

The Effect of Entrepreneurship Education and Digital Literacy on the Interest in Entrepreneurship on Senior High School Students in Mojokerto with Opportunity Recognition as a Mediating Variable

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Abstract

This study aims to analyze the effect of entrepreneurship education and digital literacy on entrepreneurial interest, with opportunity recognition as a mediating variable. This study uses a quantitative approach with a survey method through hypothesis testing. The research sample involved 358 senior high school students in grade XII in the Mojokerto area. Data analysis was performed using the Structural Equation Modeling-Partial Least Square (SEM-PLS) method. The results of this study indicate that entrepreneurship education and digital literacy have a significant and positive effect on opportunity recognition. In addition, opportunity recognition has a significant and positive effect on entrepreneurial interest. However, entrepreneurship education and digital literacy do not have a significant or negative effect on entrepreneurial interest. Entrepreneurship opportunity recognition mediates the effect of entrepreneurship education and digital literacy on entrepreneurial interest. Students do not have an interest in entrepreneurship if the recognition of entrepreneurial opportunities is not included in entrepreneurship education and digital literacy in senior high schools in the Mojokerto region. The implications of this study can help public high school educational institutions in Mojokerto to improve entrepreneurial projects and family support for students to realize entrepreneurial behavior in line with the needs of today's business world.

Key words: Entrepreneurship Education, Digital Literacy, Introduction to Opportunities, Interest in Entrepreneurship

INTRODUCTION

Entrepreneurship has long been recognized as one of the main drivers of economic growth in various countries, with a significant contribution to sustainable development (Hassan et al., 2021). Entrepreneurship also plays an important role in creating sustainable economic growth through the development of innovative ideas and market expansion (Kreiterling, 2023; Sugiarti & Elmiwati, 2024). Its positive impact is reflected in increased employment, accelerated innovation, and optimized efficiency in various economic sectors (Jardim, 2021). Therefore, the government views entrepreneurship as an important strategy to drive economic growth while improving social welfare (Aparicio et al., 2021). Furthermore, entrepreneurial activities have been proven to reduce unemployment, poverty, and living standard inequality, as found in recent studies (Xu et al., 2023). For example, China, which has aggressively promoted entrepreneurship since 2017, has achieved economic growth of 39.1% and lifted 832 counties out of poverty (Abad-Segura et al., 2020).

Indonesia, with the fourth largest population in the world, is on the verge of losing its dream of becoming the world's largest economy. According to research from the International Monetary Fund (IMF), only 3.47% of Indonesia's population are entrepreneurs and 5.45% of Indonesia's population are unemployed (Junaidi et al., 2023). Data from the International Labor Organization (ILO) shows that the youth unemployment rate in Indonesia is the second highest in Southeast Asia after Laos (Saleh, 2024). The Central Statistics Agency (BPS) also reported that in August 2024, the open unemployment rate for young people aged 15–24 reached 17.32%, while the proportion of young people in the Not in Employment, Education, or Training (NEET) category was 20.31%, which is much higher than the ASEAN average (BPS, 2024; Saleh, 2024). The high youth unemployment rate can have a negative impact on national economic growth and reduce Indonesia's competitiveness in the face of global competition (Al Jazeera, 2025).

Based on the results of observations conducted by researchers, the urgency of the problem of lack of interest in entrepreneurship among public high school students in the Mojokerto region is due to students' weak self-confidence and entrepreneurial capital. Of the 24 students interviewed regarding interest in entrepreneurship at the high school level, 92% of students answered that self-confidence and capital were the main obstacles to student interest in entrepreneurship. Weak self-confidence and capital for entrepreneurship are always correlated with the curriculum and the students' family backgrounds. The high school curriculum does not emphasize students to become entrepreneurs after graduation, but rather to continue their studies and work for companies. The fact that most students

come from lower-middle-class backgrounds makes their confidence in entrepreneurship very weak.

To overcome the above problems, students need to learn about opportunity recognition, entrepreneurship education, and digital literacy. Opportunity recognition is the cognitive ability to identify, evaluate, and exploit market gaps by combining analytical and creative processes, including through the use of technology patterns (Wood et al., 2021). Meanwhile, entrepreneurship education is a key element for students to encourage creativity and innovation in finding business opportunities (Boldureanu et al., 2020). The basic objective of implementing entrepreneurship education is to prepare students to become entrepreneurs who are able to manage their own businesses after graduating from school (Banha et al., 2022). Digital literacy is the ability of students to utilize digital technology to access, manage, and evaluate information for business purposes (Suryani & Chaniago, 2023). With increased digital literacy, students have the interest and opportunity to create a creative economy and new start-ups through digital technology (Mugiono et al., 2021).

This study identifies several theoretical and empirical gaps in entrepreneurship studies in senior high school education. First, in terms of competence, there are fundamental differences between high school and vocational school students that have not been widely explored in previous literature. The majority of entrepreneurship studies (Maula et al., 2021) focus on vocational high school students, whose curriculum is designed to prepare skilled workers, while high school students, especially those in science-based schools, are more oriented towards academic education with minimal experience in entrepreneurship. Second, conceptually, previous studies tend to examine the single influence of entrepreneurship education on entrepreneurial interest (Misbah et al., 2020), without integrating the role of digital literacy as a critical variable in the digital economy era. Third, although opportunity recognition is known as a key mediator in entrepreneurship models (Ardianti et al., 2022), no studies have examined this construct in the context of the interaction between entrepreneurship education and digital literacy among high school students. Thus, this study addresses three gaps simultaneously: (1) institutional context (high school vs. vocational school), (2) integration of new variables (digital literacy), and (3) untested mediation mechanisms (opportunity recognition).

Many previous studies have examined entrepreneurship among vocational high school students, such as Saptono's (2020) study entitled "Does entrepreneurial education matter for Indonesian students' entrepreneurial preparation: The mediating role of entrepreneurial mindset and knowledge" on vocational high school students in Jakarta. The novelty of this study lies in testing the effectiveness of entrepreneurship education among

public high school students in Mojokerto. The focus on high school students provides a new contextual contribution to the development of entrepreneurship at the high school level. This study also integrates the variable of digital literacy in shaping students' interest in entrepreneurship, which has not been widely considered in previous studies. Most previous studies, such as Misbah et al. (2020), view entrepreneurship from a traditional perspective, without considering the importance of digital skills as a means of business development in the modern era. Digital literacy is highly relevant in preparing students to face the challenges of a technology-based economy.

The implications of this research can contribute to: First, the research indicators encourage the entrepreneurial interest of public high school students in the Mojokerto region and assist policymakers in developing effective programs to encourage student entrepreneurial interest and economic growth. Second, the results of this study help educational institutions to refine their entrepreneurship and informatics education programs and ensure that education programs are in line with market needs and the increasingly digital goals of today's entrepreneurial world. Third, understanding the relationship between the effectiveness of entrepreneurship education and digital literacy, mediated by the recognition of opportunities, can help educational institutions allocate resources to increase entrepreneurial interest.

LITERATURE ANALYSIS AND METHODOLOGY

Entrepreneurship Education

Entrepreneurship education around the world has grown rapidly over the past two decades (Kong et al., 2020). Entrepreneurship education is considered an important contributor to economic growth and development. Entrepreneurship education is considered an engine of economic and social development for society (Ballesteros-Sola & Magomedova, 2023). Economic growth and innovation occur on the basis of higher levels of entrepreneurship through education. Governments in many developed countries are actively developing entrepreneurship education for students through systemic policies, collaboration between stakeholders, and integration of the curriculum into education to strengthen the ecosystem of innovation and sustainable growth (Li et al., 2023). Through such entrepreneurship education, students have the ability to become entrepreneurs after completing their education at school. With that, Indonesia as a developing country needs to provide proper entrepreneurship education to improve students' entrepreneurial skills.

Digital Literacy

Digital literacy skills have created a culture of innovation and digital entrepreneurship, especially in developed countries such as China and the United States. Recent studies show that China has used digital technology as a strategic tool in poverty alleviation, as seen in the “Taobao Villages” program, where more than 5,400 villages have successfully increased their economic income through e-commerce and extraordinary digital economic growth reaching around 50.2 trillion yuan in 2022 (China Internet Development Report, 2023; Wikipedia, 2023). In the United States, the digital economy contributes 36% to the national GDP (US Bureau of Economic Analysis, 2023), driven by a wave of AI-based start-ups, fintech, and e-commerce. A McKinsey report (2023) reveals that 72% of entrepreneurial success in the US is directly related to the adoption of technology and high digital literacy among entrepreneurs. Imjai et al. (2024) explain four instruments that can be used to measure students' digital literacy, namely digital content creation, digital sharing, online research, and digital information judgment.

Opportunity Recognition

Opportunity recognition is the chance to create, develop, or utilize an idea, product, or service that can generate profit or added value (McMullen et al., 2021). Opportunities are always associated with the chance to do something new in order to achieve new goals that have more value than before.

Opportunity recognition can be found through the ability to see market gaps, identify unmet needs in the market, and create innovative solutions to attract consumer interest (Bosse et al., 2023). With that, opportunity recognition becomes an important factor in economic growth and new companies born from creativity and innovation. According to Kreuzer et al. (2022), opportunity recognition is often initiated by technology-based start-ups because innovation is a major factor in driving economic growth. Jiang & Huang, (2023) mention four dimensions to measure opportunity recognition in students, namely innovativeness, network capability, societal support, and family interference with entrepreneurship.

Interest in Entrepreneurship

Entrepreneurial interest is a motive that can indicate an individual's attention to something interesting or enjoyment of an object (Mohd Noor & Malek, 2021). A person's entrepreneurial interest can grow through direct experience, practical knowledge, and effective training in building skills and self-confidence, which significantly increases entrepreneurial interest (Lawal & Jayeoba, 2023). For example, high school students have

an interest in entrepreneurship because of entrepreneurship education that teaches students theory and practice at school. In other words, entrepreneurial interest is a conscious state of mind that directs an individual's attention to a business object and seeks ways to achieve it (Djazilan & Darmawan, 2022). Students are encouraged to become entrepreneurs both conceptually and empirically through entrepreneurship education. The conceptual strategy applied to students allows them to gain a more comprehensive understanding of the business process as a foundation for success. Meanwhile, empirical strategies can demonstrate problem-solving techniques to help students understand how to work towards a successful business (Mei et al., 2020). Cui & Bell, (2022) mention three indicators to measure entrepreneurial interest in students, namely a career as an entrepreneur, business planning, and the desire to become an independent entrepreneur. The choice of a career as an entrepreneur occurs due to the increasing difficulty of entering the world of work in industry. This encourages students to have plans to build their own businesses in the future. Students must be able to create an independent economy to build the national economy.

METHODOLOGY

This study uses quantitative research analyzed using SEM-PLS to investigate the effect of entrepreneurship education (X1) and digital literacy (X2) on entrepreneurial interest (Y) through opportunity recognition (Z) (see Figure 1). The benefit of SEM-PLS is its ability to maximize the variance of the dependent variable and estimate data based on the dimensions of the measurement model (Hair et al., 2019).

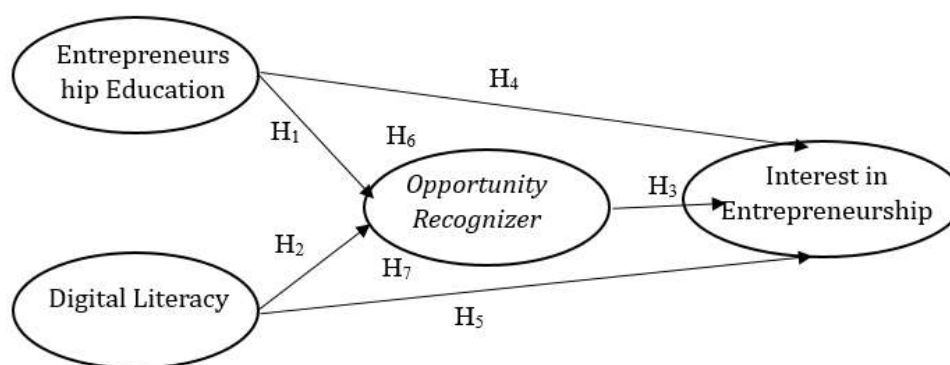


Figure 1. Research Framework Design

Respondents and Data Collection Techniques

High school students in Mojokerto participated in this study. Fourteen public high schools in the Mojokerto area were the subjects of the study. We surveyed a total of 358 respondents with 56 Google Form questions sent via WhatsApp. The criteria for respondents in this study were students who had received a full entrepreneurship education (students who had received both theoretical and practical entrepreneurship training). This study was conducted from June to August 2025. The variables in this study were entrepreneurship education (X1), digital literacy (X2), opportunity recognition (Z), and interest in entrepreneurship (Y).

Table 1. Respondent Characteristics

No	Gender	Total	Percentage
1	Female	221	61,9%
2	Male	135	38,1%
Total		358	100%

Source: processed by researcher, 2025

Table 1 above shows that the majority of respondents in this study were female, with 221 respondents (61.9%), while male respondents numbered 135 (38.1%). From these results, it can be concluded that this study discusses and analyzes the interest in entrepreneurship among women.

Instrument Development and Data Analysis

The research instrument was adapted from previous studies and literature reviews. The questionnaire was translated from English into Indonesian and modified for the Indonesian context. The questionnaire was translated from English into Indonesian and modified for the local context. Entrepreneurship education was measured with three items from (Lv et al., 2021). Digital literacy was measured with four items (Imjai et al., 2024). Opportunity recognition was measured with four items from (Jiang & Huang, 2023). Entrepreneurial behavior was measured using three items from (Cui & Bell, 2022). The questionnaire used asked participants to rate each statement from 1 (strongly disagree) to 5 (strongly agree). This study used Smart PLS 4.0 for least squares structural equation modeling (PLS-SEM).

RESEARCH AND RESULTS

Evaluation of External Models

The PLS external model was determined to ensure the reliability of the instruments. Models with determination criteria are considered reliable when composite reliability (CR) and Cronbach's Alpha > 0.05 (Hair et al., 2019). The results of this study show that the CR values for each construct range from 0.817 to 0.867 for dependence. The average extracted variance (AVE) > 0.50 indicates convergent validity (Hair et al., 2019). Convergent validity in this study was achieved because the average number of indicator items exceeded 0.50 and the AVE of each construct ranged from 0.570 to 0.679. Cross-loadings were used to test discriminant validity and convergent validity. The cross-loading values for all variables of entrepreneurial education (X1), digital literacy (X2), opportunity recognition (Z), and entrepreneurial interest ranged from 0.663 to 0.795 > 0.60 , indicating discriminant validity.

Hypothesis Testing

This model tests hypotheses using structural equation modeling (SEM-PLS). This study uses 358 bootstrap samples to display all t-statistics. As shown in Table 2, five of the seven hypotheses in this study meet the criteria, with t-values ranging from 4.268 to 8.385, which exceed 1.96. One t-value does not meet the criteria, with a t-value ranging from 1.141 to 1.313, which is less than 1.96.

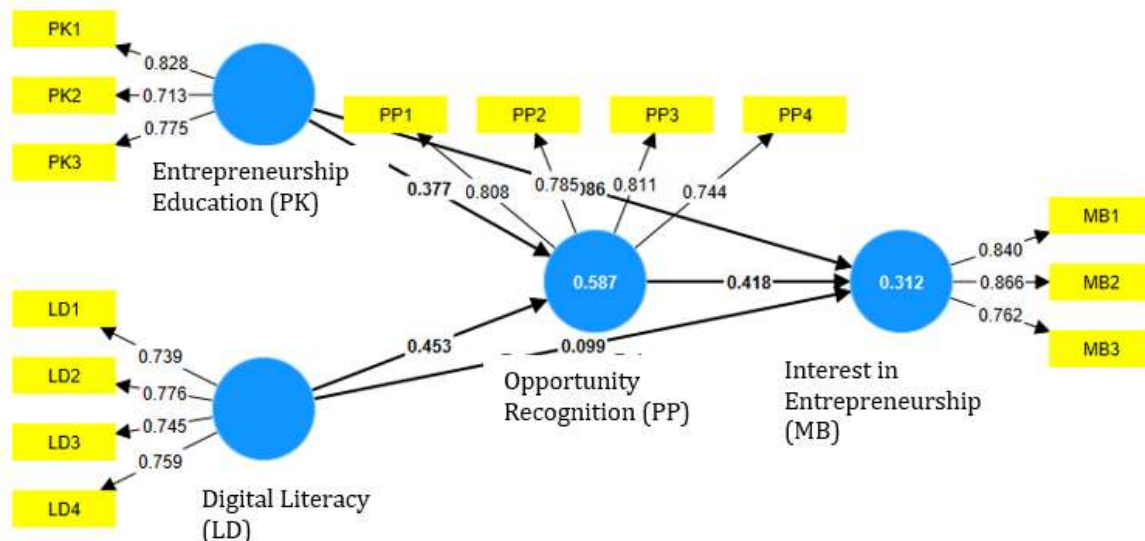


Figure 2. SEM-PLS Calculation Results

This study uses the R-Square (R²) model to show the accuracy of the model's predictions. The coefficient of determination is used to determine the accuracy of predictions and shows the magnitude of the influence of exogenous variables on endogenous variables. If the model satisfies 100% of the data with a value close to 1, then the model can be said to explain almost all of the variation in the endogenous variables (Hawinkel et al., 2023). The following are the results of the coefficient of determination based on data processing using SmartPLS.

Table 2. R-Square Analysis Results

Variables	R-Square
Interest in Entrepreneurship	0.312
Recognition of Opportunities	0.587

Source: processed by researcher, 2025

For each variable, each R -Square for the entrepreneurial interest variable (Y) was 0.312, indicating that 31.2% can be influenced by the entrepreneurial education variable (X1), the digital literacy variable (X2), and the opportunity recognition variable (Z), while the remaining 68.8% is influenced by other variables outside the scope of this study. The R-Square value for the opportunity recognition variable (Z) was 0.587, indicating that 58.7% can be influenced by the entrepreneurial education variable (X1) and digital literacy variable (X2), while the remaining 41.3% is influenced by other variables outside the scope of this study. Therefore, the higher the R-Square value, the greater the ability of the independent variables to explain the dependent variable, resulting in a better structural equation.

Table 3. Outlier Model Estimates

Construct	Item	Outer Load- ing	α	CR	AVE
Entrepreneurship Education (PK)	PK1.1	0.828	0.663	0.817	0.598
	PK1.2	0.713			
	PK1.3	0.775			
Digital Literacy (LD)	LD2.1	0.739	0.750	0.841	0.570
	LD2.2	0.776			
	LD2.3	0.745			
	LD2.4	0.759			
Opportunity Recognition (PP)	PP3.1	0.808	0.795	0.867	0.620
	PP3.2	0.785			

	PP3.3	0.811			
	PP3.4	0.744			
Interest in Entrepreneurship (MB)	PK4.1	0.840	0.762	0.864	0.679
	PK4.2	0.866			
	PK4.3	0.762			

Source: processed by researcher, 2025

Table 4. Direct Effect Test

	Variable	Original Sample	T-Statistics	P-Values	Description
H₁	Entrepreneurship Education > Introduction to Opportunities	0.377	6.806	0.000	Accepted
H₂	Digital Literacy > Introduction to Opportunities	0.453	8.385	0.000	Accepted
H₃	Introduction to Opportunities > Interest in Entrepreneurship	0.418	6.093	0.000	Accepted
H₄	Entrepreneurship Education > Interest in Entrepreneurship	0.086	1.141	0.254	Rejected
H₅	Digital Literacy > Interest in Entrepreneurship	0.097	1.313	0.189	Rejected

Source: processed by researcher, 2025

Table 4. Direct Effect Test

	Variables	Original Sample	T-Statistics	P-Values	Description
H₆	Entrepreneurship Education > Introduction to	0.157	4.268	0.000	Accepted

	Opportunities > Interest in Entrepreneurship				
H7	Digital Literacy > Introduction to Opportunities > Interest in Entrepreneurship	0.189	5.079	0.000	Accepted

Source: processed by researcher, 2025

DISCUSSION

The first hypothesis in this study suggests that entrepreneurship education influences the recognition of opportunities, with an initial sample value of 0.377, a p-value of $0.000 < 0.005$, and a t-statistic of $6.806 > 1.96$. This indicates that entrepreneurship education taught to students enables them to recognize entrepreneurial opportunities. Tian et al. (2022) found that entrepreneurship education serves as a bridge for students to discover entrepreneurial opportunities. Entrepreneurial opportunities help students to improve business development in practical terms. From these results, entrepreneurship education taught to students is able to foster students' awareness and knowledge to discover entrepreneurial opportunities.

The second hypothesis found that digital literacy has a significant and positive effect on entrepreneurial opportunities. The SmartPLS processing results found an initial sample value of 0.453, a p-value of $0.000 < 0.005$, and a t-statistic of $8.385 > 1.96$. Students feel that the digital literacy taught in schools can create new entrepreneurial opportunities. Students can utilize digital technology to discover new opportunities with online businesses. The results of this study are in line with the research by Kreuzer et al. (2022), which found that digital literacy influences students' recognition of opportunities. Students can find entrepreneurial opportunities through technology by eliminating product and industry boundaries, company boundaries, and customer boundaries. This means that entrepreneurial opportunities are no longer measured by place and distance, but all entrepreneurial opportunities can be reached with technology.

The third hypothesis found that the recognition of entrepreneurial opportunities can influence interest in entrepreneurship. Data processing results found an original sample value of 0.418, a t-statistic of $6.093 < 1.96$, and a p-value of $0.000 > 0.005$. These results indicate that students realize that entrepreneurial opportunities make them more courageous and interested in entrepreneurship. Opportunities become a chance for students to

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develop in entrepreneurial practice. Findings from Hassan et al. (2020) found that the introduction of opportunities is the strongest predictor of entrepreneurial interest, so that students have a positive attitude towards entrepreneurship. Recognizing potential business opportunities will strengthen students' interest in entrepreneurship to realize entrepreneurial behavior. Ledi et al. (2022) also found that recognizing entrepreneurial opportunities among students can increase interest in entrepreneurship.

The fourth and fifth hypotheses of this study show that entrepreneurship education and digital literacy have no significant effect on entrepreneurial interest. The t-statistic values for both hypotheses are 1.141 and 1.313 < 1.96. Students feel that entrepreneurship education and digital literacy taught in school cannot influence their entrepreneurial interest. Entrepreneurial interest among students cannot grow solely through entrepreneurial knowledge taught in schools. The results of this study differ from previous studies that showed the influence of entrepreneurial education and digital literacy on entrepreneurial interest. Studies by Ndofirepi, 2020; Shah et al., (2020) suggest that entrepreneurial education has a positive and significant effect on entrepreneurial interest. Similarly, research by (Al-Mamary & Alraja, 2022; Kang et al., 2024) found that digital literacy has a significant and positive effect on students' interest in entrepreneurship.

The sixth and seventh hypotheses of this study found that the introduction of opportunities mediates the influence of entrepreneurship education and digital literacy on interest in entrepreneurship. The measurement results found that the original sample value, p-value, and t-statistic were acceptable and valid. Students agreed that the introduction of opportunities could encourage students to be interested in entrepreneurship. Entrepreneurship education and digital literacy did not sufficiently influence students' interest in entrepreneurship. Students need an introduction to entrepreneurial opportunities in order to develop an interest in entrepreneurship. The results of this study are in line with the research by (Biswakarma et al., 2025), which states that students have an interest in entrepreneurship if entrepreneurship education teaches students to create entrepreneurial opportunities. Mehmood (2024) explains that digital literacy can guide students to find entrepreneurial opportunities. The introduction of opportunities encourages students to grow in their interest in entrepreneurship.

CONCLUSION AND RECOMMENDATIONS

The results of this study indicate that entrepreneurship education and digital literacy have a significant and positive influence on opportunity recognition. In addition, opportunity recognition has a significant and positive influence on entrepreneurial interest. However, entrepreneurship education and digital literacy do not have a significant or negative

influence on entrepreneurial interest. Recognition of entrepreneurial opportunities mediates the influence of entrepreneurship education and digital literacy on entrepreneurial interest. Students do not have an interest in entrepreneurship if recognition of entrepreneurial opportunities is not included in entrepreneurship education and digital literacy in public high schools in the Mojokerto region.

These findings have very significant implications for entrepreneurial interest in public high schools in the Mojokerto region. Entrepreneurial interest will grow in students if entrepreneurship education and digital literacy teach students to recognize entrepreneurial opportunities. Therefore, teachers need to understand current business opportunities to teach students. Students cannot develop entrepreneurial interest if they do not understand current business opportunities. Teachers and students need to understand developments in the business world so that students can see opportunities to develop entrepreneurial interest.

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