

Mobile Technologies and Live Streaming Commerce: A Systematic Review and Lexical Analysis

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Abstract - The proliferation of Live Streaming Commerce (LSC) across modern economies has lead organizations and individuals to adjust brands, marketing, and product/service offerings for exposure to live platforms. Afforded by strong mobile adoption trends, increasing shop-from-home behavior, and ever-increasing social media usage, LSC finds itself at the intersection of mobile and social within the expanding e-commerce field. Starting from 412 scholarly products and filtering for language, peer review, quality of indexing, and citation counts, this study provides a systematic review and lexical analysis of 93 academic peer-reviewed articles from the years 2018 through 2023 to explore the dimensions, contexts, and consumptive/collective behaviors of LSC users pertaining to mobile technologies. In particular, the nascent development of live streaming consumer behavior research and mobile technologies adoption are further compared to m-commerce and non-mobile streams of research. Findings reveal eight dialectics that define LSC research, diversity in theoretical approaches to LSC research, and ways to further explore the mobile technologies ubiquitous but underexamined within LSC literature.

Keywords - *Live Streaming Commerce, m-commerce, Leximancer, s-commerce, mobile technologies, systematic review*

I. INTRODUCTION

The Live Streaming Commerce (LSC) market will be valued at nearly \$200 billion globally by 2027 and the phenomenon already impacts millions of viewer-consumers per region in North America, Asia, and Europe [1]. LSC is electronic commerce that occurs when sellers synchronously broadcast on social platforms to sell products or services and interact with viewers while simultaneously providing benefits such as entertainment, education, brand identification, or additional social connection [2]–[5]. It is used widely on platforms such as Douyin and Taobao Live in Asia and YouTube and Twitch in North America. LSC also has been typified as live streaming embedded in sales platforms, live streaming platforms incorporating sales features, or social platforms offering live streaming features where users engage in selling live [6], [7]. Research examining LSC has focused on the phenomenon's growth, human interaction and purchase decision-making, marketing behavior, or brand advocacy; however, the current body of LSC research remains thin in comparison to the scale of global commercial activity [8]. Given the uniqueness of the

format's user-synchronicity and accessibility as well as the capacity for myriad platform-apps to leverage mobile technologies in commercial-live pursuits, this study seeks to examine how mobile technologies are integrated into LSC research.

A. Research Background

Social commerce (s-commerce) is a subset of electronic commerce [9] where social platforms offer buying opportunities for consumers [10], [11]. Born from the advent of online commerce moving onto Web 2.0 social platforms [12], s-commerce affords user-generated content posting and relationship building between sellers and buyers within this new sales environment [10]. A subset of s-commerce, LSC leverages mobile apps and hardware, social platforms, and synchronous human interactivity through live video to extend commercial exchanges from websites and app-based sales into users' consumptive activities while on their devices [7], [13]. Further, the sudden growth in the LSC phenomenon matched with the early growth of LSC research means there is a need to examine what precisely LSC is relative to the field of s-commerce studies. Additionally, an observed paucity of named studies relative to mobile technology within the LSC literature should be investigated given the required technologies for LSC to expand across user bases globally and given LSC literature may assume mobile technologies to be homogenous in LSC experiences. As it stands, there is likewise a growing field of study in Mobile Commerce (m-commerce) [14], [15], yet almost no investigation has been conducted to examine the default assumptions in LSC literature regarding mobile technologies [16]. This study seeks to respond to these gaps.

B. Keyword and Automatic Content Analysis

A keyword search in Google Scholar reveals several hundred academic, peer-reviewed articles on LSC. However, very few incorporate mobile technology, smartphone platforms, or mobility generally in their article titles. Additionally, examining the keywords of the articles in this dataset further indicate mobile technology is not as central to the LSC conceptual space or research writ large as purchase behaviors, social identity concerns, marketing/branding strategy, or platform specificity. Keyword analysis is important for investigating research in a particular literature stream [10], although keywords

tend to be selected by authors or editors rather than generated by the abundance of terms naturally found in the body of research writing. For this study, the dataset was found using keywords and key phrases on Google Scholar. However, analysis also included a deeper lexical analysis [17] of the final dataset to fully assess and examine the LSC phenomenon in addition to author-selected keywords.

II. RESEARCH METHODOLOGY

A. Overview

In this study, a systematic review fully investigated current LSC literature relative to all emergent trends, methodologies, contexts, and implications. It examined the defined research questions by capturing and summarizing all empirical evidence that fit the articulated eligibility requirements. Additionally, a lexical map was produced of the data (e.g., abstracts, introductions) utilizing Leximancer [18] software for thematic counts and cluster analysis to further support the review findings.

A systematic review is conducted when a field of study produces enough research needed to stabilize a scholarly community's understanding of a phenomenon, and provide assurance as to what the phenomenon includes [19]. This knowledge stability alleviates uncertainty regarding what a field of study focuses on and regards as settled science. Modeling Esmaeili & Hashemi's (2019) systematic review of s-commerce, this review followed the previous study's process to analyze the most important and highest quality LSC research (see also, [20]). First, review questions were developed. Second, a review protocol was generated. Third, study selection criteria and processes were articulated. Fourth, the qualities of studies were assessed. Fifth, lexical and human analyses were applied, and summarized results of data extraction and synthesis were presented and interpreted.

B. Review Questions

The following research questions emerged from a deep reading of the literature, and a review of previous systematic reviews of social and mobile commerce [6], [21]:

- RQ1. Over the LSC literature, what is the accepted definition of LSC?
- RQ2. How is LSC unique from other S-Commerce types?
- RQ3. What are the main theories in LSC research literature?
- RQ4. What are the research themes in LSC research?
- RQ5. What are the methodologies & data collection approaches in LSC research?
- RQ6. What are the limitations of LSC research?
- RQ7. How is mobile technology located within the LSC research literature?

C. Review Protocol

Fig. 1 identifies the research steps conducted in this study. Using a modification of PRISMA approach [22], this study's review protocol followed a find/filter/check

approach to capturing and cleaning the dataset of LSC articles for analysis. First, a Python based program crawled and captured all Google Scholar entries under the search term "live streaming commerce" in January of 2023 to build the data set of LSC research articles. The capture was saved into an Excel sheet including authors, titles, abstracts, and citation calculations (number of citations). Second, within the excel sheet, all candidate articles (by row) were organized by citation count, and article manuscripts were retrieved as PDF files from databases and saved to a cloud folder. Third, a first filter was applied with an "exclusion scope" [21] to remove all candidate rows not clearly peer-reviewed journal (PRJ) articles. A second filter's exclusion scope removed all non-English PRJs. A third filter's exclusion scope then removed all PRJs without a citation including those not currently cited by other journals, according to Google Scholar. A fourth filter's exclusion scope re-checked that titles included "live streaming" or "live" & "commerce" within them. A check determined the resulting PRJ data set was composed of those articles indexed by academic databases (e.g., Web of Science, Scopus, SCImago, EBSCO, Pubmed) and a final check removed any duplicates. The final dataset included 93 PRJs for review and analysis.

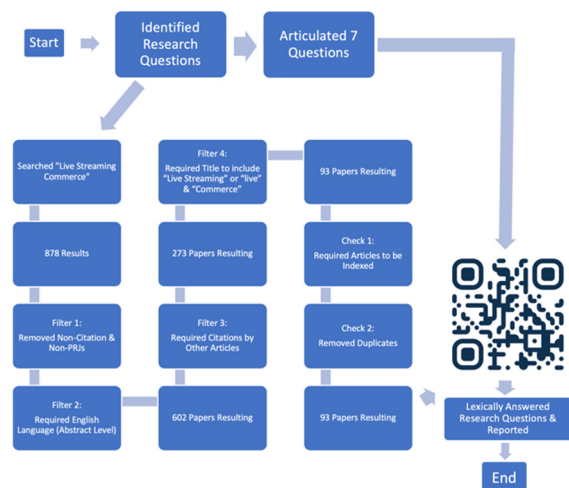


FIGURE 1. REVIEW PROTOCOL

D. Data Extraction and Analysis

This study also analyzed the entire dataset with the textual analysis software Leximancer to create outputs for research questions [23]. Leximancer uses a machine learning iterative process of seeding word definitions from frequencies and co-occurrences of words counted within blocks of text over a dataset to identify key concepts, which it groups into themes [18]. Having been used to assess scaled qualitative datasets in myriad disciplines, Leximancer was an appropriate tool to assess 93 articles for the clear concepts (direct counts) and themes (terms with strongest co-occurrences) that emerge in this LSC literature given 780124 words emerged in the dataset, roughly equivalent to the size of seven very large novels [24].

The temporal distribution of the final LSC PRJ dataset is as follows: 2018: 2; 2020: 4; 2021: 18; 2022: 67; 2023:

2. Clearly, the year 2022 saw significant growth in the number of LSC studies and inquiry. The major fields of study for these articles included education, engineering, e-commerce, marketing, and human-computer-interaction disciplines.

III. FINDINGS

A. LSC Definitions and Dialectics

The majority of dataset articles provided an explicit definition of LSC (see Fig. 1 QR code for Complete Dataset: <https://bit.ly/3Y1vcRb>), most often found in the introduction and literature review sections of articles. An aggregation of the explicit definitions across the dataset produced the following LSC definition:

LSC is the real-time interaction between streamers and followers across at least one live-video platform for the purpose of financial exchange—often the streamer selling a product or service and the follower consuming that product or service.

The totality of definitions also demonstrated dialectics for LSC research. Howard Sherman argued dialectics play an important role in scientific inquiry because they offer an “approach to problems that visualize the world as an interconnected totality undergoing minor and major changes due to...opposing forces” [25]. Over the dozens of LSC definitions within the dataset, researchers utilized eight specific dialectics to frame LSC including:

Communicator Dialectic—Streamer Versus Viewer: The majority of LSC studies focused on streamers, while others focused on the consumer, customer, viewer or follower. The two types of users, in this construct, make up a dialectic where one communicator is clearly focused on encouraging financial consumption in the other communicator. Streamers stream and sell. Viewers watch and buy. As LSC affords real-time dialogue for streamers/viewers, this dialectic was an inevitable focus of LSC research. Future LSC studies should extend this dialectical approach to examine communities of streamers compared to communities of viewers, as well as how collectives of viewing consumers impact the live nature of LSC relative to streamer/brand/product/service success.

Level of Profession Dialectic—Professional versus Amateur: Many LSC studies focused on professional popular streamers as influencers who contract with big brands or large retailers to sell products or push brand visibility. However, other studies revealed some live-video sellers engage in commercial exchange without professional relationships with big brands or larger retailers. Therefore, a clear dialectic emerged between professional streamers and amateurs who both use live video platforms to sell. Future LSC research should compare how these different types of streamers differently impact markets, build and sustain relationships, sell products/services, or endorse brands.

Channel Dialectic—Native Social Media Platforms Versus E-commerce Platforms: Within the dataset, some researchers focused on the channels created by e-commerce organizations where professional

influencers are invited and/or contracted to sell on behalf of the organizations. However, other studies focused on individuals who use social media platforms to sell products or services. The dataset clearly demonstrated there is a difference between e-commerce platforms sellers and social media platform sellers. In some cases, successful social media platform sellers are recruited to e-commerce platforms (e.g., Instagram → Whatnot). In other cases, streamers may utilize both channels to sell and endorse, while building or sustaining relationships on one particular channel. Future LSC research should investigate how the exclusion of one or the other channel impacts streamers/viewers/brands/products/services and how various syntheses of both channel types impact streamers/viewers/brands/products/services.

Commercial Object Dialectic—Product Versus Service Versus Brand: Live streaming includes products, services, and overarching brands. Streamers sometimes only sell one of these though at other times they may sell two or more. LSC research in this dataset focused primarily on products, but there is room to investigate how selling products/services simultaneously or in relation to one another might impact streamers/consumers and associated brands. Additionally, future studies should examine how brands are impacted by product/services talk or when streamers combine these sales experiences across live-video channels.

Relational Dialectic—Commercial Versus Non-Commercial Relationships: Although several studies in the dataset focused on the relationships between streamers and consumers/customers, others defined LSC relative to its commercial aspect. Because streamers/sellers utilize LSC platforms for commercial reasons, studies also pointed up the need for streamers to persuade other users to buy or endorse brands/products/services. Overall, LSC researchers viewed the non-commercial and commercial relationships as distinct; but, moving forward researchers need to ask how slippage between the two types of relationships impacts both streamer success and product/service/brand success.

Viewing Intent Dialectic—Entertainment Versus Purchase: LSC research discussed viewers as both consumers of entertainment and customers of brands/products/services. Specifically, viewing intent, within the LSC dataset, differentiated viewers based upon their reasons for participating in the live-stream: intent to be entertained or intent to purchase. Future research must explore how switching intent impacts streamer/viewer relationship, brand/product/service success, and if intent switching impacts either of these research areas.

Streamer Disposition Dialectic—Professional Versus Authentic: LSC streamers can be a quality salesperson/endorsement vehicle or merely authentic in a way that gets more viewers to watch them live—thereby increasing sales. The LSC dataset viewed streamers as successful if they were a quality salesperson/endorsement vehicle or merely authentic enough to get more viewers to watch them live, and thus increase sales. However, both dispositions appear to be distinct in the literature. Additionally, some viewers perceived salespersons as

inauthentic. Future research may examine salesperson/authenticity ratios streamers should strive for to achieve success. Moreover, research should evaluate if such a ratio impacts purchase intentions and relational maintenance.

Frequency Dialectic—Single Purchase Versus Re-Purchases: The LSC literature highlighted when viewers/consumers/customers are impacted by streamers through live-video. For instance, some research focused on novel instances of purchasing intentions and behaviors. However, other studies concentrated on re-purchasing behavior over time. Future LSC research should investigate how streamers, live platforms, and other variables positively or negatively impact novel purchases versus repurchasing behaviors. Additionally, streamers or brands should prepare for the inevitable combination of novel and repurchasing behaviors relative to their business strategy.

B. Diversity of Theories in LSC Research

Tab. 1 demonstrates the expansion of LSC research in the last several years by identifying theories as well as example articles for each. Compared to a 2019 mobile applications literature review (column 3) and a 2022 LSC literature review (column 2), the present study identified a significant growth in LSC studies and more diversity in the theoretical frameworks applied across LSC research. In the current study, Purchase/Repurchase Intention, Stimulus Organism Response (S-O-R), Customer/Consumer Engagement, Social Presence, and Affordance Theory were the top five most used theoretical frameworks based on occurrence. Although S-O-R and IT Affordance Theory were present in past studies, the remaining three are new theoretical frameworks in LSC literature.

TABLE I. LSC THEORIES – 2019 TO 2023 COMPARISONS

Theories in LSC Literature in Present Study	Theories in Prior LSC Literature Table Luo et al., 2022	Theories in Mobile App Literature Review Tang, 2019
<p>Theories Shared Across Two or More Columns</p> <p>Flow Theory (x4) [26] IT Affordance Theory (x5) [27] Socio-technical System Theory [28] Stimulus Organism Response (x10)[29] Technology Acceptance Model [30] Theory of Planned Behavior Trust Model/Theory [31] Uncertainty Reduction Theory [32] Uses & Gratifications Model [33]</p> <p>Additional Theories in the Current Study Literature</p> <p>Abandonment [34] Alternative Learning Theory [35] Attention-Interest-Desire-Action Model [36] Axiomatic Design Theory [37] Authenticity [38] Co-Creation Theory [39] Consistency-Driven Optimization Model [40] Continuance Usage [41] Customer/Consumer Engagement (x7) [42] Decision Support Systems [43] Dual-Systems Theory [44] E-Commerce Success Model [45] Evolutionary Game Theory/Stackelberg Game Theory (x3) [46] Gross Merchandise Value [47]</p>	<p>Theories Shared Across Two or More Columns</p> <p>Elaboration Likelihood Model IT Affordance Theory Socio-technical System Theory (x2) Stimulus Organism Response (x2) Trust Model/Theory Uncertainty Reduction Theory</p> <p>Additional Theories</p> <p>Fit Theory Source Traits</p>	<p>Theories Shared Across Two or More Columns</p> <p>Elaboration Likelihood Model Flow Theory Technology Acceptance Model Theory of Planned Behavior Uses & Gratifications Model</p> <p>Additional Theories</p> <p>Adaptive Expectation Theory Ambivalence Theory Big Five Trait Theory Cognitive Dissonance Theory Diffusion of Innovations Theory Dimensional Theory of Emotion/Schema Theory Environmental Psychology Perspective Expectation Confirmation Theory Habit Theory Identity Theory Motivational Theory Perceived Value Theory Personalization-Privacy Theory Rational Addiction Theory Resistance Theory Self-Determination Theory Signaling Theory Telepresence Theory & Social Capital Theory Theory of the Niche Unified Theory of Acceptance & Use of Tech.</p>

<p>Grounded Theory (x2) [48] Hypothesis/Parasocial Relationship Theory [49] Influencer Credibility [50] Information Dissemination Game Model [36] Key Opinion Leader [51] Latent Dirichlet Allocation [52] Matching Theory [53] Multi-task Learning [54] Pricing Strategy [55] Psychological Distance [56] Purchase & Repurchase Intentions (x13) [57] Semantic Network Analysis [40] Social Presence Theory (x6) [58] Source Credibility/Matchup [59] Switching Intention [60] Symbolic Interaction [61] Theory of Social Preference [46] User Experience Research [62] Value-Based Adoption Model [63] Value Perception [64]</p>		
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C. LSC Research Themes

The most frequent LSC thematic concepts that emerged from a Lexical Analysis of the 93 PRJ abstracts included influence of streamers, customer experiences during LSC consumption, the interactivity between streamers and customers, types of engagement most successful on live platforms, LSC's impact on sales, changes in shopping behavior, marketing modifications within the LSC ecosystem, purchase exchange roles, urging and nudging within LSC compared to other forms of commerce, and the impact of prices/pricing in LSC. Fig. 2 shows the lexical analysis that revealed these dataset trends based upon word count. Moreover, the cluster analysis visualized how these concepts co-occurred with additional important themes within the abstracts of this dataset.

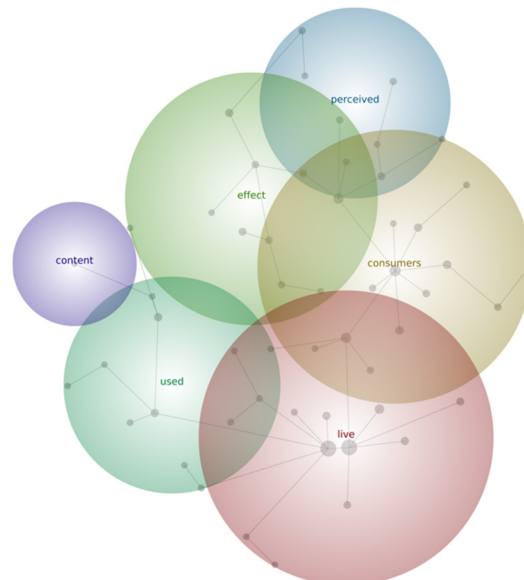


FIGURE 2. LEXICAL ANALYSIS OF TITLES AND ABSTRACTS

D. LSC Methodologies and Data Collection

Fig. 3 identifies the data collection techniques found across the methodologies for the studies in the LSC

dataset. The most common methodologies used to examine LSC were survey analysis of viewers/consumers, survey analysis of streamers, analysis of specific platform features, and content analysis. Future research opportunities include comparative analysis of different kinds of live streaming content (e.g., text, video imagery, speed of interactions), different live-platforms relative to streamers/users communication styles, information exchanges, and consumptive intent. Researchers should also utilize biometric analysis to examine streamers from the vantage of viewers relative to commercial-based and non-commercial-based messaging. Brands and business, as well as streamers and consumers, need to know how the data available in live-streaming impacts trust and relationship building, purchase behaviors, streamer longevity, online community building, and clarity of live-exchanges. Additionally, more varied methodologies will provide important data about how various platform features operate together or separately to impact strategic outcomes.



FIGURE 3. LEXICAL ANALYSIS OF METHODOLOGIES

E. LSC Research Limitations

Fig. 4 demonstrates the limitations and conclusions across the LSC dataset. After accounting for requisite terms (i.e., *live, study, research, results*), the top-ranked meaningful concepts of this analysis were *consumers/customers, purchase behaviors, products, trust, intentions, streamers, perception, information/data, relationships, engagement, platforms, and strategy* —in that order (Fig.4, list). The thematic analysis which incorporates co-occurrence calculations yielded the most important themes (Fig. 4, visual) to be *intention, products, trust, platform, sales, and strategy*. LSC research clearly has a diverse focus across myriad disciplines, and these limitations and conclusions themes bore out this reality. However, given that *platform* was still a less popular analytic term in the limitations and conclusions dataset than *products* and *trust* is important. First, the lack of mobile technology-specific research has not elevated these technologies to the forefront among scholars. This may indicate disciplines focused on mobile technologies (e.g., hardware, software applications), such as Engineering and Information Management, have yet to focus their analysis on LSC research. Additionally, disciplines currently leading the LSC research appeared to focus more on the human and business sides of LSC. Second, although *mobile technologies* did not appear in those sections of the dataset as ranked concepts, the more general term *platform* emerged as a concept and a theme. As platform analysis has yet to explore the parsing of technologies, processes, and human behavior to a greater degree, the mobile technologies research piece appeared to remain hidden in plain sight within LSC research. Future research should examine mobile technologies because these technologies play an important role in LSC human relationships and LSC business strategies.

technology-based disciplines will add to the increasing richness of LSC research.

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