

Certificate of Research in Business Administration

Behavior-Driven Reverse Supply Chain Design in Live-Streaming Commerce: An Integrated Behavioral–Operational Framework

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Self Introduction



English Name: Joey Xu

Chinese Name : Xu Guang

Birth of Place : Shandong Province, China

Current Job Title: Supply Chain General Manager

In SIMPCARE to take over end to end supply chain planning and operation ie demand, planning, purchasing, logistics etc

** SIMPCARE - Unicorn cosmetic company founded in Guangzhou in 2019*

+20 years working experience in supply chain operation

- Supply Chain VP in BENEUNDER (China leading outdoor apparel & appliance company)
- Supply Chain Senior Expert in Alibaba (China Top E-commerce platform)
- Supply Chain VP in BESTORE (China Leading leisure foods company)
- Supply Chain Director in Procter & Gamble

Thesis Topic introduction

Research backgrounds –

- Live Streaming Commerce(LSC) has grown rapidly globe wide and become one of the largest channel in online shopping in many markets
- Live Streaming Commerce's transaction mechanism leads to high product return intention due to consumer's impulse buying and influencer-induced overselling
- Consumer's high return intention leads to significant higher return rate vs traditional E-commerce business and imposes serious challenges on reverse supply chain(RSC) operation.
- There is a research gap on the linkage between LSC consumer behavioral drivers and reverse supply chain operational performance. That decides how to design an effective and efficient reverse supply chain to enable LSC financial success.

Thesis Topic introduction

The objective of this research –

- Set up the behavioral-operational model to facilitate efficient reverse supply chain design with consideration of the linkage between behavioral drivers and reverse supply chain operational variables

Research Questions

Q1: What are key behavioral drivers to influence return intention in live streaming commerce?

Q2: How does return intention affect return volume, variability and processing leadtime?

Q3: What is integrated behavioral – operational model to optimize both consumer experience and reverse supply chain performance to tackle the high return challenge?

Managerial Impact

- **Return forecast improvement** - Product return in live streaming commerce should be considered as strategic outcome of consumer behavior rather than an unavoidable operational cost. Incorporating the behavioral metrics into return forecast will significantly improve forecast accuracy beyond traditional data driven mechanism.
- **Cross function collaborative planning for better return management** - LSC financial success should have a good balance between business success(more sales) and operation efficiency(reasonable cost and service) enabled by cross function planning process and shared KPIs ie return rate, recovery efficiency etc
- **Digitalized solution to enable behavioral data transformation to reverse supply chain operation capability** - The early warning system, reverse logistics capacity pre-allocation and flexible labor scheduling could be established to better support live streaming activity based on the behavioral real time data analysis

Literature Review

- **Live streaming commerce and consumer return intention -**
- ✓ Flow theory has been adapted to web related ecommerce to explain how and why users become absorbed in online environments. That is typical consumer behavior which generates return intention LSC. - Hoffman, D., & Novak, T. 2009. "Flow Online: Lessons Learned and Future Prospects". *Journal of Interactive Marketing* 23 (2009) 23 -34
- ✓ Expectation–Reality Gap (ERG) is developed to explain the high return rate for consumer to feel the reality gap vs the expectation during shopping. ERG is amplified in LSC because of the better presentation of the product in live camera, the exaggeration of product features by the streamer and the impulsive buying intent in limited time constrain. --Sergio Barta, Raquel Gurrea, Carlos Flavi´an. 2023. "Consequences of consumer regret with online shopping". *Journal of Retailing and Consumer Services*. 73 (2023) 103332
- The lower credibility and over promotion caused by Influencer/Streamer will result in higher mismatching expectation after unboxing the product and higher likelihood of product return - Kim, J., He, N., & Miles, I. 2023. "Live commerce platforms: A new paradigm for e-commerce platform economy". *Journal of Theoretical and Applied Electronic Commerce Research*, 18(2), 959–975. DOI: 10.3390/jtaer18020049

Literature Review

➤ **E-commerce returns and reverse supply chain design**

- ✓ Reverse supply chain (RSC, also called reverse logistics) is the return process to move back the products from consumer to manufacturer and a lot of physical activities need to be implemented for product inspection, refurbishment, recycling, and disposal. - *Govindan, K., & Soleimani, H. 2017. "A review of reverse logistics and closed-loop supply chains: a Journal of Cleaner Production focus". Journal of Cleaner Production 142 (2017) 371-384*
- The uncertainty for RSC comes from the return volume, return timing, product condition, recovery value, policy change and supply disruption. - *Guide, V Daniel R, Jr, Van Wassenhove, Luk N. 2009. "The Evolution of Closed-Loop Supply Chain Research". Operations Research. Linthicum Vol. 57, Iss. 1, (Jan/Feb 2009): 10-18,257,260*
- The performance of RSC is normally measured by Return rate, Processing leadtime, Cost per unit and Disposal cost to support business success and improve customer satisfaction - *Salvatore Cannella, Manfredi Bruccoleri, Jose M. Framinana. 2016. "Closed-loop supply chains: What reverse logistics factors influence performance?" International Journal of Production Economics 175 (2016) 35-49.*

Literature Review

➤ Integrated behavioral-operation research

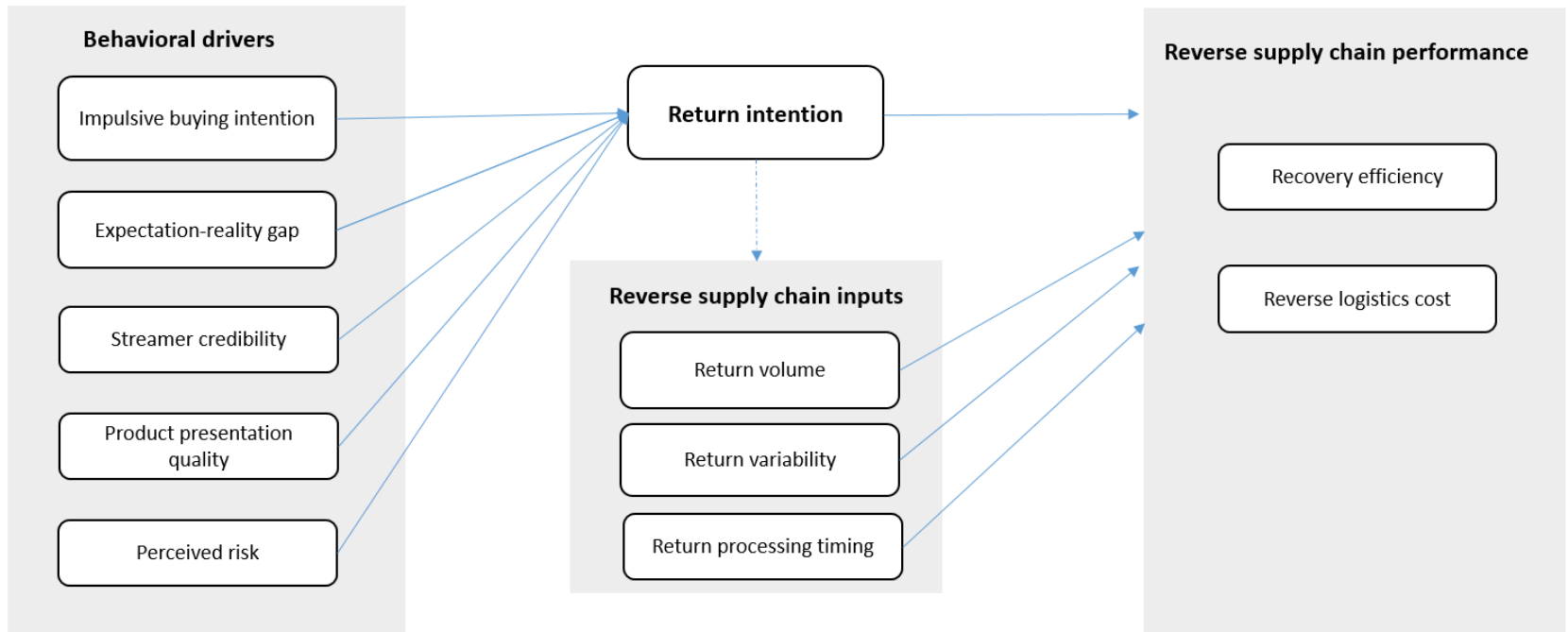
- ✓ Currently most researches on return behavior-operation are focusing on how consumer behavior affects the sale demand not the return flow - Karl, D. 2024. "Forecasting e-commerce consumer returns: A systematic literature review". *Management Review Quarterly*.
- ✓ Contraformer (Contrastive transformer) method is studied to predict product returns in live streaming e-commerce by leveraging fine-grained streamer behavior features extracted from three modalities i.e., visual, acoustic, and language - Zhang, W., Chen, R., & Li, T. 2025. "Predicting product returns in live-stream commerce using transformer models". *Expert Systems with Applications*, 238, 121314.

Research Model

➤ Two stage research

1) Behavioral drivers → Return Intention

2) Return Intention → Reverse supply chain performance



Research Hypothesis

H1: Behavioral drivers in LSC positively amplifies consumer's return intention

*Behavioral drivers - Impulsive buying behavior / Expectation-Reality Gap/
Streamer Credibility/ Product presentation/ Perceived risk*

H2: Return intention positively increases reverse supply chain return volume, variability and time concentration.

H3: Return intention mediates the relationship between behavioral drivers and reverse supply chain operational performance.

H4: Reverse supply chains that incorporates behavioral return predictors outperform traditional designs in terms of cost efficiency and service reliability.

Research Methodology

Two-stage empirical-analytical methodology

➤ **Stage 1 : Behavioral Structural Modeling**

Using Structure Equation Modeling(SEM) to examine how consumer psychological drivers affect return intention in live streaming commerce

Outcomes: Estimated return intention scores for each observation

➤ **Stage 2: Reverse Supply Chain Operation Modeling**

Using Logistic Regression to link return intention score to return action [0,1]. The return action leads to return volume and variability as key inputs for reverse supply chain design

1) Return Rate(RR) = $\alpha + \beta \times RIS$

α – baseline return rate of platform (e.g Douyin 20%-30%)

β - sensitivity of return rate to return intention by maximum likelihood estimation

Outcomes: Estimated β coefficient and predicted return probabilities

2) Return volume and variability impacts on reverse supply chain capacity and cost

Outcomes: Assessment of behavioral risk exposure for RSC operation implications

Data Analysis Plan

Stage 1: Quantitative behavioral survey data will be analyzed using Structure Equation Modeling (SEM) to validate behavioral relationships. SEM analysis by AMOS follows

- 1) Data cleaning - remove incomplete responses (<60% completion) and handle the missing data
- 2) Likert scaling alignment – ensure all Likert scales(1-7) are aligned to avoid bias
- 3) Confirmatory Factor Analysis (CFA) – Fit indices: CFI, TLI, RMSEA, SRMR
- 4) Hypothesis test with SEM - Reliability analysis : Cronbach's $\alpha \gg 0.70$, CR $\gg 0.7$; Validity analysis: CV AVE $\gg 0.5$; Path coefficients, etc

Stage 2: Simulation and optimization modeling of reverse supply chain incorporating behavioral output data (return intention score).

- 1) Logistic regression by SPSS or R to define β by Maximum Likelihood Estimation(MLE). Diagnostics: Likelihood ratio test, Pseudo-R², ROC curve and AUC.
- 2) Return volume and variability derived from expected return rate
- 3) Model validation by real company observed return data
- 4) Sensitivity and scenario analysis for behavioral - operational model ie return intent change, β , elasticity

Next Steps to Thesis Defense

- Complete online survey for LSC consumers by April 30th
- Complete SEM analysis for survey data by May 15th
- Complete behavioral data transformation to operation model by May 30th
- Set up behavioral-operational model by Hypothesis test and data analysis