

The efforts of industrial institutions in enhancing sustainability through adopting ISO 14001 environmental management system



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Abstract:

The study aims to highlight the advantages of adopting ISO 14001 standard in enabling industrial institutions to achieve environmental sustainability and optimize resource consumption during their production activities through the descriptive-analytical approach. It also illustrates the importance of adopting ISO 14001 standard in improving environmental, economic performance and enhancing the social responsibility of industrial institutions through addressing practical examples of local and foreign industrial institutions adopting this standard as a system to manage their internal environment. The study results have shown that the implementation of ISO 14001 brings about positive effects demonstrating its effective role in enabling and enhancing sustainability for institutions.

Keywords: ISO 14001; environmental sustainability; industrial institutions; social responsibility.

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Introduction:

With the increasing awareness of the importance of environmental conservation and the necessity of achieving sustainability in all aspects of life, industrial institutions are facing growing challenges to develop and implement environmental management strategies that ensure the preservation of natural resources and reduce negative impacts on the environment and the local community. Hence, the importance of implementing ISO 14001 environmental management systems as an effective tool to improve and enhance sustainability management in industrial institutions becomes evident.

The ISO 14001 standard aims to encourage organizations to enforce sustainable environmental management practices by establishing an environmental management system based on risk mitigation and seizing opportunities, setting environmental objectives, implementing plans to achieve them, monitoring environmental performance and assessing compliance with relevant environmental legislation and regulations.

This research aims to elucidate the role played by ISO 14001 environmental management systems in achieving sustainability in industrial institutions by answering the following problem statement:

❖ What role do ISO 14001 environmental management systems play in achieving sustainability in industrial institutions?

To answer this problem statement, the following hypotheses are proposed:

- The implementation of ISO 14001 environmental management systems contributes to improving environmental performance and enhancing sustainability in industrial institutions.
- Implementing ISO 14001 leads to achieving economic sustainability by enhancing efficiency and resource conservation.
- ISO 14001 contributes to enhancing the reputation and standing of the institution in society by adopting sustainable environmental practices.

Significance of the Study:

The significance of the study lies in understanding the role of ISO 14001 environmental management systems in improving sustainability in industrial institutions. This is crucial given the growing environmental challenges and increasing demands for achieving sustainable development. These systems are considered vital tools for contributing to achieving balance between the economic, environmental and social dimensions of business and industry. Thereby, promoting long-term sustainability and preserving natural resources for current and future generations.

Study's Objectives:

This research aims to explore the role of ISO 14001 environmental management systems in enhancing sustainability in industrial institutions by understanding how the implementation of these systems affects the environmental, economic and social performance of institutions. It also aims to provide practical recommendations for enhancing sustainability and maximizing the benefits of these systems in various industry contexts.

To achieve the aforementioned objectives, our study addresses the following three main topics:

1. Requirements for implementing ISO 14001 environmental management systems in industrial institutions.
2. Ways to enhance sustainability in industrial institutions through ISO 14001 environmental management systems.
3. Case studies of industrial institutions implementing ISO 14001 standards.

1. Requirements for implementing ISO 14001 environmental management systems in industrial institutions:

a. Definition of ISO 14001:

"The international standard ISO 14001 is the international agreement that specifies what an environmental management system to enable organizations in improving its environmental performance through effective resource utilization, waste reduction and gaining competitive advantage and stakeholder confidence. It helps organizations in improving, managing, monitoring, and controlling environmental issues comprehensively and effectively and suitable for organizations of all types and sizes, whether private, or public."(*ISO 14001 - Introduction to ISO 14001:2015*, n.d.)

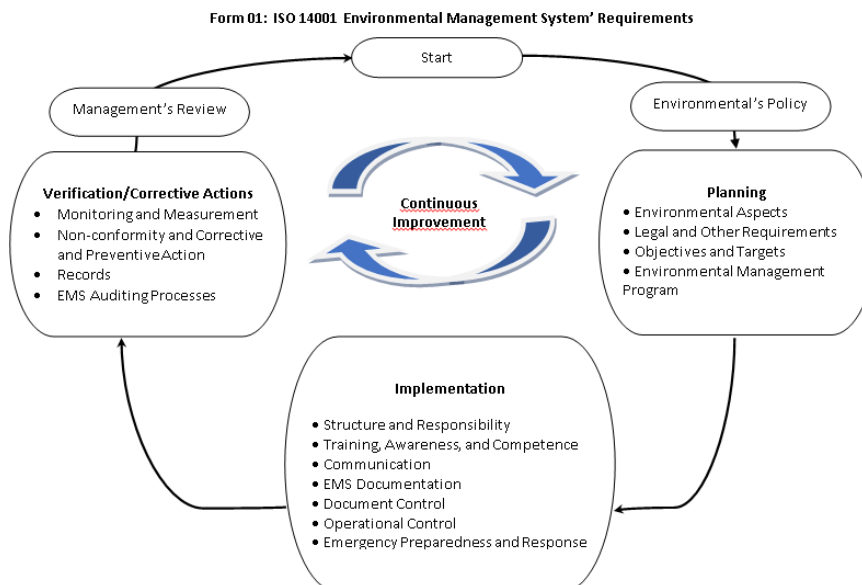
b. Requirements for implementing ISO 14001 environmental management systems:

The implementation of ISO 14001 requires adopting an integrated approach that includes several key elements to ensure the effectiveness of the environmental management system. The key elements include:

- 1) Strong Policy: Implementing ISO 14001 requires a robust environmental policy based on identifying the impacts of industrial activities and defining the objectives and interests desired by stakeholders. This policy is fundamental to the environmental management system.
- 2) Resource Support: The organization must have the necessary resources, including dedicated technical personnel, to implement and maintain the environmental management system.

- 3) Training and Awareness: Team members or employees should be trained through effective training programs to deal with the environmental management system and ensure compliance with ISO 14001 requirements.
- 4) Corrective and Preventive Actions: Regular review and evaluation of the environmental management system's performance in achieving the specified objectives are essential, and any deviations affecting effectiveness must be corrected with necessary preventive measures.
- 5) Management Review: Regular review of the environmental management system by the organization's leadership is necessary to identify any non-compliance with ISO 14001 requirements and these issues must be resolved through corrective and preventive actions (Mirajkar, 2023, p. 16).

The implementation of ISO 14001 can contribute to establishing an effective environmental management system that improves the environmental performance of the institution and ensures compliance with environmental requirements. Thereby, enforcing the institution's environmental reputation and increasing its competitiveness in the market (Management, 2023). These requirements can be summarized in the following figure:



Source: Prepared by the researchers based on (Environmental Management Systems, n.d., p. 11)

- c. **Steps to Obtain ISO 14001 Certification:** Obtaining ISO 14001 certification involves five steps as follows:

- 1) **Application for Certification:** Submitting a request detailing the activities of the institution and the facilities to be audited.
 - 2) **Documentation Review of the Environmental Management System (Desk Audit):** Submitting relevant documents for review by the audit team.
 - 3) **Field Audit:** Conducting a field visit to verify readiness for the final audit and identify potential non-conformities.
 - 4) **Final Audit:** Assessing and verifying the conformity of the environmental management system to ISO 14001 requirements, ensuring its effectiveness, implementation and maintenance.
 - 5) **Periodic Visits:** Semi-annual visits to ensure ongoing compliance with ISO 14001 standards over a three-year period (Latifa, 2020, pp. 88–89).
2. **Ways to Enhance Sustainability in Industrial Institutions through ISO 14001 Environmental Management Systems.**
- a. **Sustainability and Its Enhancement:** One of the most cited definitions of sustainability comes from the United Nations Commission on Environment and Development: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (Nations, n.d.)

Sustainability can be enhanced through various methods and means including but not limited to the following:

- 1) **Engagement with the Local Community:** This involves interacting with the local community to understand local issues and identify opportunities for effective change such as coordinating with local authorities to improve water quality in villages.
- 2) **Transition to Sustainable Practices:** This includes implementing sustainable practices in businesses and institutions such as transitioning to clean energy sources, reducing waste and improving the use of natural resources.
- 3) **Collaboration with Relevant Parties:** This entails collaborating with relevant parties such as local governments, non-governmental organizations and other companies to achieve sustainability goals more effectively (Etzion, 2018).

These are some ways to enhance sustainability in general. To design programs and strategies aimed at enhancing sustainability in institutions, several steps are necessary, which can be summarized as follows:

- 1- **Identifying Barriers and Selecting Behaviors:** Identifying obstacles that hinder the adoption of sustainable behaviors. Then, selecting behaviors that can be focused on through a study of the potential impact of these behaviors and identifying existing barriers to their adoption.

2- Designing Strategies: After identifying the barriers, a program is designed to overcome them and promote the selected sustainable behaviors. The design of these strategies relies on leveraging psychological knowledge to analyze barriers and develop effective strategies to overcome them.

3- Testing and Evaluation: Preliminary trials of the program must be conducted before its widespread implementation and the program should be evaluated after implementation to measure its effectiveness in changing the targeted sustainable behaviors (McKenzie-Mohr, n.d.).

These methods rely on understanding human behavior and its variations applying them in designing effective programs to promote sustainable behaviors.

b. Enhancing Sustainability in Enterprises through ISO 14001 Environmental Management Systems:

ISO 14001 is part of global environmental management standards and is an important tool for enhancing sustainability in enterprises. Its application enables organizations to systematically improve their environmental performance by effectively identifying and managing environmental aspects, preventing pollution, improving environmental performance and ensuring compliance with regulations. ISO 14001 contributes to creating a sustainable work environment and strengthens relationships with various stakeholders including customers and employees. Thereby, building a positive reputation for the organization. It encourages commitment to good environmental performance by urging organizations to set and achieve specific environmental objectives and regularly measure their results. Thus, promoting environmental performance and achieving sustainability goals in the long term (Fonseca et al., 2015).

In general, it can be said that the implementation of ISO 14001 helps organizations improve their environmental performance and achieve sustainability goals. Thereby, contributing to building a better future for current and future generations.

c. Advantages of Enhancing Sustainability in Industrial Enterprises through the Implementation of ISO 14001 Environmental Management Systems:

The United Nations published globally agreed Sustainable Development Goals (SDGs) in September 2015, covering 17 thematic areas. Eight out of the 17 UN Sustainable Development Goals are directly related to the implementation of ISO 14001, such as those related to clean water and sanitation, clean energy, decent work and economic growth, industry, innovation and infrastructure, responsible consumption and production, climate action, life below water, and life on land (Final UN SDG and ISO 14001 071216.Pdf, n.d.).

In their study, (Curkovic & Sroufe, 2011) pointed out several advantages of enhancing sustainability in industrial enterprises through the implementation of ISO 14001 Environmental Management Systems including:

- 1) **Improved Environmental Performance:** Implementing ISO 14001 standards helps improving the environmental performance of the company by providing the necessary structure and procedures to control the environmental impacts of its operations and products.
- 2) **Enhanced Internal Management Practices:** ISO 14001 implementation works to improve internal management practices within the company by establishing environmental policies, creating plans for their implementation, monitoring progress and taking corrective action as necessary.
- 3) **Stakeholder Satisfaction:** The company's application of ISO 14001 standards contributes to enhancing stakeholder satisfaction, including customers, investors, employees and the local community by demonstrating the company's commitment to social and environmental responsibility.
- 4) **Avoidance of Non-Tariff Trade Barriers:** By obtaining ISO 14001 certification, the company can avoid some non-tariff trade barriers that countries or markets may impose due to non-compliance with environmental standards.
- 5) **Improvement of Company Image:** Companies that align their internal environmental management with ISO 14001 standards can benefit from improving their image and increasing their ability to attract customers, investors and business partners.
- 6) **Cost Reduction:** Implementing ISO 14001 standards can help reduce additional costs associated with environmental compliance and reduce administrative costs resulting from the need to address environmental.

3. Case of studies of industrial institutions implementing ISO 14001:

There is a variety of indicators used to measure sustainability performance in industrial institutions. However, we will focus on a set of indicators that highlight the contributions of ISO 14001 to improving the economic, environmental and social performance of institutions. Among these indicators those are mentioned in a study by (Mengistu & Panizzolo, 2022, pp. 23–24), which include:

- Financial benefits, costs, and market competitiveness to measure the economic dimension.
- Resources, emissions and waste to measure the environmental dimension.
- Indicators of employees, customers and society to measure the social dimension.

This reflects the orientation towards achieving sustainable development by focusing on improving economic performance, protecting the environment and enhancing social relations within the organizational framework. Thus, promoting

a. Case of Italian Industrial Institutions:

A study by (Bravi et al., 2020, pp. 7–8) aimed to identify the changes that occurred in companies that implemented the ISO 14001:2015 Environmental Management System. The study was conducted through a questionnaire sent to 1508 Italian companies implementing ISO 14001 via email on December 4, 2018 and responses were received by February 1, 2019. The number of companies that responded to the questionnaire and formed the study sample was 284 companies. The study reached the following results:

Table 01: Effects of ISO 14001 Implementation on Sustainability Enhancement in Italian Industrial Institutions.

Economic benefits	Environmental benefits	Social benefits
• Achieving greater compliance with legal requirements (average 4.05). • Improving institutional performance (average 2.99). • Increasing access to financial funds (average 2.93). • Reducing the company's operational costs (average 2.83). • Achieving more profitability and enhancing market competitiveness	• Improving the management of activities with environmental impact (average 3.98). • Reducing the risk of environmental incidents (average 3.90). • Identifying opportunities for pollution prevention. • Reducing negative environmental impacts.	• Improving safety and work procedures (average 3.89). • Enhancing employees' environmental awareness and increasing participation (average 3.76). • Boosting employee morale and engagement. • Improving relationships with external stakeholders.

Source: Prepared by the researchers based on (Bravi et al., 2020, p. 8).

These benefits illustrate the comprehensive aspects of implementing the ISO 14001 standard as they contribute to improving the economic, environmental and social performance of companies. They reflect a commitment to social and environmental responsibility and enhance overall sustainability.

b. Case of Industrial Textile Institutions in a Group of European Countries:

The study by (Zimon et al., 2020, pp. 4–11) aimed to examine and evaluate the impact of implementing ISO 14001 standards on the environmental, economic and social performance of various institutions involved in the textile industry. Several methods were used to analyze the data including the reliability coefficient and standard deviation tests to ensure data validity, as well as correlation analysis and confirmatory factor analysis to understand the relationships between different variables.

The study sample included textile manufacturing institutions from three countries: Poland, Slovakia and the Czech Republic. The total number of companies included in the study was 105 distributed as follows: 57 companies in Poland, 21 companies in Slovakia and 27 companies in the Czech Republic. The results were as follows:

Table 02: Effects of ISO 14001 Implementation in Enhancing Sustainability in Textile Manufacturing Institutions in a Group of European Countries

Economic benefits	Environmental benefits	Social benefits
• Reduce consumption and costs: Organizations that implemented ISO 14001 provided a rating of 3.9 percent for this aspect, indicating cost and depreciation savings. • Process rationalization, including supply chain integration: Organizations received a high rating of 4.0 for this aspect, showing improved supply	• Improving environmental performance: Data shows that organizations that have implemented ISO 14001 have provided an average rating of 3.9 percent for this aspect, indicating a positive impact on environmental performance. • Environmentally conscious product design: Organizations also provided a rating of 3.8 percent for this aspect, indicating their focus on developing more environmentally friendly products. • Increased environmental awareness: A high rating of 4.0	• Increased environmental awareness: This aspect received a high rating of 4.0, indicating increased awareness of environmental issues among employees and stakeholders.

chain integration and improved cost efficiency.	was submitted by institutions, reflecting the growing awareness of environmental issues within them.	
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Source: Prepared by the researchers based on (Zimon et al., 2020, p. 11)

The figures presented in the study show that the application of ISO 14001 standards has a significant positive impact on the environmental, economic and social performance of companies, as the high assessment of environmental performance and product design taking into account environmental aspects indicates companies' commitment to environmental sustainability and reducing consumption and costs and improving integration in the supply chain shows a positive impact on economic performance while increasing environmental awareness reflects efforts to enhance awareness of environmental issues inside and outside companies which promotes positive social interaction and responsibility corporate community.

c. Case of Arab industrial establishments applying ISO 14001:

Arab institutions, in turn, show increasing interest in adopting the standards of the ISO 14001 specification. They see it as an effective tool to achieve sustainable development and the application of this standard is an essential part of the strategies of Arab companies to improve their environmental and economic performance and enhance their contribution to preserving the environment and society. To confirm this meaning, we explained the effects of applying ISO 14001 in some Arab institutions.

1- Case of pharmaceutical companies in Syria:

A study (Tamam, 2023, pp. 429–430) dealt with the impact of the application of ISO 14001 environmental management systems on the performance of pharmaceutical industrial companies in Syria, whether in the public or private sector, where the research was based on the descriptive analytical approach. The study included a sample of workers in local pharmaceutical companies that obtained the ISO 14001 certificate, which amounted to 9112 workers 793 forms were distributed to a sample of them and 791 valid forms were retrieved for analysis with a response rate of 21.19% and the use of appropriate statistical methods for data analysis and the study concluded the following effects of the application of ISO 14001:

Table 03: Effects of the application of ISO 14001 in enhancing sustainability in Syrian pharmaceutical companies.

Economic benefits	Environmental benefits	Social benefits
• Sales growth: After the implementation of ISO 14001, it was found that the company saw an average increase in market share of 67.85%, indicating that the company has achieved sales growth thanks to improved quality and increased customer's confidence. • Increase profit rate: The study data shows that the profit rate increased by an average of about 67.726% after the implementation of ISO 14001. This indicates that the company was able to improve its efficiency and reduce costs. This increases in profits.	• Improving product quality: The results of the study show that the environmental's benefits of the company leads to increase the customer's satisfaction of about 69.968% after the application of ISO 14001. This reflects an improvement in product quality and an increase in the level of customer confidence. • Increased productivity: An average increase in worker productivity of about 68.224% was observed due to improved work environment or improved production processes in line with ISO 14001 standards	• Increased customer confidence: The results of the study show an increase in customer confidence in the local product by an average of about 68.474%. This indicates an improvement in reputation and trust in the company's brand. • Increased demand for products: Data shows an increase in demand for the company's products by an average of about 68.786%. This reflects increased recognition of product quality and confidence in the production process.

Source: Prepared by the researchers based on (Tamam, 2023, pp. 445–446)

The results showed that the application of ISO 14001 has several benefits that enhance sustainability in the institutions under study including an increase in market share and profit rate which leads to enhanced economic growth. In addition to an increase in customer satisfaction and worker productivity. So, this reflects an improvement in product quality and work efficiency with an increase in customer confidence and demand for products.

2- The case of the Emirates Global Aluminium EGA Corporation:

EGA (Emirates Global Aluminium) is a leading aluminium manufacturer and has been a pioneer in achieving sustainable development by adopting the ISO 14001 Environmental Management System since its implementation in 2015. The company has led continuous efforts to preserve the environment and improve its environmental performance which is part of its commitment to achieving sustainable development in the long term reflecting its commitment to social and environmental responsibility and making an effective contribution to building a better future for current and future generations (Khedir & Berrehouma, 2021, pp. 330–331). It benefited from several economic, environmental and social benefits from the application of ISO 14001 shown in the following table:

Table 04: Effects of the application of ISO 14001 in promoting sustainability in the UAE EGA Aluminum Industry Corporation.

Economic benefits	Environmental benefits	Social benefits
- Investment in Environmental Technologies: The company has invested approximately AED 3.3 billion (approximately USD 891 million) in improving environmental technologies and facilities since 2010. This investment contributes to reducing environmental costs in the long run and increasing production efficiency. - Improvements in industrial processes: The company has improved its core industrial processes resulting in reduced emissions and waste. This can lead to savings on cleaning and correction costs and increase production efficiency. - Development of clean and	- Recycling and waste management: A total of 43,463 metric tons of SPL were recycled in 2017. - Lower emissions: The company's fluoride emissions fell by up to 36% in 2017 compared to the global industry average. - The company's 2018 plan targets the open stock of SPL waste by about 17,500 tons to maintain zero stock of SPL waste.	- Job creation: By employing a large environmental team, the company contributes to the creation of sustainable job opportunities for the local community. - Commitment to social responsibility: Through donations and contributions to local social projects, the company works to improve the living conditions of local people and provide support to the communities in which it operates.

renewable energy resources: By using clean and renewable energy resources, the company can reduce energy costs and rely on more sustainable and cost-effective sources.		
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Source: Prepared by the researchers based on (Khedir & Berrehouma, 2021, pp. 332–338)

The results and data illustrate the economic, environmental and social benefits of implementing the ISO 14001 Environmental Management System at EGA UAE. Its significant investments in environmental technology since 2010 have contributed to improving its efficiency and reducing costs while its efforts to reduce greenhouse gas emissions by 65% have improved the environmental impact of its operations. This also highlights its contributions to sustainable development and social responsibility confirming the effectiveness of ISO 14001 in enhancing the overall performance of companies in various economic, environmental and social aspects.

3- The case of the Algerian cement industry company Ain Touta:

Ain Touta Cement Company was established in 1986 in the wilaya of Batna. It is among the largest Algerian companies contributing to the national production of cement with an estimated production capacity of one million tons per year. It has adopted the environmental management system ISO 14001 since 2005 (Omar & Khalaf, 2015, p. 329), thus benefiting from several benefits, some of which were discussed in the following table:

Table 05: Effects of the application of ISO 14001 in the Ain Touta Cement Company, Batna, Algeria.

Economic benefits	Environmental benefits	Social benefits
Increased production: The installation of two new refineries contributed to the utilization of the waste emitted which was previously estimated at 34,000 tons to produce the equivalent of 27,000 tons of cement.	Conservation of resources: The company recorded a decrease in the rate of water consumption which was estimated at 240,000 m3 per year and then became estimated at 229,000 m3, i.e. saving 11,000	Achieving the satisfaction of workers: in terms of renewing the equipment that was required for them and in terms of disposing of waste emitted by the company.

• Improving the financial position of the company: It was able to acquire the two refineries without the bank's subsidy and achieve a turnover in 2011 of five billion Algerian dinars. • Reducing costs: by eliminating the tax fees that were imposed on them as a result of polluting the environment which are estimated at 40 million centimes per year.	m3, a figure covering 3,000 people. • Respect for laws related to environmental protection: the company did not exceed the specified percentage of air pollution which is estimated at 50 mg per cubic liter of air.	• Increase in workers' wages: their wages are estimated at 800 million Algerian dinars, in addition to their participation in a percentage of the annual profits related to the increase in production which are estimated at 120 and 130 thousand Algerian dinars per worker.
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Source: Prepared by the researchers based on (Omar & Khalaf, 2015, pp. 333–334)

The implementation of the ISO 14001 standard in Ain Touta Cement Company in Algeria resulted in an increase in production and an improvement in the financial situation. Along with reducing pollution and improving the consumption of natural resources as well as, raising workers' satisfaction and enhancing their morale. The application of the standard represents an effective strategy for sustainable development by balancing the economic, environmental and social aspects.

4. The results of the study:

Through the results of the application of ISO 14001 standards in the institutions referred to in the study, we conclude that the application of the standard contributes to achieving sustainability for organizations according to:

- ✚ Increase in sales and profit rate.
- ✚ Optimize industrial processes and reduce costs.
- ✚ Low emissions, recycling and waste management.
- ✚ Improve the financial situation of the company and save cleaning and correction costs.
- ✚ Investment in clean and renewable energy technologies.
- ✚ Reduction in consumption of natural resources and improved air and water quality.
- ✚ Employing environmental teams and contributing to local social projects.

- ✚ Enhance customer trust and build strong social relationships.

5. Conclusion:

Through the study, it was found that the ISO 14001 standard is a key factor in enhancing sustainability in industrial enterprises as the preliminary analysis of the results shows that the application of this standard entails tangible economic benefits such as improving institutional performance, reducing operational costs and increasing customer confidence. In addition to its contribution to improving environmental performance by reducing emissions, recycling and protecting natural resources. From a social point of view, the application of this ISO 14001 contributes to creating sustainable job opportunities and improving relations with communities. Achieving sustainability in industrial enterprises requires a strong commitment to the application of ISO 14001 standards and their integration in all aspects of business, as well as enhanced communication and cooperation between the public and private sectors and civil society to achieve sustainable development and build a prosperous future for all.

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