

JOINT KNOWLEDGE CREATION AND DELIVERY EFFICIENCY OF BOTTLED WATER PRODUCTION COMPANIES IN RIVERS STATE.

PERI-OKONNY Bomni Joy

Department of Marketing, Faculty of Administration and Management

Rivers State University Nkpolu-Oroworukwo, Port Harcourt

joy.peri-okonny@ust.edu.ng

IKEGWURU Mac-Kingsley

Department of Logistics and Supply Chain Management, Faculty of Administration and Management

Rivers State University Nkpolu-Oroworukwo, Port Harcourt

ikegwuru.mac-kingsley@ust.edu.ng

Abstract

The study investigated the relationship between joint knowledge creation and delivery efficiency of bottled water production companies in Rivers State. The study adopted an explanatory research design with a correlational method of investigation. The study population comprised 10 bottled water production companies in Rivers State. The researcher adopted a census method and administered 3 copies of questionnaire to supply chain, operations, procurement, and logistics/distribution managers from each of the 10 bottled water companies as sources of primary data collection. Pearson Product Moment Correlation was used to test the hypotheses with the aid of the Statistical Packages for Social Science, version 25.0. The study revealed positive and statistically significant correlation between joint knowledge creation and measures of delivery efficiency (on-time-delivery, order accuracy and flexibility). Based on the findings, the study concluded that joint knowledge creation has significant positive correlation with delivery efficiency of bottled water production companies in Rivers State, and recommends that bottled water production companies in Rivers State should leverage joint knowledge creation with their supply chain actors to enhance delivery efficiency.

Keywords: Delivery efficiency, flexibility, joint knowledge creation, on-time-delivery, order accuracy

Introduction

The bottled water industry contributes significantly to the economy of a nation and provides access to safe drinking water (Bear et al., 2024). For this industry, delivery efficiency is a critical determinant of its success (Harry & Ejo-Orusa, 2020). Scholars (Bushuev & Guiffrida, 2018; Agboyi, 2025) argue that a business that desires to maintain long-run survival and competitiveness must efficiently get its product to customers at the right time, quantity and place.

The importance of delivery efficiency for bottled water companies cannot be overemphasized (Pokubo & Owonte, 2023; Prananta & Hidayat, 2024). However, close observation reveals that, due to competition in the industry and growing demand for bottled water products, bottled water production companies in Rivers State struggle with delivery inefficiencies characterized by prolonged delivery time, order inaccuracy, and delivery inflexibility (Pokubo & Owonte, 2023).

This challenge can be linked to poor collaboration between bottled water production companies and their supply chain actors. Specifically, poor joint knowledge creation practice compounds this challenge. Ikegwuru and Damian-Okoro (2022) argue that joint knowledge creation results in enhanced delivery efficiency and seamless progression toward the achievement of set objectives. The joint creation of knowledge enable supply chain partners to develop innovative ideas on how to deliver customers' orders on time and accurately, enhancing customer satisfaction and retention (Bin-Dost & Rehman, 2016; Matey, 2023).

Despite the significant role that joint knowledge creation plays in enhancing delivery efficiency, there is still noticeable research gap in investigating the nexus between joint knowledge creation and the delivery efficiency of bottled water production companies in Rivers State. Therefore, the purpose of this study was to address this gap in knowledge. Additionally, the investigation provide valuable insight to bottled water manufacturing companies on how to enhance their delivery efficiency by leveraging joint knowledge created with supply chain partners.

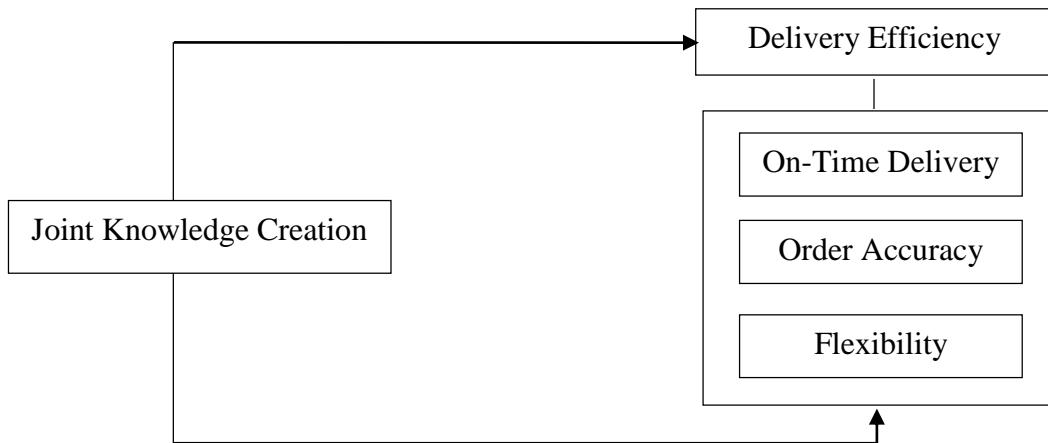


Fig. 1: Conceptual framework of relationship between joint knowledge creation and delivery efficiency of bottled water production companies in Rivers State.

Theoretical Foundations of the Study: Knowledge-Based View (KBV)

KBV was propounded by Grant (1996) as an extension of resource-based view (Curado & Bontis, 2006). KBV states that the unique knowledge and capabilities of a firm, considered as a strategic resource, are the primary drivers of a maintained competitive edge. This entails that ability to develop and leverage knowledge is one of the important assets that a business has, and which can enhance their performance (Fernandes et al., 2022). In the contemporary business domain, KBV holds strategic relevance as it emphasizes the importance of knowledge in gaining and maintaining a competitive edge.

For this study, KBV stands out as a relevant theoretical underpinning, providing a framework for understanding how joint knowledge creation leads to improved delivery efficiency. KBV posits that companies, can improve delivery efficiency by jointly developing and applying knowledge across their supply chains (Igwe et al., 2016). This developed and shared knowledge reduces delays, enhances order accuracy, and delivery flexibility. By leveraging collective expertise, companies can foresee and develop strategies to mitigate potential bottlenecks, ensuring delivery efficiency and improved overall business performance (Juhara, 2024).

Concept of Joint Knowledge Creation

Joint knowledge creation refers to the collaborative process where supply chain actors collaboratively come up with new ideas, solutions or innovations (Matey, 2023; Barua, 2018). To address challenges such as delivery inefficiencies, joint knowledge creation utilizes the diverse expertise and knowledge jointly created by supply chain actors (Alkasb et al., 2021). Scholars (Doganay & Ergun, 2017; Barua, 2018) argue that the utilization of jointly created knowledge results in outcomes that are more efficient, effective, robust, creative and applicable to real-world scenarios.

Liu and Gao (2013) define joint knowledge creation as a collaborative process of developing new ideas by combining or transforming existing ideas to meet customer expectations, efficiency, and competitiveness through shared resources and synergistic efforts. Similarly, Adewuyi (2023) defined joint knowledge creation as the process of collaboratively creating new ideas through insight gained from the market and customer feedback. By jointly creating knowledge, an organization can gain a competitive edge (Matey, 2023).

The strength of collaborative knowledge creation is in its ability to utilize collective knowledge, hence lead to more comprehensive and innovative solutions (Matey, 2023). By means of collaborative knowledge building, organizations effectively tackle complex issues that transcend the capabilities of their constituent members (Barua, 2018).

Collaborative knowledge creation also creates a learning culture (Bäck & Kohtamäki, 2016). This shows that bottled water production firms can collectively engage in collaborative learning with supply chain players for mutual analysis of consumers' buying behavior and demand quantities, to facilitate on-time delivery, order accuracy, and delivery flexibility.

Concept of Delivery Efficiency

In marketing logistics, delivery or distribution efficiency is a measure of how well a firm deliver goods and associated information to consumers at the least possible costs, and ensure timely deliveries, reduced lead time and minimizes stockout-related risks (Ateke et al., 2025). Ateke et al. (2024) argue that distribution efficiency has been a key marketing concern due to its contribution to customer satisfaction.

Delivery efficiency as a component of supply chain performance refers to the utilization of resources optimally to ensure that products reach their intended destinations without unnecessary delays (Chopra & Meind, 2019). Teng et al. (2014) define delivery efficiency as the ability to meet customers' requirements for timely and safe product delivery and at a minimal cost.

Delivery efficiency manifests in fast, flexible, responsive, accurate, and cost effective delivery of customers' orders (Chourasia, 2017). Setiani et al. (2017) argued that assessing delivery efficiency involves evaluating crucial indicators such as order fulfillment rates, lead time reduction, and the rate of customer satisfaction.

The benefits of delivery efficiency includes increased market share, sales growth, customer satisfaction, profitability, cost savings, and competitive advantage (Bushuev & Guiffrida, 2018). A high level of delivery efficiency reduces overhead costs associated with warehousing and transportation while ensuring that products get to customers on time (Chourasia, 2017). Moreover, delivery efficiency contributes to sustainability by optimizing routes, reducing fuel consumption, and minimizing carbon footprints (Teng et al., 2014).

For bottled water production companies, paying attention to delivery efficiency is paramount because delivery efficiency is essential to product availability, reducing stockouts, and ensuring profitability. It is also an indication of how successful their supply chain is in ensuring that products are available to customers at the right time (Kembro et al., 2020).

According to Ateke et al. (2025), delivery efficiency is inherently pluridimensional and may be broken down into reduction of: distribution costs, order-cycle time, and wastes, as well as optimal resource utilization and energy conservation. In this study however, delivery efficiency was measured using on-time delivery, order accuracy and flexibility (Arinze et al., 2025; Fechete & Nedelcu, 2017)

On-time delivery (OTD)

OTD is an important indicator of delivery efficiency that measures the ability of a business to fulfill orders within the promised timeframe (Jiang 2010). It reflects the efficiency and reliability of an organization's supply chain and delivery processes. Maintaining a high OTD rate is essential for customer satisfaction and operational success (Liu & Luo, 2021). In industries where timely delivery is crucial, such as manufacturing and retail, OTD serves as a key indicator of performance and competitiveness. Companies that consistently achieve high OTD rates are better positioned to build strong customer relationships and gain a competitive advantage in the market (Kamali, 2018).

According to Bushuev and Guiffrida (2018), on-time delivery measures the extent to which shipments are delivered to their destination according to both the quantity and schedule specified on the order. This definition emphasizes the importance of meeting both time and quantity commitments to customers. Igwe and Robert (2016) defines OTD as the percentage of customer orders delivered on or before the promised delivery date, highlighting its role as a key performance indicator in supply chain management. Furthermore, a research paper by Carvalho et al. (2022) describes OTD as a metric used to assess the ability of a business in fulfilling the shipment order within the period of the promised delivery date.

Order accuracy

Order accuracy is a crucial metric in supply chain management, reflecting the precision with which customer orders are fulfilled in terms of product type, quantity, and specifications (Mentzer et al., 2017). It directly impacts customer satisfaction, operational efficiency, and overall business performance. High-order accuracy reduces costs associated with returns, re-shipments, and customer complaints, thereby enhancing profitability (Chopra & Meindl, 2019). Ensuring order accuracy is critical for maintaining consumer trust and meeting market demands. Failure to maintain accuracy can result in reputational damage, financial losses, and decreased customer retention (Rushton et al., 2017).

According to Stevenson (2021), order accuracy refers to the percentage of orders that are correctly fulfilled without errors in item selection, packaging, or documentation. Order accuracy is defined as the degree to which an order is fulfilled correctly in accordance with customer requirements, including the correct product, quantity, and condition (McFarlane & Sheffi, 2003). Ramanathan (2012) emphasizes that order accuracy reflects the effectiveness of supply chain processes in minimizing errors related to inventory records, order fulfillment, and delivery schedules. According to Szozda & Werbińska-Wojciechowska (2013), order accuracy is a critical measure of supply chain performance, ensuring customer satisfaction and operational efficiency.

Flexibility

Flexibility is a fundamental concept in business operations and supply chain management, referring to an organization's ability to adapt to changing market conditions, customer demands, and unforeseen disruptions (Alolayyan & Alyahya, 2023). In a rapidly evolving business environment, flexibility in delivery enables companies to respond effectively to delivery disruption. Firms that exhibit high flexibility in delivery can adjust their delivery operations, resources, and strategies to maintain efficiency and competitiveness (Chopra & Meindl, 2019). Companies that lack delivery flexibility often struggle with delivery inefficiencies, increased costs, and customer dissatisfaction (Huo et al., 2016).

According to Chen and He (2017), flexibility in delivery refers to a service's ability to adapt to varying customer demands regarding volume, time, and place. It enables a firm to respond to

dynamic circumstances, thereby promoting risk-taking and fostering innovative thought processes (Nagaraju, 2024). In their research, Regev et al. (2006) characterized flexibility as the capability to accommodate change while maintaining a consistent identity. This capacity permits alterations in delivery processes by modifying only essential components, while ensuring the stability of other factors, thereby aligning with the evolving objectives, strategies, and requirements of customers (Alolayyan & Alyahya, 2023).

Joint Knowledge Creation and Delivery Efficiency

Various empirical literature has provided insight into the nexus between joint knowledge creation and delivery efficiency. For instance, Matey (2023) examined the relationship between collaborative knowledge creation and supply chain resilience, and found a significantly positive direct influence of collaborative knowledge on supply chain resilience and innovation.

Hadziahmetovic and Dinc (2023) examined the impact of knowledge creation and affective commitment on organizational performance. This study demonstrates that knowledge creation and affective commitment are predictors of organizational performance at public and private universities in Central and Eastern European countries.

Wale (2021) examined the relationship between knowledge creation, knowledge sharing and knowledge utilization in selected university libraries in the South-West, Nigeria. The study discovered that there is a significant relationship between knowledge creation and knowledge utilization in Nigerian University Libraries in South-West, Nigeria.

Alkasb et al. (2021) investigated the impact of supply chain collaboration on operational performance: the moderation role of supply chain complexity. The results indicated that information sharing, goal congruence, and knowledge creation sharing had direct and affirmative impact on operational performance.

Consequent upon the foregoing review, the following hypotheses were formulated:

H_01 : Joint knowledge creation does not significantly relate to on-time delivery of bottled water production companies in Rivers State.

H_02 : Joint knowledge creation does not significantly relate to order accuracy of bottled water production companies in Rivers State.

H_03 : Joint knowledge creation does not significantly relate to flexibility of bottled water production companies in Rivers State;

Methodology

This study adopted an explanatory research design with a correlational method of inquiry to examine the correlation between joint knowledge creation and delivery efficiency of bottled water production companies in Rivers State. The population of the study comprised 10 bottled water production companies, as listed in Finlib.com Nigeria Directory and search engine (2024). Given the small population size, a census approach was adopted. However, 4 respondents were drawn from each of the 10 bottled water production companies to provide data. Thus, a total of 40 respondents participated in the study. The respondents were supply chain, operations, procurement, and logistics/distribution managers. Questionnaire was used to collect primary data. The questionnaire was given to academic professionals to certify that the items suit the study variables. Additionally, a pilot study was conducted to assess the instrument's reliability through Cronbach's Alpha reliability test. As shown in Table 1, the result of the Cronbach Alpha analysis revealed that all the variables in the study produced a high Cronbach's Alpha coefficient, exceeding the threshold of 0.70 set by Nunally (1978). Pearson Product Moment Correlation (PPMC) was employed to test the formulated hypotheses with the aid Statistical Package for Social Sciences (SPSS) version 25.0.

Table 1: Reliability Test - Cronbach's Alpha Analysis

S/N	Variables	Number of Items	Cronbach's Alpha Coefficients
1	Joint Knowledge Creation	4	0.859
2	On-Time Delivery	4	0.837
3	Order Accuracy	4	0.797
4	Flexibility	4	0.815

Source: SPSS Output (2025).

Results

Table 2: Descriptive Statistics of Joint Knowledge Creation

	N	Sum	Mean	Std. Deviation	Variance
Your company engages in co-developing knowledge with your supply partners to improve delivery efficiency.	35	144	4.11	1.057	1.118
Your organization participates in mutual learning with your supply chain partners to enhance delivery processes.	35	158	4.51	1.202	1.445
Your organization collaborates with your supply chain partners to solve logistics and distribution-related problems.	35	138	3.94	.902	.813
Real-time data is integrated and shared between your organization and your supply chain partners to support joint decision-making.	35	156	4.46	1.082	1.170
Valid N (listwise)	35				

Source: SPSS Output (2025).

Table 2 revealed that most of the responses with respect to joint knowledge creation are on the higher side of the Likert scale, which ranges from 1 to 5. As a result of the high concentration of the responses on the higher side of the scale, the mean scores are greater than 3.00. Specifically, in the result, question 2, which sought to determine the extent to which bottled water production companies in Rivers State engage in mutual learning with supply chain partners to enhance delivery processes, recorded the highest sum of 158 and the highest mean score of 4.51. This also indicates that this item has the strongest influence on the variable. Also, question 2 has the highest standard deviation of 1.202 and variance of 1.445, indicating that responses spread the most in question 2 compared to other questions.

Table 3: Descriptive Statistics of On-Time Delivery

	N	Sum	Mean	Std. Deviation	Variance
Your organization achieves high order fill rates for your customer deliveries.	35	143	4.09	1.345	1.809
Lead times for your deliveries are consistent and reliable.	35	145	4.14	1.301	1.692
Your deliveries adhere to the scheduled time frames.	35	142	4.06	1.128	1.273
Your organization routinely obtains delivery confirmations from your customers to ensure schedule compliance.	35	147	4.20	1.412	1.995
Valid N (listwise)	35				

Source: SPSS Output (2025).

Table 3 revealed that most of the responses with respect to on-time delivery are on the higher side of the Likert scale, which ranges from 1 to 5. As a result of the high concentration of the

responses on the higher side of the scale, the mean scores are greater than 3.00. Specifically in the result, question 4, which sought to determine the extent to which bottled water production companies in Rivers State routinely obtain delivery confirmations to ensure schedule compliance, recorded the highest sum of 147 and the highest mean score of 4.20. This also indicates that this item has the strongest influence on the variable. Also, question 4 has the highest standard deviation of 1.412 and variance of 1.995, indicating that responses spread most in this question compared to other questions.

Table 4: Descriptive Statistics of Order Accuracy

	N	Sum	Mean	Std. Deviation	Variance
Delivered quantities from your organization match your customer order specifications.	35	142	4.057	1.241	1.540
Your products are packaged and labeled correctly before delivery.	35	140	4.11	1.186	1.406
Your customers are regularly updated on order status and accuracy.	35	144	4.11	1.186	1.406
Your organization minimizes your delivery errors and incomplete delivery.	35	148	4.23	1.098	1.206
Valid N (listwise)		35			

Source: SPSS Output (2025).

Table 4 revealed that most of the responses with respect to order accuracy are on the higher side of the Likert scale which ranges from 1 to 5. As a result of the high concentration of the responses on the higher side of the scale, the mean scores are greater than 3.00. Specifically in the result, question 4 which sought to determine the extent to which bottled water production companies in Rivers State minimize delivery errors and incomplete delivery, recorded the highest sum of 148 and the highest mean score of 4.23. This also indicates that this item has the strongest influence on the variable. Also, question 4 has a relatively low standard deviation of 1.098 and variance of 1.206, indicating that responses were positively clustered around the mean, reflecting a shared perception of accuracy in order fulfillment.

Table 5: Descriptive Statistics of Flexibility

	N	Sum	Mean	Std. Deviation	Variance
Your delivery schedules can be adjusted to meet your customer needs.	35	145	4.14	1.326	1.757
Your organization can split your orders for delivery across multiple shipments or locations.	35	141	4.03	1.270	1.613
Your organization accommodates changes to your customer orders after placement.	35	145	4.14	1.326	1.757
Your organization responds promptly to your emergency or urgent delivery requests.	35	143	4.09	1.118	1.249
Valid N (listwise)		35			

Source: SPSS Output (2025).

Table 5 revealed that most of the responses with respect to flexibility are on the higher side of the Likert scale, which ranges from 1 to 5. As a result of the high concentration of responses on the higher side of the scale, the mean scores are greater than 3.00. Specifically, in the result, questions 1 and 3 which sought to determine the extent to which bottled water production companies in Rivers State can adjust their delivery schedules and accommodate changes to customer orders after placement, recorded the highest sum of 145 and the highest mean score of 4.14. This also indicates that these items have the strongest influence on the variable. Also,

questions 1 have the highest standard deviation of 1.326 and variance of 1.757, indicating that responses were slightly more dispersed for these items compared to others.

Table 6: Relationship between Joint Knowledge Creation and On-Time Delivery

		Joint Knowledge Creation	On-Time Delivery
Joint Knowledge Creation	Pearson Correlation	1	.590**
	Sig. (2-tailed)		.000
	N	35	35
On-Time Delivery	Pearson Correlation	.590**	1
	Sig. (2-tailed)	.000	
	N	35	35

**. Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Output (2025).

The SPSS output presented in Table 6 reveals a Pearson correlation coefficient (r) of 0.590 with double asterisks (**), indicating a moderate positive relationship between joint knowledge creation and on-time delivery. Additionally, the associated p-value (0.000) is less than the significance level of 0.05, confirming that the relationship is statistically significant. This result implies that improvements in joint knowledge creation are moderately associated with enhanced on-time delivery performance among bottled water production companies in Rivers State. Consequently, the null hypothesis stating that there is no significant relationship between joint knowledge creation and on-time delivery is rejected.

Table 7: Relationship between Joint Knowledge Creation and Order Accuracy

		Joint Knowledge Creation	Order Accuracy
Joint knowledge Creation	Pearson Correlation	1	.697**
	Sig. (2-tailed)		.000
	N	35	35
Order Accuracy	Pearson Correlation	.697**	1
	Sig. (2-tailed)	.000	
	N	35	35

**. Correlation is significant at the 0.01 level (2-tailed).

Source: SPSS Output (2025).

The SPSS output on Table 7 reveals a correlation coefficient of 0.697** between joint knowledge creation and order accuracy, indicating a strong positive relationship between joint knowledge creation and order accuracy. More so, the probability value (0.000) is less than the critical value (0.05), this shows that there is a strong significant relationship between joint knowledge creation and order accuracy. This further implies that joint knowledge creation can be used to achieve order accuracy among bottled water production companies in Rivers State. Based on this, we reject the null hypothesis that there is no significant relationship between joint knowledge creation and order accuracy of bottled water production companies in Rivers State.

Table 8 Relationship between Joint Knowledge Creation and Flexibility

		Joint knowledge creation	Flexibility
Joint knowledge creation	Pearson Correlation	1	.451*
	Sig. (2-tailed)		.011
	N	35	35
Flexibility	Pearson Correlation	.451*	1
	Sig. (2-tailed)	.011	
	N	35	35

*. Correlation is significant at the 0.05 level (2-tailed).

Source: SPSS Output (2025).

The SPSS output on Table 8 reveals a correlation coefficient of 0.451** between joint knowledge creation and flexibility, indicating a moderate positive relationship between joint knowledge creation and flexibility. More so, the probability value (0.000) is less than the critical value (0.05), this shows that there is a moderate significant relationship between joint knowledge creation and flexibility. This further implies that joint knowledge creation can be used to achieve flexibility among bottled water production companies in Rivers State. Based on this, we reject the null hypothesis that there is no significant relationship between joint knowledge creation and flexibility of bottled water production companies in Rivers State.

Discussion of Findings

This study examined the link between joint knowledge creation and delivery efficiency of bottled water production companies in Rivers state. The results of the statistical analyses showed that joint knowledge creation has positive significant correlation with delivery efficiency through on-time delivery, order accuracy and flexibility. These findings are in line with the findings of prior studies. Specifically, these findings agree with the findings of Matey (2023), who examined the relationship between collaborative knowledge creation and supply chain resilience and revealed that collaborative knowledge significantly and positively influences supply chain resilience.

The findings of the present study also align with the report of Wale (2021) whose examination of relationship between knowledge creation, knowledge sharing, and knowledge utilization in selected university libraries in the South-West, Nigeria, discovered that there is a significant relationship between knowledge creation and knowledge utilization. In addition, our findings corroborate that of Alkasb et al. (2021) that knowledge creation and sharing impact on operational performance.

Conclusion and Recommendations

In line with the findings of this study and to the extent of its consistency with the results of similar previous studies, we conclude that joint knowledge creation has a significant positive relationship with delivery efficiency of bottled water production companies in Rivers State. Thus, joint knowledge creation is instrumental to enhancing the delivery efficiency of bottled water production companies in Rivers State. When bottled water production companies collaborate with their supply chain actors to create knowledge, they can leverage that knowledge to ensure that orders are delivered to customers on time, accurately, and flexibly. Based on the findings and the conclusion of this study, we recommend that bottled water production companies in Rivers State should leverage joint knowledge creation with their supply chain actors to enhance delivery efficiency.

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