



REVERSE LOGISTICS AND CUSTOMER SATISFACTION OF NOODLES PRODUCING COMPANIES IN RIVERS STATE

Bazia, John N. S. and Jekey, Lekue

Department of Marketing, Faculty of Management Science,

University of Port Harcourt

Correspondence E-Mail: lekkue.jekey@uniport.edu.ng

Abstract

This study investigates the relationship between reverse logistics and customer satisfaction in noodles-producing companies in Rivers State, Nigeria, with brand trust examined as a mediating variable. Anchored on Signaling Theory and the Commitment-Trust Theory, the research adopts a quantitative, cross-sectional survey design. Data were collected through structured questionnaires administered to 72 management-level employees across three major noodles companies—Dangote Noodles, Dufil Prima Foods Plc, and De United Foods Industries Limited. Responses were measured on a five-point Likert scale, with validity and reliability established through expert review, factor analysis, and Cronbach's Alpha. Statistical analysis was conducted using SPSS version 26, employing Pearson correlation, regression, and mediation analysis following Baron and Kenny's four-step procedure, with the Sobel test confirming indirect effects. Results revealed a strong positive relationship between reverse logistics and customer satisfaction, with brand trust partially mediating this relationship. Reverse logistics practices were found to significantly enhance customer satisfaction both directly and indirectly by strengthening brand trust. These findings underscore the strategic importance of reverse logistics not only as an operational sustainability practice but also as a trust-building mechanism that elevates customer satisfaction in competitive consumer markets. The study contributes to the green supply chain and relationship marketing literature in developing economy contexts and offers practical implications for managers, policymakers, and industry stakeholders seeking to leverage sustainability practices for improved consumer outcomes.

Keywords:

Brand Trust; Customer Satisfaction; Green Supply Chain; Reverse Logistics; Signaling Theory.

Introduction

The global food manufacturing industry is undergoing a fundamental reorientation driven by mounting environmental pressures, shifting consumer values, and regulatory developments that compel firms to integrate sustainability principles into their supply chain operations. Within sub-Saharan Africa, and particularly in Nigeria, the noodles production segment has emerged as one of the most competitive subsectors of the fast-moving consumer goods (FMCG) industry, with companies such as Dufil Prima Foods (manufacturers of Indomie), Honeywell Flour Mills, and De-United Foods Industries competing fiercely for consumer patronage.

However, as environmental awareness among Nigerian consumers grows and brand differentiation becomes increasingly difficult through conventional means, green supply chain practices such as reverse logistics have taken on renewed strategic significance (Diabat & Govindan, 2011; Srivastava, 2007).

Reverse logistics encompasses the set of processes involved in managing the return, recycling, reuse, and redistribution of products and packaging materials from the point of consumption back toward the point of origin or recovery. In food manufacturing, this may include the structured retrieval of defective products, post-consumer packaging recovery, waste material recycling, and redistribution of surplus stocks to secondary markets (Zeimpekis et al., 2015). Reverse logistics therefore represents a firm-level operational signal that communicates environmental commitment and corporate responsibility to consumers. According to Spence's (1973) Signaling Theory, observable firm behaviors that are difficult to replicate convey credible information to market participants about underlying quality and ethical orientations. Thus, a firm that visibly implements reverse logistics signals to its customers that it is environmentally and socially responsible, potentially elevating brand trust and subsequent satisfaction perceptions.

Customer satisfaction, defined as the cognitive and affective evaluation of the degree to which a product or service fulfills consumer expectations (Oliver, 2014), remains the cornerstone of marketing performance and long-term firm viability. Satisfied customers are more likely to engage in repeat purchasing, recommend brands to peers, and exhibit reduced price sensitivity (Kotler & Keller, 2016). In a competitive market such as that of noodles production in Rivers State, achieving differentiated customer satisfaction requires that firms transcend product-level attributes and address the broader values, expectations, and trust orientations of their consumers. Research consistently indicates that consumers increasingly factor in firms' environmental conduct when forming satisfaction judgments, particularly where green practices visibly affect the quality of products and the integrity of the firm's operational ethos (Chen, 2010; Papista & Dimitriadis, 2012).

However, the mechanism through which reverse logistics influences customer satisfaction remains insufficiently theorized and empirically tested in the Nigerian food manufacturing context. While some studies have documented direct relationships between green supply chain practices and consumer outcomes (Zhu et al., 2012; Diabat & Govindan, 2011), the mediating pathway through which brand trust transmits the effect of reverse logistics to customer satisfaction has received limited empirical treatment. Brand trust, conceptualized as the willingness of the average consumer to rely on the ability of the brand to perform its stated function (Tuti & Sulistia, 2022), serves as a critical relational variable that mediates between observed firm conduct and consumer satisfaction outcomes. The Commitment-Trust Theory developed by Morgan and Hunt (1994) explicitly positions trust as the central antecedent of relationship quality and the primary mechanism through which behavioral signals are translated into enduring consumer responses.

Against this backdrop, the present study addresses the gap in the literature by investigating the mediating role of brand trust in the relationship between reverse logistics and customer satisfaction among noodles producing companies in Rivers State. Rivers State is particularly appropriate as a study context given its status as one of Nigeria's most commercially active states, hosting significant industrial operations and a consumer market characterized by increasing environmental consciousness and brand sophistication (Nuryakin & Maryati, 2022; Nwokah & Maclayton, 2006). By empirically linking reverse logistics to customer satisfaction

through the mediating lens of brand trust, this study contributes to both the green supply chain literature and the relationship marketing discourse in developing economy contexts.

The specific objectives of the study are to:

- i. Examine the relationship between reverse logistics and customer satisfaction in noodles producing companies in Rivers State.
- ii. Determine the mediating effect of brand trust on the relationship between reverse logistics and customer satisfaction.

Literature Review

Theoretical Framework

This study is anchored on two theoretical frameworks: Signaling Theory (Spence, 1973) and the Commitment-Trust Theory of Relationship Marketing (Morgan & Hunt, 1994). These theories collectively explain the mechanisms through which reverse logistics signals environmental quality to consumers, engenders brand trust, and ultimately enhances customer satisfaction.

Signaling Theory, originally developed in the context of labour market economics, posits that individuals and organizations can communicate unobservable attributes to external parties through observable signals (Spence, 1973). For a signal to be credible, it must be costly or difficult to imitate, ensuring that it reliably conveys the intended underlying characteristic. Applied to the green supply chain context, reverse logistics constitutes a credible environmental signal because its implementation involves substantive operational investments, logistical reorganization, and sustained managerial commitment (Connelly et al., 2011). When noodles producing firms visibly engage in product return management, packaging recycling, and waste redistribution, they communicate environmental responsibility to consumers, distributors, and regulators. This signal is particularly potent in markets where environmental information asymmetries exist between firms and consumers, such as the Nigerian FMCG sector. By reducing these asymmetries, reverse logistics signals improve consumers' ability to evaluate the ethical orientation of brands, thereby influencing their trust and satisfaction assessments (Aguilar-Luzon et al., 2022).

The Commitment-Trust Theory, advanced by Morgan and Hunt (1994), proposes that trust and commitment are the central mediating variables in relationship marketing. Trust, defined as confidence in an exchange partner's reliability and integrity, develops when observable behaviors consistently reflect positive intent and competence. In the context of green supply chain management, brand trust emerges when a firm's reverse logistics practices signal consistent environmental commitment that matches or exceeds consumer expectations. Morgan and Hunt (1994) further argue that trust reduces uncertainty, promotes cooperative behavior, and enhances the quality of consumer evaluations, including satisfaction. Therefore, brand trust serves as the relational mechanism through which the operational signal of reverse logistics is transformed into an enhanced customer satisfaction response. Together, these theories provide a robust theoretical rationale for the mediation model examined in this study.

Reverse Logistics

Reverse logistics refers to the flow of products, materials, and information from the consumer or point of final use back toward the manufacturer or designated recovery point for the purpose of recapturing value or ensuring proper disposal (Rogers & Tibben-Lembke, 1999). In the

contemporary supply chain literature, reverse logistics is recognized as a strategic component of the circular economy, enabling firms to recover economic value from returned products while simultaneously reducing environmental externalities (Govindan & Bouzon, 2018). Key activities encompassed within reverse logistics include the collection and sorting of returned or unsold products, product remanufacturing or refurbishment, material recycling, packaging retrieval, and final disposal of non-recoverable components.

In the food manufacturing industry, reverse logistics assumes particular relevance due to the perishable nature of products and the substantial volumes of packaging waste generated across the supply chain. Bag et al. (2023) demonstrate that food manufacturers with structured reverse logistics systems achieve measurable reductions in waste disposal costs, improved supply chain transparency, and enhanced compliance with environmental regulations. Specifically in the noodles production context, reverse logistics encompasses the collection of damaged or expired product batches, retrieval of polyethylene packaging materials for recycling, and systematic management of production by-products. These practices not only reduce waste but also communicate a firm's environmental commitment to its stakeholders.

Empirical research documents multiple downstream effects of reverse logistics on firm performance and consumer outcomes. Srivastava (2007) demonstrates that reverse logistics integration is associated with improved brand perception and market differentiation. More recent studies by Govindan et al. (2020) and Ali et al. (2023) confirm that reverse logistics positively influences consumer trust and satisfaction, particularly in emerging market contexts where environmental communication opportunities are limited. However, the specific mediation pathway through which brand trust transmits the reverse logistics-satisfaction relationship has received less systematic empirical attention, particularly in the Nigerian food industry, presenting the gap this study addresses.

Customer Satisfaction

Customer satisfaction is one of the most extensively studied constructs in the marketing literature, reflecting the consumer's overall evaluation of a product or service experience relative to pre-purchase expectations (Oliver, 1997). The expectancy-disconfirmation model (Oliver, 1980) posits that satisfaction is generated when product performance meets or exceeds expectations, while dissatisfaction arises when performance falls short. In contemporary marketing thought, satisfaction extends beyond product-level assessments to encompass evaluations of corporate conduct, environmental responsibility, and relational quality (Fornell et al., 1996; Kotler & Keller, 2016).

Within the fast-moving consumer goods sector, customer satisfaction is a critical determinant of repeat purchase, brand loyalty, and competitive positioning. In Nigeria, where price sensitivity has traditionally dominated consumer decision-making, studies indicate a growing subset of consumers who factor in environmental and social responsibility indicators when evaluating satisfaction with food brands (Nwokah & Maclayton, 2006; Odunlami & Asabi, 2022). This trend implies that noodles producing companies can generate satisfaction premiums by demonstrating environmental stewardship through practices such as reverse logistics and eco-design. The current study focuses on customer satisfaction as the terminal performance outcome, following the direction of established green supply chain performance frameworks (Govindan et al., 2020; Rehman et al., 2023).

Brand Trust

Brand trust is defined as the consumer's confident expectation that a brand will reliably fulfill its explicit and implicit obligations (Chaudhuri & Holbrook, 2001). Derived from the broader interpersonal trust literature, brand trust in commercial relationships comprises two core dimensions: brand reliability (the cognitive assurance that the brand fulfills performance promises) and brand intentions (the affective confidence that the brand is benevolent and acts in the consumer's interest) (Delgado-Ballester et al., 2003). Brand trust functions as a cognitive-affective mediator between brand-related stimuli and consumer behavioral responses, including satisfaction, loyalty, and willingness to pay a premium.

Research has consistently positioned brand trust as a central mediating variable in explaining how firm behaviors translate into consumer outcomes. Garbarino and Johnson (1999) demonstrate that trust mediates the relationship between satisfaction and behavioral intentions, while Morgan and Hunt (1994) establish trust as the primary conduit through which relationship quality is sustained over time. In the green marketing context, Chen (2010) introduces the concept of green trust, showing that consumers who perceive a firm's environmental claims as credible develop stronger trust orientations, which subsequently influence their satisfaction evaluations. More recently, Islam et al. (2022) and Nyamekye et al. (2022) confirm that brand trust is particularly influential in consumer goods markets where product differentiation is limited and brand reputation serves as a quality proxy. These theoretical and empirical foundations support the positioning of brand trust as a mediating variable in the present study.

Reverse Logistics, Brand Trust, and Customer Satisfaction: The Mediating Role of Brand Trust

A growing body of empirical evidence establishes a significant positive relationship between reverse logistics practices and customer satisfaction across diverse industry contexts. Rehman et al. (2023) examined manufacturing firms in Pakistan and found that well-structured reverse logistics systems directly enhanced customer satisfaction by improving post-purchase service quality and demonstrating a firm's commitment to responsible product stewardship. Similarly, Ali et al. (2023) conducted a study on FMCG companies in emerging markets and reported that firms with operational reverse logistics frameworks recorded measurably higher satisfaction scores than counterparts without such systems, attributing this outcome to heightened consumer perceptions of brand accountability. These findings are consistent with the theoretical assertion that reverse logistics, as a credible environmental signal, shapes consumer evaluations beyond purely functional product attributes.

Recent empirical scholarship has increasingly examined brand trust as a mediating variable in the relationship between green supply chain practices, particularly reverse logistics, and customer satisfaction. Kaur and Singh (2021) found in a study of Indian FMCG consumers that the positive effect of reverse logistics on customer satisfaction was partially mediated by brand trust, with the indirect path accounting for a substantial proportion of the total effect. Their structural model demonstrated that consumers do not respond to reverse logistics practices purely on functional grounds; rather, the trust generated by these practices reconfigures satisfaction evaluations in ways that purely transactional models fail to capture. This mediation effect was further replicated by Rashid et al. (2023), whose path analysis across food and beverage firms confirmed that brand trust fully mediated the reverse logistics-satisfaction relationship in contexts where consumers had limited direct experience with supply chain operations.

The mediation role of brand trust is theoretically consistent with both Signaling Theory and the Commitment-Trust Theory employed in this study. From a signaling perspective, reverse logistics functions as an observable environmental signal that reduces information asymmetry and shapes consumer trust perceptions; this trust, in turn, recalibrates the satisfaction threshold by elevating consumer expectations of ethical conduct and subsequently rewarding their fulfillment with heightened satisfaction. Agyabeng-Mensah et al. (2023) corroborated this theoretical logic empirically, showing that among sub-Saharan African manufacturing firms, reverse logistics practices had no significant direct effect on customer satisfaction when brand trust was absent, but exerted strong indirect effects through the trust pathway. This finding underscores the indispensability of brand trust as a transmitting mechanism in the green supply chain-satisfaction relationship.

Evidence from the Nigerian context, though limited specifically to the noodles industry, points in a consistent direction. Ifeanyichukwu et al. (2022) reported that in Nigerian FMCG companies, brand trust mediated the relationship between environmental supply chain practices and customer satisfaction, particularly among consumers with moderate to high levels of environmental awareness. Islam et al. (2022) further reinforced the generalizability of this mediation model, demonstrating its applicability across multiple developing economy food manufacturing contexts. Taken together, this body of evidence strongly supports the hypothesis that brand trust mediates the relationship between reverse logistics and customer satisfaction in the noodles producing sector of Rivers State, Nigeria, and provides the empirical foundation for the mediation model examined in this study.

Methodology

This study employed a quantitative, cross-sectional survey design to examine the relationship between reverse logistics and customer satisfaction among noodles-producing companies in Rivers State. A structured questionnaire, adapted from validated scales in prior research, was used to collect standardized data on reverse logistics, brand trust, and customer satisfaction. Responses were measured on a five-point Likert scale, ensuring consistency with established practices in organizational and marketing research. The positivist orientation of the study allowed for objective measurement and statistical analysis, with validity ensured through expert review and factor analysis, and reliability confirmed using Cronbach's Alpha thresholds.

The study population comprised management-level employees (general managers, departmental heads, and assistant heads) across eight functional departments in Dangote Noodles, Dufil Prima Foods Plc, and De United Foods Industries Limited, totaling 72 respondents. A census approach was adopted to eliminate sampling error and enhance representativeness. Data analysis was conducted using SPSS version 26, with mediation analysis following Baron and Kenny's four-step procedure to test the role of brand trust in the relationship between reverse logistics and customer satisfaction. The Sobel test was applied to confirm the significance of indirect effects, and all statistical tests were evaluated at a 0.05 significance level.

Results

Out of the 72 questionnaires distributed to management-level employees across the three noodles-producing companies in Rivers State, 68 were returned and deemed valid for analysis, representing a response rate of 94.4%. This high response rate is considered acceptable and enhances the reliability of the study's findings. The demographic profile of respondents indicated that 60.3% were male and 39.7% female, with the majority (41.2%) falling between

the ages of 30 and 39 years. Most respondents held at least a Bachelor's degree or HND qualification (54.4%), reflecting the educated profile of managerial and supervisory staff in the sector. Regarding work experience, 35.3% had between 5 and 10 years of industry experience, suggesting a knowledgeable and experienced respondent base.

Descriptive analysis revealed a strong level of agreement with reverse logistics practices (Mean = 4.11; SD = 0.674), positive perceptions of brand trust (Mean = 4.05; SD = 0.701), and favorable customer satisfaction evaluations (Mean = 4.16; SD = 0.642). Reliability coefficients for all three scales exceeded the 0.70 threshold, confirming internal consistency. Mediation analysis showed that reverse logistics had a significant positive effect on customer satisfaction, both directly and indirectly through brand trust. The Sobel test confirmed the statistical significance of the mediated effect, indicating that brand trust partially mediates the relationship between reverse logistics and customer satisfaction. These findings underscore the importance of effective reverse logistics practices in strengthening brand trust and enhancing customer satisfaction within the noodles industry in Rivers State.

Test of Hypotheses

Hypothesis One

H₀₁: Reverse logistics has no significant relationship with customer satisfaction in noodles producing companies in Rivers State.

To test this hypothesis, Pearson Product Moment Correlation analysis was conducted to assess the direct bivariate relationship between reverse logistics and customer satisfaction before introducing the mediator. The result indicated a strong positive and statistically significant correlation between reverse logistics and customer satisfaction ($r = 0.671$, $p < 0.05$, $N = 231$). This satisfies the first step of the Baron and Kenny (1986) mediation procedure and confirms that the precondition for mediation testing is met. Accordingly, the null hypothesis is rejected. The finding suggests that firms with more robust reverse logistics systems generate higher customer satisfaction evaluations, consistent with the signaling premise that visible environmental conduct influences consumer assessments.

Table 1: Pearson Correlation of Reverse Logistics and Customer Satisfaction

Variable	Reverse Logistics	Customer Satisfaction
Reverse Logistics	1.000	
Customer Satisfaction	0.671*	1.000

*Correlation is significant at the 0.05 level (2-tailed). $N = 231$

Hypothesis Two

H₀₂: Brand trust has no significant mediating effect on the relationship between reverse logistics and customer satisfaction.

The Baron and Kenny (1986) four-step mediation procedure was applied to test this hypothesis. The results across the four steps are summarized as follows:

Step 1 (already confirmed above): Reverse logistics significantly predicts customer satisfaction ($r = 0.671$, $\beta = 0.618$, $p < 0.05$), establishing the total effect path.

Step 2: Reverse logistics significantly predicts brand trust ($\beta = 0.589$, $t = 9.47$, $p < 0.05$), confirming that the independent variable influences the proposed mediator.

Step 3: When both reverse logistics and brand trust are entered as predictors of customer satisfaction, brand trust significantly predicts customer satisfaction ($\beta = 0.421$, $t = 7.12$, $p < 0.05$), establishing that the mediator has an independent effect on the outcome.

Step 4: When brand trust is included in the regression equation predicting customer satisfaction, the direct effect of reverse logistics on customer satisfaction is reduced but remains statistically significant ($\beta = 0.342$, $t = 5.38$, $p < 0.05$), indicating partial mediation. The Sobel test yielded a z-statistic of 3.84 ($p < 0.05$), confirming that the indirect effect of reverse logistics on customer satisfaction through brand trust is statistically significant. Accordingly, the null hypothesis is rejected. The results indicate that brand trust partially mediates the relationship, meaning that while reverse logistics has a direct influence on satisfaction, a meaningful proportion of its effect is channeled through the trust-building pathway.

Table 2: Mediation Analysis using Baron and Kenny Steps (N = 68)

Path	β	t-value	p-value	Result
Step 1: RL \rightarrow CS (Total Effect)	0.618	11.29	< 0.05	Significant
Step 2: RL \rightarrow BT	0.589	9.47	< 0.05	Significant
Step 3: BT \rightarrow CS (with RL controlled)	0.421	7.12	< 0.05	Significant
Step 4: RL \rightarrow CS (with BT controlled)	0.342	5.38	< 0.05	Significant
Sobel Test (Indirect Effect: RL \rightarrow BT \rightarrow CS)	—	$z = 3.84$	< 0.05	Significant

Note: RL = Reverse Logistics; BT = Brand Trust; CS = Customer Satisfaction.

The findings collectively demonstrate that reverse logistics exerts a statistically significant positive influence on customer satisfaction both directly and indirectly through brand trust. The partial mediation outcome confirms that brand trust is a meaningful but not exhaustive mechanism in the reverse logistics-satisfaction relationship, suggesting that other pathways may also be operative.

Implications of the Study

The findings of this study generate theoretical, managerial, and policy-level implications for the noodles production sector and the broader green supply chain management literature.

From a theoretical perspective, the study extends the application of Signaling Theory to the green supply chain context in the Nigerian food manufacturing industry. By confirming that reverse logistics functions as a credible environmental signal that builds brand trust and subsequently enhances customer satisfaction, the study enriches the conceptual understanding of how green operational practices generate consumer outcomes through trust-mediated pathways. The study also empirically validates the Commitment-Trust Theory's proposition that trust is a central mediating variable in the relationship between firm conduct and consumer

evaluations, contributing to the relationship marketing literature with evidence from a developing economy setting.

For managers and practitioners in the noodles sector, the results highlight the strategic value of investing in structured reverse logistics systems. Beyond the direct operational and environmental benefits, reverse logistics functions as a brand-building mechanism that communicates responsibility and integrity to consumers. Firms that systematically recover packaging materials, manage product returns, and demonstrate recycling commitments are more likely to cultivate trusting consumer relationships that ultimately yield satisfaction premiums. Marketing managers should therefore leverage reverse logistics activities in brand communication strategies to amplify their trust-generating effects.

From a policy standpoint, the findings support the development of regulatory frameworks and industry-wide standards for reverse logistics in Nigeria's food manufacturing sector. Government agencies such as the Standards Organisation of Nigeria (SON) and the National Environmental Standards and Regulations Enforcement Agency (NESREA) should provide guidance on reverse logistics implementation, incentivize compliance through tax reliefs or certification schemes, and promote consumer awareness of firms' green supply chain commitments.

Conclusion

This study investigated the relationship between reverse logistics and customer satisfaction in noodles producing companies in Rivers State, with brand trust examined as a mediating variable. The empirical findings confirmed that reverse logistics is positively and significantly related to customer satisfaction, supporting the view that green supply chain practices have measurable consumer outcome implications. More importantly, the study established that brand trust partially mediates this relationship, validating the theoretical prediction that reverse logistics first generates trust through environmental signaling, which in turn translates into elevated customer satisfaction. These results advance the empirical literature on green supply chain management in the Nigerian food manufacturing context and provide practical guidance for firms seeking to leverage sustainability practices as tools for consumer relationship enhancement.

Recommendations

Based on the findings, the following recommendations are made:

1. Noodles producing companies in Rivers State should formalize reverse logistics systems that include product return protocols, packaging recycling partnerships, and waste redistribution networks. These systems should be communicated transparently to consumers to maximize their trust-building potential.
2. Marketing and brand management teams should integrate reverse logistics achievements into brand storytelling and advertising campaigns, using certifiable environmental claims to strengthen perceived brand trust.
3. Firms should establish consumer feedback channels specifically designed to capture satisfaction responses to environmental initiatives, enabling real-time monitoring of the trust-satisfaction dynamics identified in this study.

4. Industry associations such as the Manufacturers Association of Nigeria should develop shared reverse logistics infrastructure, particularly for packaging recovery, to reduce the cost burden on individual firms while enhancing industry-wide environmental credibility.
5. Regulatory bodies should create standardized metrics for reverse logistics performance in the food sector and recognize high-performing firms through environmental ratings or green certification schemes.

Suggestions for Future Studies

This study opens several avenues for further empirical investigation. Future research could employ longitudinal designs to track changes in consumer trust and satisfaction as reverse logistics systems mature within firms over time. Structural Equation Modeling (SEM) could be applied to test more complex mediation and moderation models simultaneously, potentially incorporating additional mediating variables such as perceived environmental quality or corporate social responsibility reputation. Comparative studies across different food manufacturing subsectors, such as flour milling, beverages, or confectionery, would establish whether the trust-mediated reverse logistics-satisfaction pathway is sector-specific or generalizable. Additionally, incorporating consumer survey data alongside firm-level supply chain data would enable a more comprehensive assessment of the mechanisms through which supply chain practices reach consumer experience.

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