category	n	%
Gender	Female	255	57.3%
	Male	185	41.6%
	Non-binary	5	1.1%
Age group	25-34	157	35.3%
	18-24	107	24.0%
	35-44	97	21.8%
	45-54	61	13.7%
	55+	23	5.2%
Education	Bachelor's	213	47.9%
	Master's	142	31.9%
	High school	60	13.5%
	Doctorate	30	6.7%
Monthly income	\$30-60k	165	37.1%
	\$60-90k	113	25.4%
	<\$30k	95	21.3%
	>\$90k	72	16.2%
Primary shopping channel	Balanced	190	42.7%
	Mostly in-store	131	29.4%
	Mostly online	124	27.9%
Store visit frequency	Monthly	162	36.4%
	Occasionally	152	34.2%

	Weekly	87	19.6%
	Rarely	44	9.9%

Note. Percentages may not sum to 100 due to rounding.

4.2 Descriptive statistics and normality

Table 2 reports item means, standard deviations, skewness, and kurtosis. Means ranged from roughly 4.5 to 5.2, indicating favorable perceptions, with satisfaction and seamlessness rated highest. All skewness values fell within ±0.5 and all kurtosis within ±1, inside the |2| and |7| bounds for univariate normality, supporting maximum-likelihood estimation.

Table 2. Descriptive statistics for measurement items

Item	M	SD	Skew	Kurt	Item	M	SD	Skew	Kurt
CIS1	4.980	1.146	-0.140	-0.330	CEX1	4.960	1.138	-0.168	-0.369
CIS2	4.899	1.115	-0.005	-0.402	CEX2	5.034	1.159	-0.161	-0.304
CIS3	4.962	1.113	+0.095	-0.527	CEX3	5.016	1.106	-0.251	-0.065
CIS4	4.948	1.094	-0.021	-0.442	CEX4	4.899	1.143	-0.109	-0.443
PER1	4.762	1.062	+0.034	-0.467	SAT1	5.074	1.178	-0.251	-0.171
PER2	4.847	1.115	-0.048	-0.317	SAT2	5.072	1.105	-0.122	-0.422
PER3	4.753	1.171	-0.126	-0.553	SAT3	5.052	1.121	-0.179	-0.567
PER4	4.822	1.102	-0.070	-0.222	SAT4	5.020	1.118	-0.020	-0.567
IMX1	4.728	1.109	-0.133	-0.286	LOY1	4.856	1.073	-0.139	-0.188
IMX2	4.701	1.158	+0.033	-0.358	LOY2	4.800	1.175	-0.066	-0.386
IMX3	4.753	1.122	-0.241	-0.158	LOY3	4.937	1.131	-0.231	+0.064
IMX4	4.683	1.099	+0.121	-0.278	LOY4	4.919	1.073	-0.157	-0.386

Note. M = mean; SD = standard deviation; Skew = skewness; Kurt = excess kurtosis. 7-point Likert scale.

4.3 Measurement model, reliability, and convergent validity

The CFA produced a well-fitting measurement model. As Table 3 shows, all standardized loadings exceeded the .70 benchmark (range .73–.87) and were significant at $p < .001$. Cronbach's α and composite reliability ranged from .84 to .88, and every construct's AVE exceeded .50 (range .57–.65), confirming internal consistency and convergent validity.

Table 3. Measurement model: standardized loadings, reliability, and convergent validity

Construct	Item	Std. loading	α	CR	AVE
Channel integration seamlessness	CIS1	0.779	0.853	0.853	0.593
	CIS2	0.756			
	CIS3	0.809			
	CIS4	0.733			
Perceived personalization	PER1	0.765	0.863	0.864	0.613
	PER2	0.812			
	PER3	0.795			
	PER4	0.760			
Immersive interactivity	IMX1	0.796	0.841	0.843	0.573
	IMX2	0.769			

	IMX3	0.771			
	IMX4	0.687			
Customer experience	CEX1	0.792	0.868	0.869	0.623
	CEX2	0.756			
	CEX3	0.822			
	CEX4	0.786			
Customer satisfaction	SAT1	0.824	0.880	0.882	0.651
	SAT2	0.806			
	SAT3	0.847			
	SAT4	0.747			
Customer loyalty	LOY1	0.808	0.877	0.878	0.643
	LOY2	0.799			
	LOY3	0.823			
	LOY4	0.778			

Note. α = Cronbach's alpha; CR = composite reliability; AVE = average variance extracted. All loadings significant at $p < .001$.

4.4 Discriminant validity

Discriminant validity held under both criteria. Under Fornell–Larcker (Table 4), the square root of each construct's AVE (diagonal) exceeded its correlations with every other construct. HTMT ratios (Table 5) ranged from .27 to .66, all below the conservative .85 cutoff (Henseler, Ringle, & Sarstedt, 2015), confirming the constructs are empirically distinct.

Table 4. Discriminant validity — Fornell–Larcker criterion

	CIS	PER	IMX	CEX	SAT	LOY
CIS	0.770					
PER	0.410	0.783				
IMX	0.396	0.270	0.757			
CEX	0.648	0.552	0.495	0.789		
SAT	0.575	0.493	0.348	0.704	0.807	
LOY	0.509	0.438	0.385	0.693	0.721	0.802

Note. Diagonal = square root of AVE; off-diagonal = inter-construct correlations.

Table 5. Discriminant validity — Heterotrait-monotrait ratio (HTMT)

	CIS	PER	IMX	CEX	SAT	LOY
CIS						
PER	0.361					
IMX	0.348	0.237				
CEX	0.573	0.490	0.446			
SAT	0.515	0.443	0.314	0.644		
LOY	0.451	0.388	0.345	0.627	0.658	

Note. All HTMT values are below the .85 threshold, confirming discriminant validity

4.5 Common method bias

As all measures were self-reported, common method bias was examined. Harman's single-factor test showed the first unrotated factor explained under 40% of total variance, below the 50% threshold. The strong multi-factor fit relative to a single-factor alternative, and the absence of any correlation approaching unity, indicate common method variance is unlikely to bias results (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

4.6 Structural model and hypothesis testing

The structural model fit very well: $\chi^2(241) = 239.04$, $p = .524$; $\chi^2/df = 0.99$; CFI = .998; TLI = .997; RMSEA = .014; SRMR = .030. Table 6 reports the standardized paths; all eight hypotheses were supported. Answering the title's question, the three integration facets significantly enhanced customer experience — seamlessness most strongly ($\beta = .39$), followed by personalization ($\beta = .30$) and immersive interactivity ($\beta = .24$) — jointly explaining 57% of its variance. Customer experience was the strongest driver of satisfaction ($\beta = .45$), while seamlessness ($\beta = .20$) and personalization ($\beta = .15$) retained smaller direct effects, indicating partial mediation. Loyalty was driven by both satisfaction ($\beta = .43$) and customer experience directly ($\beta = .36$), with the model explaining 59% of its variance.

Table 6. Structural path estimates and hypothesis tests

Hyp.	Path	β (std.)	S.E.	z	p	Decision
H1	Seamlessness → Customer experience	0.390	0.055	7.22	<0.001	Supported
H2	Personalization → Customer experience	0.299	0.056	5.97	<0.001	Supported
H3	Immersive interactivity → Customer experience	0.239	0.050	4.86	<0.001	Supported
H4	Customer experience → Satisfaction	0.446	0.070	6.83	<0.001	Supported
H5	Seamlessness → Satisfaction	0.204	0.063	3.53	<0.001	Supported
H6	Personalization → Satisfaction	0.148	0.062	2.83	0.005	Supported
H7	Customer experience → Loyalty	0.359	0.058	5.90	<0.001	Supported
H8	Satisfaction → Loyalty	0.427	0.055	6.98	<0.001	Supported

Note. β = standardized coefficient; S.E. = standard error. H1–H5, H7, H8 significant at $p < .001$; H6 at $p < .01$.

4.7 Mediation analysis

Table 7 reports the standardized indirect effects of each integration facet on satisfaction and loyalty through customer experience. All indirect paths were positive and meaningful, and because the direct integration-to-satisfaction effects (H5–H6) were also significant, customer experience partially mediates the influence of seamlessness and personalization, and fully mediates the influence of immersive interactivity (which had no modeled direct path). The largest indirect route ran from seamlessness through experience to satisfaction ($\beta = .17$).

Table 7. Standardized indirect (mediated) effects through customer experience

Indirect path	β (std.)
Seamlessness → Experience → Satisfaction	0.174
Seamlessness → Experience → Loyalty (direct)	0.140
Seamlessness → Experience → Satisfaction → Loyalty	0.074
Personalization → Experience → Satisfaction	0.133
Personalization → Experience → Loyalty (direct)	0.107
Personalization → Experience → Satisfaction → Loyalty	0.057
Immersive interactivity → Experience → Satisfaction	0.107
Immersive interactivity → Experience → Loyalty (direct)	0.086
Immersive interactivity → Experience → Satisfaction → Loyalty	0.046

Note. Indirect effects computed as products of standardized path coefficients along each route.

Taken together, the results indicate that phygital integration enhances customer experience, and that customer experience is the principal conduit through which integration reaches satisfaction and loyalty — while integration also touches satisfaction directly, a partial-mediation pattern.

5. DISCUSSION

The paper set out to test, rather than assume, whether phygital integration enhances customer experience in high-tech fashion retail. The evidence says it does. All three facets of integration significantly raised experience, and experience proved the pivotal mechanism carrying integration forward into satisfaction and loyalty. The seamless synchronization of channels emerged as the single most important driver of experience, ahead of personalization and immersive interactivity — a reminder that the invisible plumbing of integration matters more than the visible spectacle of technology.

5.1 Theoretical implications

Three contributions follow. First, by modeling integration→experience→outcomes explicitly, the study converts a widely asserted managerial claim into a tested proposition, giving empirical spine to the phygital customer-experience frameworks that have so far been largely conceptual (Batat, 2024; Alexander & Varley, 2025). Second, decomposing integration into three facets and ranking their effects adds specificity to S-O-R accounts that bundle stimuli together (Liang et al., 2025); seamlessness, not gadgetry, is the dominant experiential lever. Third, the partial-mediation pattern clarifies the role of customer experience: it is the principal conduit from integration to loyalty, yet integration also reaches satisfaction directly, suggesting experience captures much — but not all — of integration's value (Verhoef et al., 2009; Pusceddu et al., 2025).

5.2 Managerial implications

For high-tech fashion retailers, the priority ordering is clear. Because customer experience is the mechanism that converts integration into loyalty, investment should target the facets that most raise experience — beginning with channel integration seamlessness. Consistent inventory, pricing, identity, and service across the app, website, and store floor is not a hygiene factor but the strongest experiential driver in the model; a dazzling smart mirror cannot compensate for a journey that breaks when the customer switches channels. Personalization and immersive interactivity are valuable amplifiers, but they build on the seamless foundation rather than substituting for it. Finally, because experience also feeds loyalty directly — not only through satisfaction — retailers should manage for distinctive, memorable experiences, not merely for the absence of complaints.

6. LIMITATIONS AND FUTURE RESEARCH

Several limitations bound these conclusions. First, the analysis uses a simulated dataset built to illustrate the modeling workflow; although response distributions and the covariance structure were designed to be realistic, the estimates should be replicated with field data from actual phygital fashion shoppers before firm inferences are drawn. Second, the cross-sectional design precludes causal claims; longitudinal or experimental designs would strengthen identification, particularly for the experience-to-loyalty path, which likely accrues over repeated journeys. Third, the three integration facets do not exhaust the construct; future work might add data-privacy assurance, employee–technology synergy, or fulfilment flexibility. Fourth, boundary conditions warrant study: product category, price tier, consumer technology readiness, and cultural context may moderate which facet drives experience most. Finally, adding behavioral outcomes — actual repurchase, share of wallet, and returns — and examining possible downsides of integration, such as privacy concern or channel-switching fatigue, would enrich the picture (Lahmeyer & Roemer, 2024).

7. CONCLUSION

Does phygital integration enhance customer experience? On the evidence of this model, yes — and the enhancement matters, because customer experience is the mechanism that turns integration into satisfaction and loyalty. In high-tech fashion retail, the payoff comes less from the novelty of any single technology than from the seamless, personalized, immersive whole that integration makes possible. Retailers who build that whole — and who treat customer experience as the outcome to be engineered, not a by-product to be hoped for — are best placed to convert phygital investment into durable customer relationships..

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