

# Identifying Factors of Ai Affecting the Vietnam Retail Industry

Th.S Huỳnh Bá Thúy Diệu- Trường Đại học Công nghệ thông tin và Truyền thông Việt- Hàn

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**Abstract:** Artificial intelligence (AI) is having a strong impact on all aspects of life, affecting all industries and fields, including the retail industry. This paper aims to focus on analyzing, establishing and measuring factors of AI affecting retail industry in Vietnam. The article builds a research model of AI factors affecting the retail industry, conducts a survey of related subjects, and using SPSS 26.0 software to produce results. Research results show that there are five factors of AI affecting Vietnam retail industry. They are: (1) Technology for AI, (2) legal and regular for AI, (3) Trust and ethics in AI, (4) AI- Readiness among consumers and (5) Data infrastructure for AI. From there, the article gives some implications for state management agencies, retailers to help their business more effectively.

**Key words:** affect, AI, factors, retail industry, Vietnam.

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## I. Introduction

### 1.1. Rationable

AI will play a central role in the retail commerce of the future. However, right now, there are many AI-based technology solutions used to bring personalized experiences to customers, help retailers reduce costs and attract more and more customers. than. The company can predict shopper behavior and optimize the entire supply chain from inventory management and forecasting to workplace planning. All of these segments play an important role in helping retailers increase their market share.

To compete today, retailers are forced to use systems, mechanisms, and tools that enable them to gain a competitive advantage. With a wide variety of applications, AI is considered groundbreaking and revolutionary because it allows to simulate human intelligence, replacing humans in complex tasks. Researched aspects such as natural language processing, image recognition, object control... Retail is one of the industries with many successful applications of AI technology and will continue to grow. Other new technologies that are also having a significant impact on retail include: Process Automation (RPA), Connected Things (Internet of Things - IoT), virtual/augmented reality (VR/ AR), Robots and autonomous vehicles.

Digital transformation in retail is about more than connecting things. It's about converting data into insights, which inform actions that drive better business outcomes. AI in retail—including machine learning and deep learning—are key to generating these insights. For retailers, that leads to incredible customer experiences, opportunities to grow revenue, fast innovation, and smart operations—all of which help differentiate you from your competitors.

To secure a competitive advantage by adopting new technologies, retailers must consider three key factors: Improving the consumer experience; Cost reduction; Increase business revenue and profit. This study aims to identify the benefits, AI in retail and identify the factors of AI affecting retail industry activities in Vietnam.

### 1.2. Aims of the study:

The article studies which factor of AI affect the business of the retail industry in Vietnam. On the basis of recognizing the impact of each factor on the retail industry, the article will recommend solutions to help retailers optimize their business activities.

### 1.3. Overview about AI:

#### 1.3.1 Concept of AI, retail

- **Concept of AI:** According to B.J. Copeland - Professor of Philosophy and Director of the Turing Archive for the History of Computing, University of Canterbury, Christchurch, New Zealand. Author of *Artificial Intelligence* and others. **Artificial intelligence (AI)** is the ability of a digital computer or computer-controlled robot to perform tasks commonly associated with intelligent beings. The term is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experience. Since the development of the digital computer in the 1940s, it has been demonstrated that computers can be programmed to carry out very

complex tasks—as, for example, discovering proofs for mathematical theorems or playing chess—with great proficiency. Still, despite continuing advances in computer processing speed and memory capacity, there are as yet no programs that can match human flexibility over wider domains or in tasks requiring much everyday knowledge. On the other hand, some programs have attained the performance levels of human experts and professionals in performing certain specific tasks, so that artificial intelligence in this limited sense is found in applications as diverse as medical diagnosis, computer search engines, and voice or handwriting recognition.

**- Concept of Retail:**

Retail is a vast sector, ranging from department stores to coffee machines, from the town square to the digital storefront, from the most promising transformations to possible apocalypse. In this post, we'll explore the retail sector and its unique characteristics.

The retail sector is often said to be one of the most important for a country's economy because it is a sort of litmus test of an economy's level of well-being. In a healthy economy, there is high production and, consequently, wealth is reflected on consumption, most of which is concentrated in retail. For this reason, in times of crisis, one of the first sectors to contract is retail, which immediately suffers: consumption is reduced and, consequently, operators who base their business on the sale of food or consumer goods see their revenues fall, with resulting repercussions on employment.

*1.3.2. Role of AI in retail industry*

Defined as a system capable of collecting and analyzing learning data and then applying new knowledge to achieve certain results or perform a task through adaptive behavior, AI includes many human fields, which can be mentioned: Machine Learning (ML); Deep Learning (DL), based on artificial neural network techniques that can perform complex learning tasks using advanced processing capabilities for association, classification, grouping and regression, by analyzing large volumes of data. Deep Neural Networks (DNN) combine many ML tasks and leverage other advanced technologies, such as cloud computing, IoT, or big data (Big Data), allowing ML algorithms to manage Process various data (video, audio, text) to improve the accuracy of product demand forecasting by analyzing customer behavior. Furthermore, by leveraging other digital platform technologies and features, retail companies increase their ability to promote and expand their business globally.

**- Improving customer experience through AI technologies**

The growth of e-commerce and the exponential growth of customer data have contributed to predicting behavior and improving consumer experience (CE). According to Maghraoui and Belghith (2019), the data shared on the Internet over the past decade exceeds that in all of human history. Therefore, if an organization properly analyzes and exploits this data, it will gain a distinct advantage.

Language recognition technologies like Chatbots improve CE by providing 24/7 service, while reducing the volume of transactions that go directly to employees. The chatbot also offers personalized styling services, using photo options and asking buyer style questions, creating style profiles for customers. Voice recognition technology involves the use of virtual assistants, which can perform a variety of tasks (receiving phone orders, searching for information, sending recommendations to customers...). By converting voice to text, the customer's voice commands are transmitted to the order taking system, either automatically or via email. Virtual assistant-based visual recognition technology can identify shapes or people, track the status of product shipments, open accounts remotely, and detect Internet users' preferences for certain brands. certain mark. For example, using facial recognition technology, a retailer can identify a frequent shopper or a loyal customer as soon as they enter the store. Digital signage is not new to retail, but when combined with facial recognition and big data analytics, it can directly target a specific customer based on their buying previous behavior. Technologies using Autonomous Robots enable the performance of activities or tasks by adapting behavior to the environment. One of the ways retailers use in-store robots is to help customers find the products they need. Customers' curiosity to see them in action makes Retail Robots an important lever in brand adoption and CE improvement. Predictive analytics technology enables large companies to predict future customer behaviors using past or present behavioral patterns, thereby illustrating their strategic decisions. Predictive analytics can identify unhappy customers and to detect risky situations, helping to reduce the rate of companies going out of business.

**- Cost savings**

In addition to improving customer experience and increasing revenue, cost reduction needs to be carefully considered when assessing the impact of new technologies on retail companies. There are several possibilities for AI-based cost savings: Effectively reaching target consumers, reducing workforce, and optimizing inventory.

+ *Reach target consumers at a lower cost.* Timing matters in retail: Delivering the right message to the right customer at the right time can determine a significant increase in sales. Applying Big Data technology, such as predictive analytics, retailers can “estimate” consumer behavior and tailor their offerings accordingly. Tens of terabytes of new data integrated with historical data on millions of customers and billions of journeys of sold products. AI-powered tools can handle this growing volume of data with less technical, time, and cost requirements and computer systems that are less prone to errors or interruptions, thus saving money. significant cost.

+*Reduce labor.* Sensor, mobility, and AI technologies offer new capabilities that can replace humans. Smart shelf technology, sensor meshes, photodetectors, microphones, and sensors collect data on product health and send notifications to store staff when the number of products is less Predefined; In addition, real-time inventory-based AI allows stores to update prices automatically for all products that expire on the current day. Therefore, because smart shelves are self-managing, store employees do not need to periodically check the inventory of products on the shelves, aggregating the collected data and sending it to the person in charge.

+*Inventory optimization.* Deciding how much product to order and when to restock are very sensitive decisions, as they have a direct impact on inventory costs and on profit maximization. This is why inventory optimization is emerging as a key case for retail companies' AI implementations. Use ML algorithms to best forecast weekly sales trends, with as little error as possible. In practical terms, predictive analytics helps retailers determine fresh produce, optimize supply quantities and appropriate locations, reduce inventory of perishable food items, and minimize waste. and intelligently synchronize downstream and upstream supply levels.

#### - **Increasing Revenue.**

Technology trends have made AI applications in the retail sector popular, helping to increase sales, profits, and business performance. AI technology helps retailers strengthen their sales strategies by leveraging existing store features. The goals of pricing optimization and sales maximization lead to AI-enhanced use of big data technology, which detects correlations between independent variables such as promotional prices, location, and range expansions. type and dependent variables such as store sales and profits, brand switching, etc.

Analysis of the impact of AI on online returns finds that virtual experiences to enhance personalization can reduce or even eliminate uncertainty about product suitability and improve after-sales service, by seeing the interests of consumers as an opportunity to facilitate their continuous search for exchanges. Retail companies in Europe have started using AI-based fraud prevention to address vulnerabilities. Apply AI and IoT technologies to identify consumers and identify goods, create customer flows and increase transaction volume.

Acknowledging the recent development of e-commerce, accelerated for at least five years due to the pandemic, experts have warned that retailers do not take advantage of AI technologies such as VR/AR, IoT, mobile will not improve business performance.

## **II. Literature Review**

- **Technology:** In the Living in an AI world 2020 report- Retail insiders, KPMG survey recognized that technology plays a key role in adopting AI in retail industry. The adoption of technology is tricky for the businesses and the AI technologies involved ma also involve losses of jobs and ensuring rust issues with the patrons. It is seen that about 60% of the consumer brands and retailers lack of specialized skills, which has been the main challenge regarding rolling-out of AI within the companies (Lenon, 2020). It also helps using external technological partnerships for enhancing the AI capabilities. It also helps developing capabilities in-house and that helps reflecting the way of plugging skill gaps.

- **Legal:** According to the Retails Economic, in the report of the impact of AI on the UK Retail Industry (2021), Legal and regulatory barriers are factors also affect to retail.It is seen that another barrier to AI investment is issue related to legal as well as regulatory issues pertinent to its acceptance. This complex patchwork with governing rules and regulations pertinent to the usage of AI in the company is the minefield required for navigation. It also comprises of laws and also usage and storage of personal data with using the AI technologies and that helps in improving the realm to the law of competition.

- **Trust and ethics:** It is another barrier to integration and use of AI in the UK-based retailing sector. In case of handling issue regarding security of data, it helps underestimating the importance as well as hiring of skilled people for managing the data ethics within the organization (Bughin et al. 2019). The AI technologies help making decisions in the companies and it provides higher rate of scrutiny from the patrons and regulators based on which, the decisions are to be made. Due to rising attacks and vulnerabilities to the internet and retail companies, the trust and ethics of securing patrons are often shaken by these intruders and hackers.

- **AI-readiness of consumers:** The businesses need to reflect on usage of the AI. It is because; it significantly divergence between the patrons those claim to make the organizations for perceiving the same. The consumers are not the same and the businesses are quite investing to use of technology. In terms of use of modern technology, both the customers and organizations are not always on the same page (Nayak, 2019). It,

therefore, causes gap in the readiness among the customers regarding accepting AI. Survey is important for understanding the readiness of the customers regarding use of modern technology on the basis of age. Elimination of physical gift cards with improved customer satisfaction and shopping experiences.

- Data infrastructures: As AI moves beyond experimentation toward adoption, it will demand significant computing resources and infrastructure costs. Overheads will snowball as the technology becomes more complex and resource-demanding, and in a world increasingly impacted by AI, finding cost-effective environments to run the intensive processes will be both a requirement and a competitive advantage (Eltjo Hofstee, 2022). Businesses will have to adapt and be flexible, especially with regard to infrastructure. Cloud technologies, particularly hybrid cloud solutions, are and will be the foundation of AI as its needs for substantial amounts of data ratchet up. Hybrid cloud solutions will ensure that the needs of businesses and workloads match technology to the demands increasingly required to sustain AI, but not only that, it will also make sure this is at the right cost level.

### III. Results

#### 3.1. Methodology

##### 3.1.1 Model building and developing hypothesis research

Based on previous studies, the article proposes hypotheses affecting Viet Nam retail industry: Technology, Legal, Trust and ethics, AI-readiness and Data infrastructure.

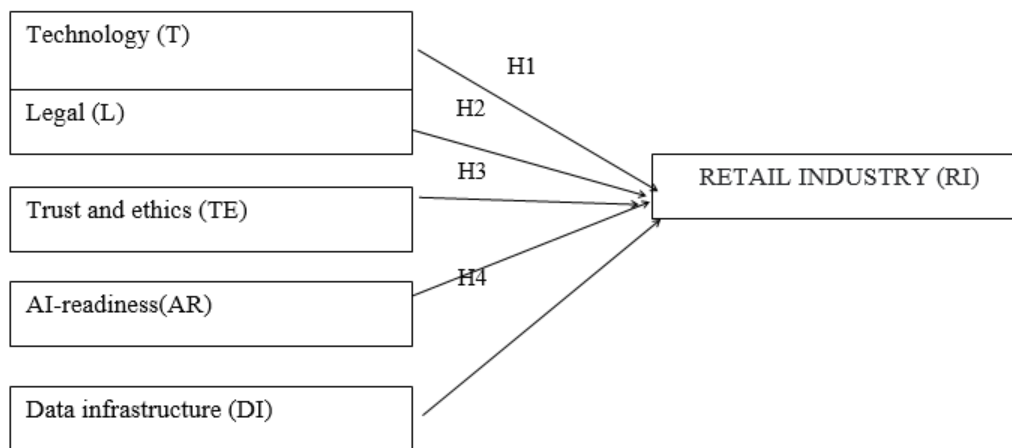
**H1:** A modern technology will benefit retailing.

**H2:** The effective legal will ensure for retail industry

**H3:** The consumers' trust is not clearly, their culture of fear will drawback to Vietnam retail industry.

**H4:** AI-readiness among consumer will increase the efficiency of AI in retail industry in Vietnam.

**H5:** A good data infrastructure will benefit Vietnam retail industry.



**Figure 1: Model**

##### 3.1.2 Variables and measures

Through qualitative research results, the author has built some of scale. Likert's scale with 5 levels (1 to 5) is suitable for measuring research.

- Build the scale and describe the independent variable

Technology: the scale of this variable inherits from the study of Kunami (2007). The author has adjusted and added some of scales, the results have 5 observed variables.

Legal: the scale of this variable inherits from the study of Shields (1995) at Cavalluzzo & Ittner (2003). The author has adjusted and added some of scales, the results have 5 observed variables.

Trust and ethics: the scale of this variable inherits from the study of Artley, (2001). The author has adjusted and added some of scales, the results have 4 observed variables.

AI-readiness: the scale of this variable inherits from the study of Cavalluzzo và Ittner (2003). The author has adjusted and added some of scales, the results have 4 observed variables.

Data infrastructure: the scale of this variable inherits from the study of Schein (1984). The author has adjusted and added some of scales, the results have 5 observed variables.

Build the scale and describe the dependent variable: Retail industry (RI). The dependent variable in the research model is self-built by the author, based on collecting expert opinions from the case study method and background theory.

3.1.3 Data collection method

- Respondents: Professionals, business working at the retail chain.
- Survey method: The survey form for this research is surveyed in two ways: The questionnaires are sent directly to the respondents and collected after the survey is completed; Email individuals that match the sample selection criteria

3.1.4 Primary data collection

In a total of 525 responses, there are:230 males (43,8%) and 295 females (56,2%)

3.2 Results

3.2.1 The results of reliability and variables

By using SPSS 26.0 software to analyze data and obtained the results of the synthesis of Cronbach Alpha coefficient as well as the correlation coefficient of the total variable, the reliability test of the independent variables all showed that the coefficients are large. more than 0.6 and all observed variables for the variables in the model, including the independent and dependent variables, have a reliable variable correlation coefficient. In addition, when analyzing the combined reliability and extracted variance, the combined reliability coefficients are all greater than 0.7 and the variance extracted for the factors is all greater than 0.5. Thus, it is possible to confirm the necessary reliability of the scales.

Table 1. Summary of Cronbach's alpha coefficient results

Independent Variables	Cronbach's coefficient Alpha
Technology (T)	0,922
Legal (L)	0,789
Trust and ethics (TE)	0,909
AI-readiness (AR)	0,801
Data infrastructure (DI)	0,852
Dependence variable RI	0,876

(Source: authors' compilation)

3.2.2 Exploratory factor analysis results

Table 2. KMO and Bartlett's Test

KMO and Bartlett's Test		
Kaiser- Meyer-Olkin Measure of Sampling Adequacy		0,935
Bartlett's Test of Sphericity	Approx. Chi-Square	2863.393
	Df	213
	Sig.	.000

(Source: authors' compilation)

The results in Table 2 show that the KMO index of 0.935 is very close to 1.0, showing that the factor analysis is appropriate and the significance level is sig. if .000 is less than 0.05, it is statistically significant.

3.2.3 Linear regression analysis results

Correlation coefficient test (r)

Table 3. correlation matrix

		T	L	TE	AR	DI	RI
T	Pearson Correlation	1	.459**	.357**	.328**	.417**	.587**
	Sig. (2- tailed)		.000	.000	.000	.000	.000
	N		525	525	525	525	525
L	Pearson Correlation		1	.154*	.129	.276**	.457**
	Sig. (2- tailed)			.013	.074	.000	.000
	N			525	525	525	525
TE	Pearson Correlation			1	.276**	.182**	.421**
	Sig. (2- tailed)				.000	.008	.000
	N				525	525	525
AR	Pearson Correlation				1	.432**	.465**
	Sig. (2- tailed)					.000	.000
	N					525	525
DI	Pearson Correlation					1	.435**
	Sig. (2- tailed)						.000
	N						525
RI	Pearson Correlation						1
	Sig. (2- tailed)						
	N						525

(Source: authors' compilation)

The correlation t matrix shows that the correlation coefficient between the "obstructing factor" and the variables is as follows: with the variable "Technology" (Pearson = 0.587), the variable "Legal" (Pearson = 0.457), variable "Trust and ethics" (Pearson = 0.421), variable "AI-readiness" (Pearson = 0.465), variable "Data infrastructure" (Pearson = 0.435). Therefore, it can be concluded that the independent variables can be included in the model to explain the factors affecting university governance in the condition of educational autonomy including 5 independent variables

**Regression analysis**

The results of the linear regression test are shown in Table 4

**Table 4. Linear regression test results**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin- Watson
1	.705 <sup>a</sup>	.685	.657	.63049	1.025

a. Predictor: (Constant), T, L, TE, AR, DI

b. Dependent Variable: RI

Model	Unstandardize Coefficients		Standardize Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	-.895	.302		-2.967	.000		
T	.360	.084	.256	4.372	.000	.644	1.765
L	.284	.061	.242	4.651	.000	.754	1.501
TE	.235	.066	.201	3.345	.000	.821	1.099
AR	.214	.067	.188	3.123	.001	.725	1.007
DI	.198	.063	.209	3.024	.000	.737	1.482

(Source: authors' compilation)

The result shows that the adjusted R2 coefficient is 0.685. This means that the research model explains 68.5% of the variation of the dependent variable by the independent variables in the model. The VIF (Variance Inflation Factor) coefficients of the independent factors in the model are all low and less than 2.2 (from 1.007 to 1.765). This shows that there is no multicollinearity between the independent variables in the model (Nguyen Dinh Tho, 2011). Besides, the Sig coefficient. of the independent factor coefficients in the model are all less than 0.05. Therefore, all 5 factors affect the dependent variable.

The normalized regression model shows a simple linear relationship between the variables:

$$RI = 0,256 * T + 0,242 * L + 0,201 * TE + 0,188 * AR + 0,209 * DI$$

The variable "Technology" with Beta coefficient is 0.256 with high statistical significance >99.99% when the Sig index. reach 0.000; Similar variable "Legal" with Beta coefficient is 0.242 with statistical significance Sig. has a value of 0.000. Next are the variables "Trust and ethics" with Beta coefficient of 0.201 and Sig statistical significance. is 0.000, the variable "AI-readiness" with 2 values Beta and Sig. are 0.188 and 0.001 respectively. Finally, the variable "Data infrastructure" with a Beta value of 0.209 has a Sig statistical significance. is 0.000.

The results of this study show that the factor that has the strongest influence on retail industry is the technology, next is the legal factor, the trust and ethics also greatly affects the retail industry, the data infrastructure also strongly affects the retail industry and finally the AI-readiness in changing retail industry.

**IV. Conclusions and implementations**

The article has shown the impact model of 5 factors of AI on the operation of the retail industry in Vietnam with different degrees. Thereby, to be able to best help apply AI in the near future in the retail sector in Vietnam, the article proposes some solutions as follows:

4.1. **Technology:** retailers must apply AI in the following activities:

- *Operation and business activities:*

+ Planning Supply chain: AI is completely transforming the supply chain by providing retailers with insights into how their supply chains work and helping to find the most efficient and economical way to operate.

+ Demand forecast: The ability to predict demand quickly and accurately is essential in retail operations. That's why many of the world's biggest retailers are using AI to analyze huge data sets so they can predict trends or anomalies affecting demand

+ Inventory management: In many areas of retail, artificial intelligence and the use of robots make it possible for businesses to perform simple tasks such as checking order status, determining inventory levels, and assisting with inventory decisions. In addition, the data recorded by the system can be used to improve product placement and identify trends, making necessary forecasts.

- *Enhance customer experience through:*

+ (1) Personalize purchase consulting service: Through the use of intelligent technologies, data about customer wants and needs are collected and pre-set, AI intelligence can suggest and suggest automatically the most

suitable products for each customer. This enhances the shopping experience as well as reduces the work of manual consultants, thereby helping to entice and build relationships with customers.

**+(2) Personalized Marketing**

AI intelligence can be used to implement powerful marketing automation. Personalized ads will automatically be sent to customers through many different channels such as (social networking site, E-Commerce, website, ...). However, in order to do this, you must first analyze the information available on the Internet.

- Building a chain of automated stores through Automated Robots at retail stores, building an automatic payment model.

**4.2. Legal:**

The state needs to establish legal status for AI. Giving AI legal status means granting certain rights that are commensurate with the attributes that AI has and support its contributions to society. However, AI should be considered as a new subject in the legal relationship, not classified as an existing subject. Because, AI has different characteristics with the subjects of current legal relations: by default, AI does not have the characteristics of an organization, AI is an artificial entity, not a natural entity like People.

According to the provisions of the civil code of our country, the subject of legal relations is an individual or a legal entity. Since AI is an artificial entity, not a natural entity like a human; therefore, AI cannot be included in the group of individuals; Obviously AI is not an organization, does not have the characteristics to be recognized as a legal entity. On the other hand, AI should not be seen as just a tool. Because, in the future, the prospect of AI independently participating in social relations by itself is entirely possible. Considering AI as an asset, tool or product is not suitable for the development level of AI. From these arguments, it can be seen that the most optimal solution to the problem is to give AI legal status, considering it as an independent subject from actual entities, thereby building a legal framework. separate legal matters related to AI.

**4.3. Trust and ethics:**

To develop trustworthy AI systems, the State should propose ethics guidelines for AI. These guidelines encourage fairness and promote AI applications that are unbiased, non-discriminatory, and beneficial to society. In addition, the state should Build a safe Vietnamese cyberspace. According to analysis by a representative of the National Cyber Security Monitoring Center (NCSC), the Information Security Administration: There are 4 main "keywords" for users' digital trust when using an online service. agencies, organizations, that is: information security, privacy/data control; values and benefits; the willingness to take responsibility, how to respond and account in case of an attack. Therefore, in order to strengthen and build digital trust for Vietnamese Internet users, it is necessary to have the association and companionship between three parties including: State - State agencies in different fields; Retailers and service providers in the digital environment.

**4.4. AI-readiness among consumers:**

The State should introduce specific policies to promote the application of AI. Furthermore, the state bans some regulars to support the government's National Strategy on the Research, Development, and Application of AI by 2030. Retailers need to make strong investments in AI.

**4.5. Data infrastructure**

In order to improve the data and computing infrastructure in Vietnam, first of all, it is necessary to develop a platform that allows the collection and sharing of those discrete data sources, and the State needs to put in place rules to ensure balance. balance between privacy and data sharing. Besides, the State and retailers should control the quality of data.

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