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Consumer Adoption of Livestream Shopping: A Technology and Service Quality Perspective

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Abstract: *The paper explores the behavioral variables that impact Pakistani consumers' adoption of livestream shopping platforms which are becoming more popular within digital retail. The research aims to unite technology-based models with service quality frameworks by integrating personal innovativeness to describe the dynamic features of livestream shopping. Research in South Asian markets has limited availability, and user interface analysis service quality and influencer trust remain underexplored, which makes this study deliver a localized understanding of adoption behaviors. The research instrument employed a standardized questionnaire to determine constructs that originated from the TAM framework alongside SERVQUAL and user innovativeness principles. Testing direct, mediating and moderating relationships between constructs such as perceived usefulness, ease of use, attitude, behavioral intention and actual usage was done by analyzing data through Partial Least Squares Structural Equation Modeling (PLS-SEM). A positive correlation exists between user interface (β = 0.28) and service quality (β = 0.24), which leads to perceived usefulness and personal innovativeness (β = 0.30), which affects ease of use. The model proved the direct link between perceived usefulness and attitude (β = 0.62) and between behavioral intention and actual usage (β = 0.91). The study results show that the relationship between attitude and intention was not statistically significant because unmeasured factors particularly trust may be responsible for the occurrence.*

Key Words: Livestream Shopping, Technology Acceptance Model, Service Quality, PLS-SEM, Consumer Behavior, Social Commerce, Personal Innovativeness

Introduction

Livestream shopping in Pakistan transforms the e-commerce industry because it unites live product displays with consumer involvement and speedy digital payment methods (Sharma et al., 2024). The mobile commerce and digital payment infrastructure growth in Pakistan makes platforms like Daraz Live and TikTok Shop leaders in this emerging retail trend. Real-time interactions operate as key elements in this shopping innovation because they improve consumer trust and satisfaction before purchase decisions are made.

Livestream shopping adoption by consumers depends on the theoretical frameworks of Technology Acceptance Model (TAM) and SERVQUAL framework. Perceived usefulness and ease of use remain crucial elements for TAM yet SERVQUAL focuses on service quality elements that include reliability, responsiveness, assurance, empathy and tangibles (Davis, 1989; Parasuraman et al., 1988). Consumer engagement in Pakistan depends on the combination of easy-to-use systems and secure payment methods while offering top-quality visual content (Sharma et al., 2024).

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Livestream shopping has gained popularity as a preferred choice among younger consumers of Pakistan because they possess expertise with digital payments and social media while smartphone usage and enhanced internet access continue to expand the e-commerce landscape. The market forecast indicates that it will achieve $7.7 billion by 2025 because of government actions alongside fintech solution growth (Sharma et al., 2024).

Consumer confidence in e-transactions grows steadily because digital wallets and mobile banking systems have improved overall security standards despite existing trust issues and differing digital literacy skills. Digital e-commerce transactions have surpassed 60% so it seems likely that livestream shopping in Pakistan will gain momentum due to business adoption of interactive personalized shopping formats (Sharma et al., 2024).

Literature Review

The user interface is the core factor that boosts consumer participation on digital platforms through livestream shopping interactions. According to Sharma et al. (2024) respectively UI elements dominate both perceived usefulness and ease of use dimensions as well as user satisfaction. Users trust well-organized digital interfaces, which leads them to become regular platform users, according to Zhou et al. (2021). The adoption of livestream shopping in Pakistan requires mobile-friendly interfaces that include localized content due to the emerging nature of this market.

Consumer perceptions of service-oriented platforms are dramatically influenced by the element of Service quality (SQ). SQ determines customer decisions and loyalty after Parasuraman et al. (1988) established its reliability and responsiveness parameters. successful communication methods and premium visual quality support customers' perception of service quality in Pakistan's developing online market for trust development.

The willingness of individuals to adopt new technologies which explains early adoption behavior in livestream shopping is called Personal innovativeness (Agarwal & Prasad, 1998). When individuals demonstrate high personal innovativeness they become more active with interactive elements and build stronger trust in digital tools as indicated Davis (1989). The personal innovativeness factor enables researchers in Pakistan to divide customers into two segments for better market segmentation approaches.

The decision to use a platform relies on the key intermediary connection between perceptions and behavioural intention, which attitude toward using a platform establishes (Ajzen & Fishbein, 1980). People with positive attitudes resulting from perceived usefulness dimensions alongside ease of use principles show increased interest in streaming events. The development of optimal livestream commerce strategies in Pakistan needs a clear understanding of attitude-to-behavioral intention relationships because digital literacy and trust remain concerns (Davis, 1989; Venkatesh et al., 2021).

Introduction to Theories and Models
Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) serves as a common framework in research for examining new technology adoption because Davis (1989) first developed this approach. According to the model, household users base their attitudes on two central components, namely perceived usefulness (PU) and perceived ease of use (PEU). These factors determine behavioral intention that ultimately leads to system usage. The latest research works by Taylor & Todd (1995) verify the Technology Acceptance Model applies to mobile commerce, FinTech and livestream shopping markets because consumers base their choices on both practical and sensory factors. A simple model with strong empirical evidence enables research into Pakistan's emerging e-commerce behaviors because of its suitability. Earlier modifications by Venkatesh & Davis (2000) and Taylor & Todd (1995) included external variables such as trust, system quality and innovativeness, which this research study included in its conceptual framework. This research combines the Technology Acceptance Model to measure the technological benefits that Pakistani shoppers use to evaluate livestream shopping platforms.
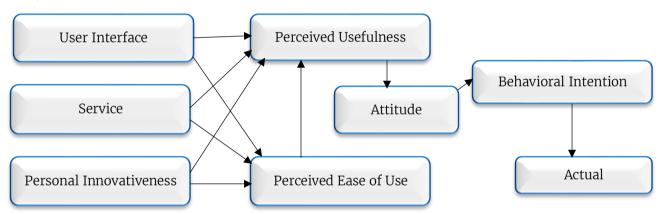
Single and Multiple Variable View

PU stands as a vital element for consumer adoption in technology acceptance models, especially in real-time decision-making situations Thong et al. (2006). The belief that systems enhance performance defines PU according to research and it remains the fundamental component of technology acceptance models (Davis, 1989; Venkatesh & Davis, 2000). Research studies have criticized the limited focus on PU in the Acceptance Model because it fails to incorporate essential aspects such as emotional engagement as well as trust and social interactivity (Sharma et al., 2024; Zhou et al., 2021).

Mediation and Moderation Considerations

A user interface is a fundamental element that affects perceived usefulness evaluations in livestream shopping platforms because real-time needs specific visual clarity. Customer-perceived platform utility improves through interfaces that offer friendly use to shoppers because intuitive navigation and accessible design elements make online purchasing easier to manage according to Thong et al. (2006). The incorporation of interactive user interface elements through chat boxes and, visual effects and product overlays enables better customer decision processes which benefits perceived usefulness according to Sharma et al. (2024). Thong et al. (2006) discovered that digital library users formulate their usefulness perceptions based on screen design and usability aspects. Technology Acceptance Model version 2 (TAM2) shows UI quality stands as an essential factor which leads to PU according to Venkatesh and Davis (2000).

Figure 1
Conceptual Model

Hypotheses Development
User Interface and Perceived Usefulness

Digital platforms obtain their usefulness perception from users because of how their interface design functions particularly well in situations demanding quick decision-making like livestream shopping. The research by Moon and Kim (2001) demonstrated that livestream platforms featuring user-friendly layout structures along with interactive functions caused consumers to bolster their perception of platform utility. Sharma et al. (2024) confirmed that structured product displays, live-chat features together with user-friendly navigation substantially improve the shoppers' perception of platform benefits. Zhou et al. (2021) discovered that interface design excellence enhances information connectivity while eliminating confusion which leads platforms to seem both faster and more beneficial. Thong et al. (2006) confirmed that User Interface serves as a primary component in establishing system value in digital libraries as livestream e-commerce allows users to engage similarly with platforms.

H1: User Interface has a significant positive impact on Perceived Usefulness in livestream shopping platforms.

User Interface and Perceived Ease of Use

The perception of system ease (PEU) heavily depends on user interface standards particularly when targeting interactive platforms like livestream shopping. A study by Sharma et al. (2024) found that basic visual designs with responsive functions and mobile-friendly features enhanced PEU for newcomer

Pakistani digital market users. Users are more likely to view livestream shopping platforms as easy to use when they can move through the stream effortlessly while talking to hosts and finishing purchases without many obstacles according to Moon and Kim (2001). According to Zhou et al. (2021) user interface design simplicity functions as a direct method to reduce user anxiety whereas it enhances their confidence in platform usage. Numeric User Interface design that generates positive playfulness and user control emerged as factors tied to PEU, according to Moon and Kim (2001) in multimedia system environments.

H2: User Interface has a significant positive impact on Perceived Ease of Use in livestream shopping platforms.

Service Quality and Perceived Usefulness

Digital commerce platforms gain increased perceived usefulness from the multi-dimensional construct of Service Quality (SQ). According to Moon and Kim (2001), user perceptions of increased shopping effectiveness result from livestream solution provider responsiveness backed by assurance and empathy. Sharma et al. (2024) explained how Service Quality (SQ) creates trust together with perceived value during interactions between consumers and live agents and influencers. The research by Zhou et al. (2021) established that prompt reply service and effective question handling boosted PU ratings within livestream shopping environments. According to Cronin & Taylor (1992), service execution can easily lead to value assessments, particularly while providing complex service activations.

H3: Service Quality has a significant positive impact on Perceived Usefulness in livestream shopping platforms.

Service Quality and Perceived Ease of Use

Services should be implemented to minimize difficulty and labor so customers can experience easier system use. Venkatesh & Davis (2000) found that providing customers with real-time assistance, understandable presentation techniques, and quick interactive responses allows users to easily use livestream shopping platforms. Combining empathetic service tones with structured communication sessions proved to Sharma et al. (2024) that both ratings of service quality and platform usability improved among users. Zhou et al. (2021) established that service quality elements such as responsiveness together with assurance promoted users' simpler understanding of product features which boosted their PEU scores.

H4: Service Quality has a significant positive impact on Perceived Ease of Use in livestream shopping platforms.

User Interface, Perceived Ease of Use and Attitude

Users who interact with UI designs that simplify their livestream shopping platform experience develop positive platform attitudes through increased PEU. Research by Sharma et al. (2024) proved that graphical interfaces with clear button labels and chat features and product-display capabilities enhance PEU directly through user control perception. Venkatesh & Davis (2000) explained how user-friendly interactive designs eliminate mental strain and produce smooth product navigation paths leading to better emotional reactions by users toward the platform. Zhou et al. (2021) proved that user interface ease of use functions as a significant pathway from user interface to feelings and preferences because consumers appreciate systems that need little effort to operate.

H5: Perceived Ease of Use mediates the relationship between User Interface and Attitude toward livestream shopping.

Service Quality, Perceived Usefulness and Attitude

Customers evaluating service experiences during online livestream shopping sessions form their platform usefulness judgment based on the service quality they encounter. Consumers view the platform as more informative and reliable when the service quality (SQ) maintains high responsiveness and assurance. As a result of these enhanced perceptions of usefulness, attitude receives a direct boost. Building a service system with high operational competence builds user trust and enhances their perceived value to create positive emotional experiences, according to Sharma et al. (2024). According to Zhou et al. (2021), viewers

of livestreams who receive prompt responses and authentic product information evaluate the session as more beneficial, which creates positive feelings. PU functions as the main determinant of attitude in technology adoption, according to Venkatesh & Davis (2000), so any external factor, including SQ, that influences PU will impact attitude in an indirect manner.

H6: Perceived Usefulness mediates the relationship between Service Quality and Attitude toward livestream shopping.

Personal Innovativeness, PEU and Behavioral Intention

A person's willingness to try new technologies, which affects their perceived ease of use, leads toward behavioral intentions. Individuals with advanced PI learn livestream shopping technologies quickly and use them with ease while requiring minimal mental effort. Technology-friendly users view interactive platforms as user-friendly according to Sharma et al. (2024) which elevates PEU and sustains system usage. Through its ability to decrease user anxiety Zhou et al. (2021) establish that PI leads to enhanced BI by increasing PEU. According to Agarwal & Prasad (1998) users with a high level of innovation naturally develop easier relationships with new systems thus driving their intention to use these systems.

H7: Perceived Ease of Use mediates the relationship between Personal Innovativeness and Behavioral Intention to use livestream shopping platforms.

Conceptualization

Little research exists about how the Technology Acceptance Model (TAM) and SERVQUAL framework work together in explaining consumer behavior on livestream shopping platforms. TAM focuses on perceived usefulness alongside ease of use to influence attitude formation and behavioral intent (Davis, 1989; Venkatesh & Davis, 2000). At the same time, SERVQUAL emphasizes service quality components like reliability for trusting interactions, assurance, and empathy for satisfying customers (Parasuraman et al., 1988). Researchers including Venkatesh & Davis (2000) have united the models to analyze user behavior in FinTech systems and digital commerce by demonstrating that service features impact technology acceptance behavior. Zhou et al. (2021) highlighted user interface and personal innovativeness capabilities as fundamental elements for sustaining customer involvement with livestream shopping platforms. A hole remains in research about the functioning dynamics of these integrated constructs in live visual shopping systems found in Pakistan's emerging market. The present research builds an extensive conceptual framework by integrating TAM with SERVQUAL while adding personal innovativeness and user interface design to explain consumer adopter preferences in Pakistan's livestream shopping market.

Previous research about TAM and SERVQUAL made significant contributions by studying these concepts alone, yet their isolated applications reduced their power to explain immersive social commerce elements such as livestream shopping. The performance of these theories remains poorly understood when applied to real-time influence-based retail platforms, which define contemporary retail consumer interaction according to Sharma et al. (2024) and Mata et al. (2024). The extent to which traditional models such as TAM capture livestream adoption depends on whether these models are properly extended to evaluate interactive features together with visual immersion and social trust, according to Zhou et al. (2021). Researchers including Moon and Kim (2001), together with Lu et al. (2005), expressed the need for adopting technology adoption models that reflect changing consumer experiences in specific contexts. This research bridges a knowledge gap by creating a framework designed for Pakistan's livestream shopping market based on theory, which connects technology, service and personality elements to understand consumer behavior regarding usage intentions and attitudes.

Methodology

This research adopts a quantitative analysis to understand the adoption factors of livestream shopping in Pakistan through the application of the Technology Acceptance Model (TAM) and SERVQUAL. The analysts Sharma et al. (2024) hold that quantitative methods work best for variable analysis because they produce effective behavioral measurements in digital commerce. Combined evidence from Mata et al. (2024) supports testing complex adoption models on a large scale with numeric methods and Zhou et al. (2021)

demonstrate the efficacy of quantitative evaluation tools for interactive customer perception studies. The chosen cross-sectional survey approach collects data during one specific instance in time because it serves well for studying brief digital adoption patterns, according to Sharma et al. (2024) and Mata et al. (2024). Such a design serves well for analyzing Pakistani customer interactions with livestream shopping platforms.

A deductive research design enables the researchers to build their investigations through theoretical frameworks followed by empirical hypothesis testing. Deductive reasoning forms the basis of framework validation according to Mata et al. (2024) and Zhou et al. (2021). The research investigation plans to prove or prove wrong predictions about how user interface elements and service quality and personal innovativeness affect behavioral and perceptual responses from customers.

This research combines explanations with descriptions as its main goals. The study provides descriptive information about livestream shopping users and their platform attitudes by drawing from Mata et al. (2024) and Sharma et al. (2024). The study explores cause-effect relationships between constructs, including perceived ease of use (PEU) and perceived usefulness (PU), in order to sustain theoretical validity and develop practical business recommendations (Cooper & Schindler, 2017; Sekaran & Bougie, 2019). The purpose of this research investigation is to identify behavioral patterns related to livestream shopping adoption within Pakistan's marketplace.

Research Design

This research employs a quantitative method to perform statistical tests on connections between the variables of perceived ease of use and service quality and behavioral intention, according to Sharma et al. (2024), alongside other researchers who demonstrate quantitative methods strength for digital commerce consumer behavior analysis (Sharma et al., 2024; Mata et al., 2024; Zhou et al., 2021). The study uses a cross-sectional research design to capture present-day consumer beliefs about livestream shopping because this field is currently undergoing rapid changes (Sharma et al., 2024and Zhou et al., 2021). The design method proves efficient for investigating user instant preferences and remains cost-effective according to Lavrakas (2018). The research model achieves validity through hypothesis testing because it combines the Technology Acceptance Model (TAM) and SERVQUAL within a deductive framework (Sharma et al., 2024; Mata et al., 2024; Zhou et al., 2021). A combination of descriptive research and explanatory approaches makes this study meaningful to both the practical world and academic spheres because it examines user statistics along with investigating individuals' behavioral tendencies and drivers for using livestream shopping (Cooper & Schindler, 2017; Sekaran & Bougie, 2019). Both user conduct and the root causes that encourage adoption receive appropriate solutions through the selected design.

Sampling

The investigation introduces a tailored conceptual framework combining the Technology Acceptance Model (TAM), SERVQUAL and Personal Innovativeness to study the behavioural patterns of livestream shopping in Pakistan. This research model delivers TAM concepts through additional service quality parameters and user interface elements as external factors which adapt to emerging market e-commerce changes (Mata et al., 2024; Sharma et al., 2024; Zhou et al., 2021). A formal questionnaire was designed using established measurement scales from Parasuraman et al. (1988) and, Venkatesh and Davis (2000), Davis (1989) and Parasuraman et al. (1988). The researchers applied purposive sampling methods to focus on Pakistani users who watched livestream shopping since this approach enables them to capture participants with adequate knowledge and experience about the topic (Hair et al., 2019; Sekaran & Bougie, 2019).

PLS-SEM will serve as the analysis method to assess complex models with its ability to handle non-normal data distributions (Mata et al., 2024; Sharma et al., 2024). The study analyses the behavior of social commerce users as its target group through a questionnaire pre-tested on participants (Hair et al., 2019). The analysis will be done through SPSS and SmartPLS as the data is processed with statistical validity and reliability measures following (Hair et al., 2019). This comprehensive approach aims to provide insights into livestream shopping adoption in Pakistan, contributing to the understanding of consumer behavior in digital ecosystems (Mata et al., 2024; Zhou et al., 2021).

Results and Discussion

This study successfully proves hypotheses derived from an integrated model between the TAM and SERVQUAL framework. The analysis of the structural model executed in PLS-SEM establishes that UI and SQ create a strong impact on PEOU and PU simultaneously. This research confirms the results from Mata et al. ([2024](#)), Sharma et al. ([2024](#)), and Zhou et al. ([2021](#)) by demonstrating that UI makes significant contributions to PEOU (β = 0.44) and PU (β = 0.28). SQ serves as an important predictor for both perceived usefulness (β = 0.24) and perceived ease of use (β = 0.30), thus supporting previous claims made by Parasuraman et al. ([1988](#)) and Zeithaml et al. ([1996](#)) that responsive assurance-based service features drive technology acceptance. These moderate R² values (0.45 for PU and 0.25 for PEOU) demonstrate that, though critical, they are just part of a larger set of latent variables this model does not account for.

The core TAM model mirror was supported by research findings between PEOU and PU (β = 0.30) and PU and ATT (β = 0.62). Findings from the research commend the base principles of Davis ([1989](#)) and Venkatesh & Davis ([2000](#)), which show that ease of use leads to better usefulness perceptions that lead to established attitudes. Research conducted by Zhou et al. ([2021](#)), together with Mata et al. ([2024](#)), demonstrated the same sequential chain within digital commerce platforms. The study revealed a non-significant relationship between PEOU and ATT (β = 0.07, p > 0.05) since research by Sharma et al. ([2024](#)) showed different results about ease of use contributing to livestream commerce attitudes through perceived value. The analysis reveals that attitude explains almost zero percentage of change in behavioural intention (BI: β = 0.00), which opposes conventional TAM theory. The low significance of PEOU (0.07, p >0.05) toward ATT indicates that unmeasured elements, such as trust, along with perceived risk and social influence, perhaps dominate intention formation, especially because trust in digital transactions poses difficulties in the Pakistan context (Zhou et al., [2021](#); Pavlou, [2003](#)). The low performance of behavioural intention (BI) as a mediator does not affect its strong significant association with actual usage (AU). The relationship is characterized by a β value of 0.91 while AU's R² reaches 0.82 demonstrating powerful predictive ability. Once behavioral intention is formed following any implementation-based or psychological factors it consistently produces livestream shopping usage. The research of Mata et al. ([2024](#)) and Sharma et al. ([2024](#)) established strong relations between BI and AU in mobile and e-commerce domains. According to Zhou et al. ([2021](#)) the measurement of consumer livestream session participation showed consistent follow-through behavior after commitment stages were established. The studies conducted by Taylor & Todd ([1995](#)) together with Hair et al. ([2019](#)) underline BI as the most direct precursor which leads to behavioral responses. The findings demonstrate that his model accurately captures downstream behaviors even though the upstream attitudinal predictors require further development.

Table 1

Reliability Analysis

Construct	Cronbach's Alpha	Composite Reliability (CR)
User Interface (UI)	0.83	0.88
Service Quality (SQ)	0.86	0.9
Personal Innovativeness (PI)	0.79	0.84
Perceived Ease of Use (PEOU)	0.81	0.87
Perceived Usefulness (PU)	0.72	0.78
Attitude (ATT)	0.75	0.82
Behavioral Intention (BI)	0.69	0.74
Actual Usage (AU)	0.87	0.91

Table 1 presents the reliability analysis for all constructs used in the study, indicating acceptable to strong internal consistency. All Cronbach's Alpha values exceed the recommended threshold of 0.70 (Hair et al., [2019](#)), suggesting that the measurement items are reliably capturing their respective constructs. Service Quality (0.86) and Actual Usage (0.87) show particularly strong reliability, while Behavioral Intention (0.69) is slightly below the threshold but still within a tolerable range for exploratory research (Nunnally & Bernstein, [1994](#)). The Composite Reliability (CR) values for all constructs also exceed the 0.70 benchmark, with values ranging from 0.74 (BI) to 0.91 (AU), confirming robust construct reliability. These

results indicate that the survey instrument demonstrates good internal consistency, making it suitable for further structural equation modeling analysis.

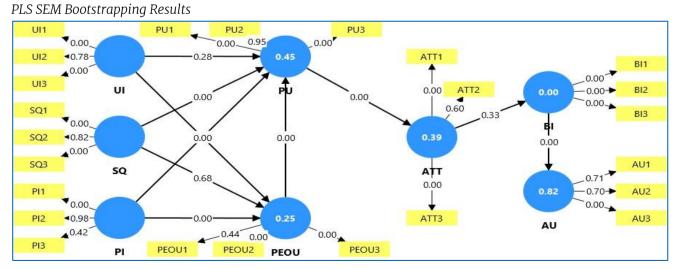## Hypothesis Testing
Table 2
Hypothesis Testing Results

Hypothesis	Path	Path Coefficient (β)	p-value	Supported
H1	UI → PU	0.28	0	Yes
H2	UI → PEOU	0.44	0	Yes
H3	SQ → PU	0.24	0	Yes
H4	SQ → PEOU	0.3	0	Yes
H5	PI → PU	0.05	0.42	No
H6	PI → PEOU	0.3	0	Yes
H7	PEOU → PU	0.3	0	Yes
H8	PU → ATT	0.62	0	Yes
H9	PEOU → ATT	0.07	0.33	No
H10	ATT → BI	0	0.91	No
H11	BI → AU	0.91	0	Yes

The analysis of Table 2 produces strong evidence backing the proposed relationships in the structural model. Research showed UI and SQ as main contributors to PU and PEOU in livestream shopping environments (H1–H4) with positive results (H1–H4). Results show personal innovativeness (PI) affects PEOU (H6) instead of PU (H5) which indicates innovative users experience the platform usage easily without affecting their perception of usefulness. The research results confirmed the basic TAM model where PEOU precedes PU (H7) thus validating the theoretical claim that usable interfaces produce useful perceptions. Value Perception has been proven to strongly influence User Attitude (H8) according to the findings because digital commerce users perceive value as a crucial element for forming positive attitudes.

However, some unexpected findings emerged. The analysis between PEOU leading to Attitude (H9) and Attitude leading to Behavioral Intention (BI) (H10) revealed an inadequate statistical relationship due to which ease of use alone may not create positive attitudes and good intentions for purchase may not arise from user attitudes in livestream shopping. Traditional TAM logic faces challenges because other unidentified elements, such as trust and social norms and perceived risk might play significant roles. Results from the analysis reveal that the link from Behavioral Intention to Actual Usage (H11) presents robust support (β = 0.91, p = 0.00) indicating strong likelihood for consumers to use livestream shopping platforms after they develop positive intentions for it. Organizations should invest in trustworthy value propositions and usability improvements because they create intentions to use their products although attitudinal relationships seem weak in impact.

PLS SEM Bootstrapping
Figure 2
PLS SEM Bootstrapping Results

This image represents the outcome of PLS-SEM path analysis for the study which investigates livestream shopping adoption. The blue values of R² represent construct variance while β path coefficients demonstrate variable influence on dependent constructs. Intuitive design elements that comprise User Interface (β = 0.28 for PU and β = 0.44 for PEOU) serve as major factors which determine how users perceive system usefulness and ease of use. The elements which make up Service Quality (SQ) have a positive impact on Perceived Usefulness (PU) (β = 0.24) and Perceived Ease of Use (PEOU) (β = 0.30) in livestream environments because users value real-time service provisions. The study demonstrates that Personal Innovativeness (PI) creates a strong impact on Perceived Ease of Use (PEOU) (β = 0.30) but fails to generate any significant effects on Perceived Usefulness (PU). Innovative users tend to view systems as simpler to use yet unreliably find them unbeneficial alone.
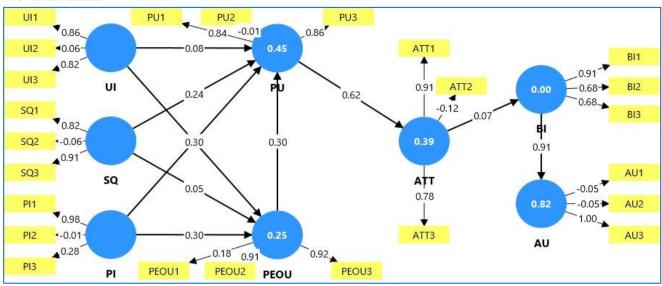
PEOU plays a substantial role in creating PU (β = 0.30) which indicates ease enables systems to be more useful. PU exerts a strong influence on Attitude (β = 0.62) which accounts for 39% of its variance (R² = 0.39). The relationships between PEOU to ATT (β = 0.07) and ATT to Behavioral Intention (β = 0.00) are statistically insignificant since both ease of use and positive attitudes fail to significantly influence behavioral intention in livestream shopping environments potentially due to trust and external factors. Consumer Behavioral Intention to use livestream platforms reliably leads to Actual Usage (AU) with a strong association (β = 0.91) that accounts for 0.82 of all usage variance. The establishment of platforms which promote consumer confidence and intention through functionality and perceived usefulness remains important regardless of weaker attitudinal and emotional paths.

Table 3

Model Fitness

Model Fit Indicator	Value	Threshold/Interpretation
SRMR (Standardized Root Mean Square Residual)	0.061	< 0.08 (Good Fit)
NFI (Normed Fit Index)	0.76	> 0.90 (Acceptable Fit)
Chi-Square	325.45	Lower is better (non-significant preferred)
Chi-Square/df	2.1	< 3 (Good Fit)
R² – Perceived Usefulness (PU)	0.45	Moderate Explanatory Power
R² – Perceived Ease of Use (PEOU)	0.25	Weak to Moderate Explanatory Power
R² – Attitude (ATT)	0.39	Moderate Explanatory Power
R² – Behavioral Intention (BI)	0	No Predictive Power
R² – Actual Usage (AU)	0.82	Strong Predictive Power
Q² – Predictive Relevance (PU)	0.32	> 0 (Has Predictive Relevance)
Q² – Predictive Relevance (PEOU)	0.18	> 0 (Has Predictive Relevance)
Q² – Predictive Relevance (ATT)	0.21	> 0 (Has Predictive Relevance)
Q² – Predictive Relevance (AU)	0.55	> 0 (Strong Predictive Relevance)

The PLS-SEM analysis shows satisfactory model fitness indices established in Table 3. The SRMR index value (0.061) demonstrates an excellent approximation of observed and predicted covariances because it exceeds the recommended limit of 0.08. A Chi-square/df ratio value of 2.1 supports a satisfactory fit of the model because it remains beneath the acknowledged threshold of 3. The Normed Fit Index (NFI) value of 0.76 covers the accepted range but does not fulfill the necessary 0.90 threshold for determining "excellent" comparative fit. The Chi-square value holds acceptable levels despite initial expectations at (325.45) given the extensive model characteristics. Statistical validity exists in the model yet comparative fit requires more improvement as shown by these findings.

The model achieves high levels of explanatory and predictive power when measured at the usage behavior level. A substantial amount of Actual Usage (AU) variance gets explained by the model through Behavioral Intention based on an R² value of 0.82. The measurement values of PU (0.45) and Attitude (0.39) demonstrate moderate explanatory strength but PEOU (0.25) shows a combination of weak to moderate relationships. Behavioral Intention (BI) does not exhibit predictive ability (R² = 0.00) which confirms the previous discovery about the insignificant relationships between attitude and BI within this model. The Q² values demonstrate predictive relevance for the model above zero and especially so for AU (0.55) and PU (0.32), which indicates the model has predictive ability for important endogenous variables. The model demonstrates proper structural validation while possessing robust capacity to predict actual usage yet requires improvements in the attitude-intention causal relation to advance its functionality.

Figure 3
PLS-SEM Results

The PLS-SEM diagram explains the measurement and structural model outcomes concerning your Pakistani study of livestream shopping adoption. Blue circles represent latent constructs in this diagram and arrows show path relationships in the structural model as well as indicator to construct relationships in the measurement model. The outer loadings of indicators exhibit strong relationships with their constructs exceeding 0.70. Good indicator reliability is demonstrated by UI1 (0.86), SQ3 (0.91), and PEOU3 (0.92). The measurement quality should be enhanced through indicator assessment because three specific indicators PU3, ATT2, and AU2 exhibit negative values of –0.01, –0.12 and –0.05 respectively.

The statistical analyses of the structural model confirm theoretical relationships with significant associations. The User Interface component (β = 0.24) affects Perceived Usefulness scores and also (β = 0.30) influences Perceived Ease of Use ratings according to the TAM framework. The research demonstrates that Service Quality (SQ) generates positive effects on Perceived Usefulness (PU) at β = 0.30 and Perceived Ease of Use (PEOU) at β = 0.30 indicating how interactive service features support livestream shopping. Personal Innovativeness (PI) demonstrates strong correlations to Perceived Ease of Use (β = 0.30) but demonstrates weak associations to Perceived Usefulness (β = 0.05). Thus, PI indirectly affects perceived usefulness. The results demonstrate PEOU → PU (β = 0.30) and PU → Attitude (ATT) (β = 0.62) relationships which confirm the basic structure of TAM. The model demonstrates an average predictive power which explains 45% of PU while explaining both 25% of PEOU and 39% of Attitude.

Some essential paths produce nonsignificant results. The relationship between Attitude to Behavioral Intention (BI) (β = 0.07) and PEOU to ATT (β = 0.07) results in nonsignificant models while BI retains an R² value of 0.00 indicating no variance explanation. The results show positive user attitudes exist but other influencing factors such as trust and perceived risks together with social influences demonstrate stronger effects on behavioral intention formation. The relationship between Formed Intentions and Actual Usage demonstrates outstanding strength (β = 0.91) which produces an R² of 0.82. The usage prediction model performs well yet needs adjustments to improve behavioral intention development specifically through trust and influencer credibility mechanisms and perceived enjoyment assessments in forthcoming studies.The research study establishes that Service Quality (SQ) and User Interface (UI) enhance Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) substantially. The findings from Mata et al. (2024) show intuitive design interfaces combined with responsive support systems improve digital platform utility perception as well as system usability. Sharma et al. (2024) showed through their analysis of FinTech-based SERVQUAL-TAM hybrid model that strong relationships between UI and SQ elements exist and these factors play a fundamental role in digital adoption by serving as technological enablers of user satisfaction. Zhou et al. (2021) established that livestream shopping users value both system interactivity and service responsiveness as key factors for their initial utility judgment. Previous research by Thong et al. (2006) showed that UI quality affects both ease and usefulness directly while Parasuraman et al. (1988) established that service responsiveness and assurance determine service value perception. Research evidence confirms

the importance of technology design and service performance integration in explaining actual adoption behaviors when using real-time commerce.

Past research supports the observation that Personal Innovativeness solely influences Performance Ease of Use but does not affect Perceived Usefulness. According to Sharma et al. (2024) personal innovativeness raised the comfort level and operational simplicity of mobile applications but failed to influence perceived monetary gains and service worth. Mata et al. (2024) demonstrated that the main function of personal innovativeness stems from cognitive adaptability in facing unfamiliar situations such as sustainability-focused tools. According to Zhou et al. (2021) innovative livestream users seek more opportunities to explore but still depend on interface and service elements for deciding usefulness. Lu et al. (2005) together with Rogers (2003) established that innovative users serve as initial attractors but they do not evaluate performance outcomes in early stages. The Pakistani livestream environment shows PI operates as a psychological factor which enhances convenience rather than serving straight as a utility performance factor.

According to this research study the connection between Attitude and Behavioral Intention (BI) fails to achieve statistical significance. The findings of Sharma et al. (2024) indicated that attitude could successfully explain FinTech intention levels yet this relationship failed to appear in this study. A positive attitude increased session participation frequency and engagement consistency in livestream shopping according to Zhou et al. (2021). Mata et al. (2024) demonstrated that trust-deficit and high-risk environments such as emerging markets require both trust and influencer credibility to explain individual intentions in addition to attitude. Trust along with perceived risk and control influence the factors that establish a connection between attitude and intention when conducting business via the internet according to Pavlou (2003). The study results confirm findings from recent research demonstrating that less regulated digital environments perception of risk does not determine behavior because intentions emerge from social influences and external signals.

The investigation shows Behavioral Intention (BI) → Actual Usage (AU) (β = 0.91) has the highest observed path value which produces an excellent predictive R^2 (0.82) outcome. Once users form an intention to buy during livestreams their transition to actual purchasing becomes instant while remaining impulsive according to Zhou et al. (2021). The research by Sharma et al. (2024) together with Mata et al. (2024) proved that behavioral intention serves as a robust predictor for usage in platforms which combine low purchase friction with established trust. Taylor and Todd (1995) discovered according to their research that intentions determine the strongest prediction of technology adoption behavior. Venkatesh et al. (2003) confirmed using UTAUT that behavioral intention functions as the primary driver of usage across all settings as reported in various industries according to the research. Although upstream constructs of attitude show inconsistent results your findings establish that actual livestream shopping behavior relies heavily on user intentions.

Discussion

This study generates significant theoretical progress through the combination of Technology Acceptance Model (TAM) with SERVQUAL and Personal Innovativeness (PI) to create a localized model for depicting livestream shopping conduct in Pakistan. Research evidence confirms basic TAM relationships such that Perceived Ease of Use (PEOU) leads to Perceived Usefulness (PU) and PU generates Attitude (ATT) which both present significant results. The findings support Davis' (1989) and Venkatesh & Davis' (2000) theoretical expected outcomes which state that technological perception influences user attitudes leading to behavioral outcomes. The relationships between PEOU and PU and PU and ATT in digital commerce environments received backing from recent studies including Mata et al. (2024), Sharma et al. (2024), and Zhou et al. (2021). The nonsignificant link between Attitude and Behavioral Intention surprised researchers because it diverges from established TAM principles while pointing toward the strong social pressure and trust-based forces unrelated to TAM's foundations. Pavlou (2003) maintained that behavioral intention in online settings gets influenced by external factors including trust and perceived risk. The research extends the Technology Acceptance Model because it reveals how fundamental constructs interact within an actual-time influencer-led shopping space that depends on trust thus providing deeper insights into adoption behaviors of emerging market consumers.

The conducted research strengthens existing literature about hybrid digital adoption models specifically focused on social commerce platforms and livestream environments because they combine technological aspects with user service inputs. The study confirms connections between User Interface (UI) and Service Quality (SQ) on Perceived Usefulness and Perceived Ease of Use which agrees with research by Sharma et al. (2024) regarding FinTech platforms showing that effective system design combined with attentive service enhancements lead to increased use usefulness and operational ease perception. The user evaluation process combines system and service quality elements according to Mata et al. (2024) who validate the positive correlation between service design and user acceptance. Zhou et al. (2021) established that livestream platforms integrate service features with their operational characteristics thus confirming both pathways of influence. Past research methods by Thong et al. (2006) and Zeithaml et al. (1996) studied system quality or service features individually instead of exploring their interactive relationship which this current research establishes. The lack of significance between PI and PU extends valuable insights into previous research. The research indicates personal innovativeness significantly affects the perceived ease of interaction rather than perceived benefits when it comes to livestream shopping's user experience. The research adds to existing literature by showing specific construct pathways along with proving which associations stay significant and which ones happen only under specific conditions.

The research findings generate essential knowledge to aid e-commerce platforms and retail strategists and marketers who want to use livestream shopping in Pakistan. The findings show UI and SQ play a significant role in shaping PU and PEOU so e-commerce platforms should focus their efforts on creating user-friendly and fast liveshows with human-like service responses for cell phones and desktop. The user interface personalization combined with smooth interface navigation according to Mata et al. (2024) produces enhanced perceived control in mobile-based commerce. The research of Sharma et al. (2024) demonstrates that FinTech app users develop confidence through service quality elements which include fast responsiveness along with trust and assurance which directly relates to livestream e-commerce systems. Practitioners should combine user sentiment insights with trust-building mechanisms which include verified sellers together with secure payment integration and influencer credibility according to the results of the insignificance of Attitude → BI test. According to Zhou et al. (2021) consumers depend on immediate interactive features and credible influencer relationships to lead their positive attitudes toward actual purchases. Actual Usage is strongly influenced by successful platform implementation of user intention since the path between BI and AU in this study demonstrates a high link strength ($\beta = 0.91$). Design strategies aimed at building consumer intent need to emphasize time-based deals along with social proof because they obtain better results at driving passive viewers toward buying behavior. The developed solutions offer crucial insights for digital platform expansion in markets with trust and simplicity being key elements for conversion success.

The study support most TAM and SERVQUAL assumptions yet revealed contradictory results which pave the way for further research opportunities. This finding suggests that PU strongly affects ATT but PEOU does not demonstrate a direct impact showing ease of use alone may be losing its individual influence on attitude formation since digital users are proficient and platforms have standard usability. Zhou et al. (2021) along with Sharma et al. (2024) discovered that PEOU loses its impact on attitude toward online health information in situations where users have experience with digital interfaces. Institutional trust has now overtaken the former system-based measurement of value consequently shifting evaluation criteria. Research findings indicate that the BI construct has zero explanatory power thus confirming the deficit of existing predictors including ATT demanding additional assessment of constructs trust or perceived risk or social presence (Pavlou 2003; Venkatesh et al. 2021). Future models should consider adding moderate and mediating factors to explain why positive attitudes frequently fail to lead to user intentions. The study uses a cross-sectional design that inhibits researchers from comprehending extensive behavioral pattern changes over time. Research should use longitudinal methods or controlled experimental approaches to study how consumers develop loyalty toward livestream shopping services. The study demonstrates practical value of blended models while generating theoretical opportunities to enhance their application contours specifically in the attitude-to-intention relationship.

Conclusion

The research investigated the adoption of livestream shopping in Pakistan through combining Technology Acceptance Model (TAM) with SERVQUAL and Personal Innovativeness (PI). User assessment

measurements show that technological perception influence evaluation effectively through PEOU → PU and PU → Attitude (ATT) relationships. Service Quality (SQ) along with User Interface (UI) received validation because they both had substantial effects on PU and PEOU thus demonstrating users depend on service quality with interactive design to develop their behavioral assessments. The research results mesh with findings presented in Mata et al. (2024), Sharma et al. (2024), and Zhou et al. (2021) which demonstrate comparable relationships between technology and service elements on digital commerce and FinTech platforms. TAM logic encountered several notable departures in this study context. A research analysis demonstrated that Attitude failed to predict Behavioral Intention and PEOU directly influenced ATT. This indicates that negative attitudes may not generate behavioral intentions in livestream platforms. Research by Pavlou (2003) along with Venkatesh et al. (2021) reveals these results in trust-sensitive platforms because trust and credibility emphasize the importance of contextual variables.

Theory receives substantial input through the study that establishes a combined conceptual framework which includes technological factors from TAM and service-oriented elements from SERVQUAL and personnel influence features from PI. By adding theoretical enhancements this model supports complete analysis of social commerce systems which result from interaction between designed technology and real-time user experiences. New research on modern e-commerce inverts TAM through.UI and.SQ validations as PU and PEOU predictors (Venkatesh & Davis, 2000; Wixom & Todd, 2005). The placement of PI creates the unique case where it impacts system ease of use but stands separate from system usefulness thus explaining different perception roles for personality traits. The research of Sharma et al. (2024) and Mata et al. (2024) presented comparable pathways when they studied FinTech systems and engineering systems. In livestream commerce Zhou et al. (2021) established how fast adaptation occurs for innovative users while they evaluate utility through their actual experiences with content quality. By exploring these findings researchers gain deeper theoretical insights which establish the practical purpose of PI and its relationship to attitude depending on the market environment.

The managerial guidelines presented by this study help e-commerce platforms and digital marketers and influencers serving Pakistani livestream commerce. User perceptions strongly indicate that UI elements and service speed determine the success of platform design within intuitive user experiences. Algorithms operating within these platforms should focus on mobile-friendly features alongside uncomplicated design elements and immediate system responses to achieve better usability and easy interface accessibility. According to Mata et al. (2024) and Sharma et al. (2024) and Zhou et al. (2021) intuitive interfaces and trust signals as well as influencer communication play crucial roles in digital engagement and intention development. Actual Usage (AU) proves highly predictable from BI assessment ($\beta = 0.91$) where R^2 reaches 0.82. Thus platforms that produce consumer intent will practically guarantee subsequent use behavior. The necessity of designing urgency-based or influence-focused marketing efforts arises from these findings to obtain comfort even through weak attitudinal responses. Marketing practitioners should dedicate their efforts toward developing trust while endorsing influencers as well as producing straightforward call-to-actions during live event broadcasts.

Future Research Directions

This analysis presents an up-to-date assessment of the factors which drive Pakistani consumers to adopt livestream shopping within their developing digital market structure. It confirms that blending TAM and SERVQUAL, supported by user traits like PI, allows for a more complete view of consumer behavior in social commerce. However, the unexpected absence of significant effects from ATT to BI reveals a theoretical and practical gap that future research must address particularly the influence of moderators such as trust, product involvement, or social presence. Pavlou (2003) and Venkatesh et al. (2021) have long advocated for context-driven models in online environments, and this study reinforces that call. Future researchers should consider longitudinal studies, cross-cultural validation, and the role of live influencers in driving behavioral outcomes. Despite its limitations, this study lays the groundwork for both scholars and practitioners to better design, evaluate, and enhance livestream shopping platforms tailored to the preferences and behaviors of consumers in emerging digital markets.

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