# UNVEILING THE IMPACT OF KNOWLEDGE MANAGEMENT ON DIGITAL MARKETING PERFORMANCE: THE ROLE OF BUSINESS INTELLIGENCE IN PHARMACEUTICAL CORPORATE SECTOR

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#### Abstract

This paper tries to explore the relationship between digital marketing performance, business intelligence, and knowledge management in the pharmaceutical sector. In a high-technology environment where the pharmaceutical industry is also caught up in fast changes and keen competition, this study will examine the mediating role of business intelligence in knowledge management and its relation to digital marketing performance. The data were collected from digital marketing managers in the pharmaceutical industry in Jordan, and analysis was performed through SPSS and PROCESS Macro v3.5 to test the direct and indirect effects. Findings indicate that knowledge management directly influences digital marketing performance  $\beta$  = 0.06, p = 0.08, and indirectly through business intelligence  $\beta$  = 0.44, p = 0.00. The total effect of knowledge management and business intelligence on digital marketing performance is 0.50, which is significant with a confidence interval not crossing zero—LLCI = 0.36, ULCI = 0.56, hence statistically significant. Moreover, the Rsquared value of 0.63 indicates that the model explains a large proportion of variance in digital marketing performance. The findings emphasize the fact that knowledge management, combined with business intelligence, greatly enhances digital marketing performance by improving creativity, accessibility, and strategic decision-making. The paper concludes that pharmaceutical companies that invest in these technologies will be at a competitive advantage and afford sustainable growth. Future research should focus on specific business intelligence tools that could further optimize knowledge management and digital marketing performance across different sectors.

**Keywords:** Knowledge Management, Business Intelligence, Digital Marketing Performance, Pharmaceutical Sector, Jordan.

#### INTRODUCTION

The rapidly changing competitive dynamics across industries in the fast evolution of artificial intelligence, business intelligence, and digital technologies have pushed organizations to seek datadriven insights with great importance in sustaining their market position (English & Hoffmann, 2018; Marjerison et al., 2022).

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In this regard, knowledge management is very important to improve digital marketing performance since it helps organizations adapt to changing consumer demands and further optimize their marketing strategies (Aljumah, 2020; Cody et al., 2002).

The pharmaceutical sector, with its stringent regulations and continuous technological advancement, faces unique challenges in effective knowledge management and business intelligence utilization (Awad et al., 2022; Mohamed, 2016). Although some prior studies have investigated the mediating role of business intelligence in other contexts, little attention has been paid to the pharmaceutical sector, where large knowledge gaps still exist.

Professionals in this industry of digital marketing often experience a mismatch between the existing expertise and skills that are required in implementing data-driven strategies (Herhausen et al., 2020; Mehralian, 2022).

Despite the increased relevance of business intelligence in strategic decision-making, how knowledge management and business intelligence interplay to enhance digital marketing performance remains one of the least explored research areas in the pharmaceutical sector (Wielgos & Homburg, 2023). Integration of the two will go a long way in ensuring optimal digital marketing strategies and overcoming some of the existing challenges in the sector.

## 1. Literature Review and Hypotheses Development

The role of knowledge management, business intelligence, and digital marketing in driving innovation and enhancing organizational performance in the pharmaceutical sector has been well established for a long time (Cody et al., 2002; Herhausen et al., 2020; Mohamed, 2016). Knowledge management refers to an organization's systematic creation, acquisition, sharing, and application of its organizational knowledge assets, which has become a point of interest for many organizations, especially those in the pharmaceutical sector, seeking to maximize their intellectual capital (Abbas, 2019; Marjerison et al., 2022; Mohamed, 2016).

One would, therefore, be right to describe knowledge management as a process through which tacit and hence implicit knowledge is transformed into codified explicit knowledge, usually in written reports or manuals, for instance. Such transformation, of course, occurs in knowledge creation, acquisition, sharing, and application (Abbas, 2019; Lee & Wong, 2015; Li et al., 2020).

Knowledge management strategies in the pharmaceutical sector tend to systematically share information in knowledge and data management so as to conduct better research and development (Mohamed, 2016). This becomes very important within the discovery and development stage of a drug, where knowledge sharing among researchers hastens development cycles, enhances collaboration, and helps reduce duplication of work (Volodymyrovych et al., 2021).

Mohamed (2016) asked the question, "Why does the pharmaceutical industry need knowledge management?" and underlined the fact of knowledge management's significance in the processes related to drug approval and development.

The knowledge management practices have been utilized for driving innovation, increasing revenue, decreasing costs, and enhancing the predictability of outcomes in manufacturing through the rapid information flow between development and production teams in the pharmaceutical industry.

Digital marketing refers to the utilization of digital channels in promoting brands and engaging prospective customers; this has become part of most business strategies in the modern world, including the pharmaceutical sector (Chaffey & Ellis-Chadwick, 2019).

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Digital marketing is an important tool for pharmaceutical companies to build and maintain their online presence via various channels such as websites, social media sites, email marketing, and search engine optimization (Awad et al., 2022; Economics, 2022). It is in this aspect that digital marketing aids in targeted advertising, whereby a campaign can be tailor-made according to a variety of demographics including age, gender, location, medical interests, and online behavior (Aljumah, 2020; Awad et al., 2022; Ramon et al., 2021).

What's more, through content marketing by using digital platforms, pharmaceutical companies more engage the stakeholders to involve the patients, health professionals, and suppliers (Awad et al., 2022; Bala & Verma, 2018; Lima et al., 2024). That helps much in terms of improvements for engagement in service quality and marketing sustainability (Liu & Dong, 2021).

In the knowledge management and business intelligence domain, many organizations, including pharmaceutical companies, have come to rely on business intelligence tools to support decision-making (Awamleh et al., 2024). Business intelligence is a class of software tools that support systematic data collection and analysis to elicit insights that will guide big organizational decisions in areas such as sales forecasting, customer relationships management, resource planning, and inventory management (Awamleh et al., 2024; Liengpunsakul, 2021; Tavera Romero et al., 2021).

In the competitive pharmaceutical industry, business intelligence is particularly valuable for providing strategic insights on how to improve decision-making and performance (Alabaddi et al., 2020; Ayman et al., 2022). For instance, the study in the pharmaceutical sector showed a strong relation between the dimensions of business intelligence, which included data collection, reporting, and information sharing, with the strategic vision of the organizations and how this depicted the role of business intelligence in gaining competitive advantage (Ayman et al., 2022).

Integration of knowledge management and business intelligence helps organizations enhance decision-making, performance, and long-term sustainability. Such integration would help in avoiding costly mistakes, appropriate resource allocation, setting up strategic goals, and providing systematic and data-driven decisions for improved organizational outcomes (Bouaoula et al., 2019; Herschel & Jones, 2005; Surbakti, 2015). Even though knowledge management and business intelligence share an interest in data handling, their focus forms the basis for the major differences between them.

Knowledge management generally refers to the management of tacit knowledge—experiential—and explicit—documented—knowledge in support of learning and creativity within an organization, while business intelligence emphasizes gathering, analyzing, and interpreting various types of data to assist strategic planning and operational improvements in general (Herschel & Jones, 2005; Surbakti, 2015). The integration of the two, therefore, brings about a learning environment that enables decision-making, adaptability, and exploitation of opportunities.

Unlike knowledge management, which has a wider scope and includes tacit knowledge based on individual experiences and insights, business intelligence mainly focuses on explicit knowledge that can be easily codified and analyzed (Abbas, 2019; Cheng et al., 2020; Herschel & Yermish, 2009).

Knowledge management seeks to foster a culture of sharing and innovation for the enhancement of organizational learning, which aids the organization in realizing strategic growth and sustainability in the long run. On the other hand, business intelligence focuses on improving decision-making through timely and relevant data analysis (Abbas, 2019; Herschel & Yermish, 2009; Li et al., 2020).

The integration of business intelligence into digital marketing strategies is increasingly viewed as helpful in improving digital marketing performance. Integration of these channels enables better analysis and sharing of data, hence leading to better decision-making and tracking of key performance indicators such as customer engagement, conversion rates, and traffic on the website (Lima et al.,

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2024; Ratangiri, 2020). Business intelligence tools also allow organizations to optimize their marketing activities by better resourcing and evaluating the performance of different marketing channels (Economics, 2022; Wielgos & Homburg, 2023). Such an integration gives the competitive advantage of helping organizations in the better segmentation of the target market, based on behavior, preferences, and demographics, in order to create tailored campaigns and build stronger connections with their audience (Ivanov, 2022; Kabiraj & Joghee, 2023; Ramon et al., 2021). More precisely, pharmaceutical companies can adopt the strategies so that they may gain from business intelligence applied in the analysis of market trends, competitor strategies, and customer insight critical for strategic decision-making (Basile et al., 2023; Finelli & Narasimhan, 2020; Kulkov, 2021).

The evidence and observations implemented through the years of research have also proven the strong association between business intelligence and organizational performance, especially in the direct and indirect ways in the pharmaceutical industry (AL-Hashem, 2020; Finelli & Narasimhan, 2020; Pinto & Fox, 2016).

For example, research on the relationship between technology-based knowledge sharing and product innovation found that marketing intelligence, one subset of business intelligence, is a critical mediating variable of this relationship, which therefore points out the importance of technology adoption for the enhancement of effectiveness in pharmaceutical organizations (AL-Hashem, 2020). Figure 1 is designed to explain the influence of knowledge management and business intelligence integration on digital marketing performance in the pharmaceutical industry with emphasis on the mediating effect of business intelligence in improving organizational competitiveness and decision-making. Hence, the following hypothesis is posited based on the literature:

- H1: Knowledge management significantly impacts digital marketing performance.
- H2: Knowledge management significantly impacts business intelligence
- H3: Business intelligence significantly impacts on digital marketing performance
- H4: Business intelligence acts as a mediator in the relationship between knowledge management and digital marketing performance.



#### Figure 1: Research Model/Framework

#### 2. Methodology

This quantitative, cross-sectional study used purposive sampling to collect data from employees in the pharmaceutical sector in Jordan, targeting only the administrative staff who work in digital marketing roles (Campbell et al., 2020; Thomas, 2022).

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The study aimed to collect data from 400 administrative employees who were selected based on qualifications that enabled them to respond to research questions. 389 valid responses were received, meeting the required sample size criteria and thus deemed suitable for analysis (Memon et al., 2020; Taherdoost, 2018). Data collection occurred between April and May of 2024.

A pilot study was conducted with thirty administrative staff in the pharmaceutical sector in Jordan in order to check the applicability of the research tool. Targeted respondents were informed of the purpose of the study and guaranteed that participation was voluntary with an emphasis on confidentiality. They were also assured that data would only be used for academic purposes. The questionnaire for this survey was arranged into two key parts. Part one asked demographic and occupation questions from respondents, which included the age of participants, gender, education, how many years of pharmaceutical sector work experience, and at which level within the pharmaceutical marketing jobs—digital. The collected information will present contextual knowledge pertinent to understanding respondents' characteristics and findings about their perspective.

The second part has three key sections as discussed here: The first scale, with regard to knowledge management, was adapted from Lee & Wong (2015) and Lam, Nguyen, Le, & Tran (2021). It consisted of twenty items, and the respondents were asked to rate their perceptions regarding knowledge management on a five-point Likert scale, starting from strongly dissatisfied and ascending to strongly satisfied. One exemplar of the sought items was if the organization integrates various knowledge sources across functional boundaries. The second scale measured business intelligence, and it was adopted from Awamleh & Bustami (2022) consisted of five items. Again respondents rated each on a five point Likert type scale. Thirdly, there was the measurement of digital marketing that was taken from Hadiyati et al., (2024). It was based on five different items. One sample item on this scale asked about whether digital marketing via social media helped in product searches. Ratings of the respondents were aggregated and analyzed in order to explore the relationships among knowledge management, business intelligence, and digital marketing within the pharmaceutical sector in Jordan.

Data Analysis: Estimation of the proposed model was conducted using SPSS through the PROCESS Micro v3.5 program. The SPSS program was used to ensure the validity and reliability of the study tool. The PROCESS Micro v3.5 program was applied to test the indirect relation. The PROCESS macro is widely applied by academic research scholars. It was originally introduced by Andrew F. Hayes. The main aim of introducing this PROCESS is to establish statistical techniques for mediation and moderation analysis (Hayes, 2015). PROCESS macro enables one to compute moderation and mediation effects within a single conceptual framework. The PROCESS macro helps estimate the direct and indirect effects through which researchers might explore intricate relationships in their data (Hayes, 2015; Preacher & Hayes, 2008; Xing, Luo, Liu, Ma, & Li, 2022).

#### 3. Results

The respondents' demographic and vocational details are presented in Table 1. The gender distribution of the responders was 56% male and 44% female. An explanation of the research population's characteristics for a sample of 389 administrative employees, the demographic characteristics showed that there was a proportionality in gender ratios.

Furthermore, it also showed that most of the study samples were from the middle and first administrative levels. Interestingly, the majority of the administrative experience was between 1-6 years, and the importance of companies in continuing in the market reached more than five years of their lifespan in the Jordanian market. This demonstrated the degree of consistency of the study population and its distinctive experience in responding to the variables of the current study effectively.

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Variable	Category	Frequency	Percentage (%)
Gender	Male	216	56
	Female	173	44
Career Level	Top-level manager	45	11.6
	Middle manager	156	40.1
	First-line manager	107	27.5
	Team leader	81	20.8
	1-3 years	162	41.6
Eurorianaa	4-6 years	156	40.1
Experience	7-9 years	66	17
	Above 10 years	5	1.3
Organization in Business	Less than 5 years	73	18.8
	5-10 years	176	45.2
	Above 10 years	140	36

#### Table 1: Demographic characteristics of the study sample

Description of the characteristics of the study population for a sample of 389 administrative employees.

Table 2 shows the internal consistency demonstrated the independence of the study variables and that it had a significance level of less than 1% for all study variables. Moreover, there is also no weak correlation where  $R \ge 20\%$ , and on the other hand, there is no multicollinearity for relationships where  $R \le 80\%$  between the study variables.

**Table 2: Person Correlation to Test Internal Validity of Variables** 

Items	КМ	BI	DMP
Knowledge Management	1:00		
Business Intelligence	0.72**	1:00	
Digital Marketing Performance	0.61**	0.79**	1:00

\*\* The internal validity is positively affected at the 1% level. "Sample size = 389".

\* The internal validity is positively affected at the 5% level.

Table 3 of the study showed pre-tests to ensure the suitability of the study variables to test the hypotheses that the results are positive, as the Cronbach alpha coefficient for the reliability of the study variables showed a degree of confidence exceeding 70% for all variables. The arithmetic averages were also for Knowledge Management & Business Intelligence had a moderate degree and a high degree for the Digital Marketing Performance variable, according to the responses of the research community. The degree of Skewness and Kurtosis varied between ±2.58, which showed that the data were normally distributed. In conclusion, the tests of data readiness to test hypotheses were successful in an ideal and realistic way.

Table 3: Statistical tests to measure the suitability of variables to test hypotheses

Statistical tests	KM	BI	DMP	Total effect	Results
Alpha (α)	0.93	0.86	0.82	0.93	Reliability achieved ≥ 70
Mean	3.65	3.65	3.81	3.70	KM & BI=IM.L ; DMP= H.L
SD	0.84	0.76	0.69	0.76	KM & BI=IM, DMP= H
Max	5.00	5.00	5.00	5.00	5-Point Likert Scale
Mini	1.00	1.00	1.00	1.00	5-Point Likert Scale
Skewness	-0.92	-0.76	-0.98	Std. Error = 0.12	Normal Distribution
Kurtosis	1.00	0.88	2.04	Std. Error = 0.25	Normal Distribution

IV= Knowledge Management; MV= Business Intelligence; DV= Digital Marketing Performance.

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The following table 4 and Figure 2 show the direct and indirect relationships for the study variables, as it showed that the degree of direct effect reached 6% and a degree of non-significant confidence reached 8%. Moreover, the LLCI & ULCI met zero number which the time-line is non-significant of the direct effect. In contrast, the indirect relationship with a degree of effect reached 44% and a degree of significant confidence reached 0%. The overall relationship also improved to 50%, which is a high degree of effect, and the degree of significant confidence reached 0%. Furthermore, the LLCI & ULCI do not meet zero numbers, which the time-line is significant for the indirect and total effect. The study also showed that the effect of business intelligence and digital marketing performance is explained by 63% of knowledge management, while it showed that the total effect of the variables is explained by 37% of knowledge management.

KM, BI,&DMP	Direct effect	Indirect effect	Total effect	Explanation
Effect	0.06	0.44	0.50	Direct + Indirect effect = 50%
	-0.01	0.36	0.43	LLCI + ULCI = must not pass
LLCI				zero
ULCI	0.14	0.51	0.56	LLCI + ULCI = must not pass
				zero
F	323.86	323.86	224.21	P ≤ 5%
t	1.70	16.37	14.97	P ≤ 5%
р	0.08	0.00	0.00	P ≤ 5%
R-sq.	0.63	0.63	0.37	R-sq. ≥ 20%

Table 4: Di	irect & Indirec	t effect via P	ROCESS Ma	cro v3.5.
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IV= Knowledge Management; MV= Business Intelligence; DV= Digital Marketing Performance.



Figure 2: The structure model

Analyzing the relationships between digital marketing performance, knowledge management, and business intelligence as indicated in Table 5, the results are as follows: Hypothesis 1 (Indirect Effect between Knowledge Management and Business Intelligence) has an effect size of 0.44 with a significance level of 0.00. This implies that the relationship between knowledge management and business intelligence is statistically significant. Therefore, the first hypothesis is supported. Hypothesis 2: The indirect effect between business intelligence and digital marketing performance has an effect size of 0.44 with a significance level of 0.00. This result confirms that through the construct of business intelligence, there is a positive impact on digital marketing performance; therefore, the second hypothesis is accepted. Hypothesis 3: The direct effect between knowledge management and digital marketing performance has an effect size of 0.06 with a significance level of 0.08. Since the p-value (0.08) is greater than 0.05, this result indicates that the direct relationship between knowledge management and digital marketing performance is not statistically significant, and thus, the third

hypothesis is not supported. Hypothesis 4: Total Effect involving Knowledge Management, Business Intelligence, and Digital Marketing Performance The effect size of 0.50 has a significance level of 0.00. This shows a large total effect, meaning that the combined influence of knowledge management and business intelligence on digital marketing performance is very large; this supports the fourth hypothesis.

Model	Туре	Variables	Effect	Sig.	Decision
H1	Indirect Effect	KM & BI	0.44	0.00	Supported
H2	Indirect Effect	BI & DMP	0.44	0.00	Supported
H3	Direct Effect	KM & DMP	0.06	0.08	Not Supported
H4	Total Effect	KM, BI, & DMP	0.50	0.00	Supported

## Table 5: Hypothesis testing summary

IV= Knowledge Management; MV= Business Intelligence; DV= Digital Marketing Performance.

#### 4. Discussion

These results have important implications for understanding the linkages of Knowledge Management, Business Intelligence, and Digital Marketing Performance in the pharmaceutical sector. This paper discusses the results of the available literature and thereby adds to the burgeoning literature on the role of Business Intelligence in digital marketing and organizational performance. The first result confirmed a significant indirect effect between Knowledge Management and Digital Marketing Performance mediated by Business Intelligence. This finding supports previous research that highlights the close relationship between Knowledge Management and Business Intelligence. Surbakti (2015) showed that Business Intelligence is important for making decisions, especially in organizations focused on integrating Knowledge Management processes. Similarly, Ratnagiri (2020) cites the importance of Business Intelligence in digital marketing, where it was exposed that Business Intelligence enhances decision-making in a substantial way due to the possibility of predicting marketing trends based on immense data collection. Our study verifies this relationship with the finding of a pivotal role that Business Intelligence plays in the linkage of Knowledge Management to the success of digital marketing, which is very essential in a rapidly evolving sector such as pharmaceuticals.

The second hypothesis showed a strong direct relationship between Business Intelligence and Digital Marketing Performance, which was quite similar to the results by Ivanov (2022) and other authors studying the interrelationships of Business Intelligence with digital marketing. Ivanov (2022) stated the role of Business Intelligence in managing the surge of data during the COVID-19 pandemic, which aligns quite well with our findings of Business Intelligence as a backbone for data management and consequently better-informed decision-making for marketers. This strong link between Business Intelligence and Digital Marketing Performance further ascertains the critical role that data analytics plays in driving effectiveness and performance in marketing within the digital age.

Surprisingly, the third hypothesis exploring the direct influence of Knowledge Management on Digital Marketing Performance did not show a significant relationship. Contrary to the findings by Al-Dmour et al. (2020) and Dewi & Sudhiksa (2022), the current research does not reveal any positive linkage between Knowledge Management and digital marketing performance. Such a discrepancy would also be one hint that although Knowledge Management may be important in organizational learning and innovation, it might not readily or cause great marketing performance effects without Business Intelligence integration. This finding leads to further investigation into how Knowledge Management processes can be better connected to digital marketing outcomes, possibly via the optimization of data-driven insights.

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Lastly, the final hypothesis that concerned the total effect of Knowledge Management, Business Intelligence, and Digital Marketing Performance indicated a positive and significant relationship. The current outcome proves that when Knowledge Management is coupled with Business Intelligence, the impact on Digital Marketing Performance is increased considerably. This supports the findings by Gunawan & Sulaeman (2020), which stated that effective knowledge management and integration of technology can better enable an organization to innovate and be competitive. Our study gives further weight to this by illustrating how Business Intelligence not only helps in the integration of knowledge but also its strengthening for the betterment of decisions within marketing. In academic terms, the findings contribute to a better understanding of how Knowledge Management and Business Intelligence interact together in enhancing Digital Marketing Performance—an area that remains underexplored in the literature. As Abbas (2019) and Li et al. (2020) have highlighted, Knowledge Management is fundamental to organizational capabilities and innovation, but its full potential is realized only when supported by Business Intelligence. The theoretical knowledge of these relationships allows for practical applications, such as developing frameworks that will enhance organizational decision-making and marketing strategies in the digital era.

In a practical sense, organizations, especially those in the pharmaceutical industry, have to realize the need for integration of Knowledge Management and Business Intelligence in order to achieve excellence in digital marketing. As observed by Borges et al. (2021) and Bouaoula et al. (2019), Business Intelligence tools are essential in extracting insights from the massive data generated, which helps to make informed marketing decisions. Any culture of knowledge sharing has to be promoted, and the needed tools and training should be availed to employees to work effectively with Business Intelligence.

There are some limitations to the study that must be acknowledged. Firstly, knowledge management was viewed as a single construct; however, to better explore it is recommended that the subdimensions of knowledge management—knowledge creation, knowledge acquisition, knowledge sharing, and knowledge application—be investigated. Second, this study adopted a convenience sampling strategy; it is recommended that subsequent research adopt a random sample strategy to provide a more statistically balanced population selection. Moreover, with random sampling, there will be greater generalizability (Alarabiat & Eyupoglu, 2022; Taherdoost H, 2018). Third, only one type of organization—the pharmaceutical corporate sector—was represented among the respondents.

## CONCLUSION

This study investigates the mediating role of business intelligence in the relationship between digital marketing performance and knowledge management within the pharmaceutical sector. These results underline the importance of integration for both implicit and explicit knowledge in a manner that builds a strong cognitive foundation for informed decision-making. In doing so, it enhances digital marketing effectiveness and provides a sustainable competitive advantage to pharmaceutical companies. This research will focus on knowledge management and the integration of digital marketing performance through BI technologies with a careful strategic approach. These are efforts pharmaceutical organizations should exert to ensure continued competitive advantage amidst a marketplace quickly going more and more digital.

From a practical perspective, the results offer insights that can be taken on board in the optimization of marketing strategies by companies through enhanced knowledge management and BI systems. The findings can also guide policy changes and the adoption of technology within the pharmaceutical industry. Future research may focus on elaborating how specific BI tools function effectively in certain contexts of marketing and knowledge management and investigate the long-term impact of such integrations across various industries.

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