

## **The use of environmental management system in the production of green products (View Toyota Motor Company experience )**

استخدام نظام الإدارة البيئية للتوجه نحو إنتاج المنتجات الخضراء (عرض تجربة شركة تويوتا للسيارات)

Faiza Bouabdallah <sup>1</sup>

<sup>1</sup> University of Blida2, Algeria,

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### **Abstract:**

Environmental Management System is the main tool that could be used in the development plans of environmental strategy in order to improve the environmental performance of the firms.

the Toyota Japanese automaker is one of the leading companies that have a positive results concerning the application of the environmental management system, where the company has adopted many environmental technologies in the production process. The company started producing a hybrid car (environmentally friendly) in 1997 in Japan, as the first hybrid production car in the world, in addition to that the company seeks many challenges to overcome by 2050.

**Keys words:** environmental management system, green products, Environmental technologies.

### **Résumé**

Le système de gestion environnementale est le principal outil qui pourrait être utilisé dans les plans de développement de la stratégie environnementale afin d'améliorer la performance environnementale des entreprises.

L'entreprise japonaise Toyota des automobiles est l'une des entreprises leaders qui a réalisé des résultats positifs en appliquant le système de management environnementale, où elle a adopté plusieurs technologies environnementales dans le processus de production. Cette dernière a lancé la production de sa première voiture hybride (respectueuse de l'environnement) en 1997 au Japon, comme étant la première au monde, en plus de cela, la société cherche de nombreux défis à surmonter d'ici 2050.

**Mots clés :** système de management environnemental, produits verts, Technologies environnementales.

ملخص :

يعتبر نظام الإدارة البيئية الأداة الرئيسية التي يمكن الاعتماد عليها في وضع الخطط الاستراتيجية البيئية بغرض تحسين الأداء البيئي للمؤسسة، ومؤسسة تويوتا اليابانية لصناعة السيارات من أبرز المؤسسات التي أظهرت نتائج ايجابية لتطبيقها لنظام الإدارة البيئية، حيث اعتمدت المؤسسة على العديد من التقنيات البيئية في عملية إنتاج منتجاتها، كما بدأت في إنتاج سيارة هجين (صديقة للبيئة) عام 1997 باليابان، لتكون بذلك أول سيارة إنتاج هجين، بالإضافة إلى التحديات التي تسعى لتجاوزها بحلول عام 2050.

**الكلمات المفتاحية:** نظام الإدارة البيئية، المنتجات الخضراء، التقنيات البيئية.

\*faiza bouabdallah, EMAIL : faizablida2@gmail.com

## **Introduction**

The business sector realized in the recent years that the patterns of current production and consumption is not sustainable,

Therefore, the company in order to guarantee the viability and survival in the market should include gradual and continuous environmental considerations in its strategy and plans for long term, in order to improve their environmental performance,

Where the environmental management was considered the system that is concerned by the environment in all aspects of the economic activities,

And thus the concern of the environment has become a necessary requirement for the continuation of industry at the local level and at the international level,

In addition, in this study we will present the Toyota Motor Company experience, and clarify the environmental technologies that have been used by the company towards the production of Green products.

Therefore, the research problem is:

### **Does the Environmental Management System play a role in Toyota's orientation to green production?**

To answer the research problem, the following **sub- questions** must be asked:

- What is the importance of applying the environmental management system in the economic institution
- Has Toyota Corporation relied on environmental technologies in production ?
- Does Toyota Corporation have prospects and challenges related to green production?

Through the previous sub-questions, the following **hypotheses** can be formulated:

- The implementation of the environmental management system in the institution contributes to improving environmental performance, increasing productivity and increasing revenues ... etc.
- Toyota Corporation has relied on many environmental technologies to produce its products such as hybrid technology, electro- hybrid technology...etc.
- Toyota Corporation has environmental perspectives and challenges of seeking to achieve by 2050.

## **Research importance**

The importance of this study stems from the fact that , it is handling of one of the important issues on the local and international level, The company is considered the main axis in any country's economy, and therefore it is concerned with implementing the dimensions of sustainable development and preserving the environment, and this is through the adoption of an environmental management system that gives it the opportunity to improve its environmental performance and satisfy consumers' desires with environmentally friendly products, which allows the corporation to access the global markets.

## **Research Objectives:**

The current study discusses the followings three main objectives

- Knowing the concepts related to the environmental management system, the importance of its application in companies
- identify the environmental technologies that Toyota Corporation uses in green production
- identify the prospects and challenges of the Toyota Corporation in producing green products.

## **Research Methodology**

The descriptive analytical method was used in this research, where theoretical concepts related to the environmental management system and the importance of its application were discussed, in addition to presenting the experience of Japanese automaker Toyota and its contribution to the production of green products.

**Organization of the study :** To address the issue, we divided the research into two parts as follows:

- The environmental management system and the importance of its application;
- Toyota Corporation and the orientation towards the production of green products.

## **2. the environmental management system and the importance of its application**

Spread the concept of environmental management with the end of the eighties and early nineties, and environmental management is the first step towards achieving sustainable development

### **2.1. The concept of environmental management system**

in the following part of the study we deal with the concept of the environmental management system and the ISO 14001 standard.

Many thinkers agreed with the definition provided by the (ISO) organization about the environmental management system, as it defined it as part of the overall management system, which includes the organizational structure, planning activities, responsibilities, practices, procedures, processes and resources related to developing, implementing, reviewing and maintaining environmental policy.;

As for the viewpoint of (UNEP), it considers the environmental management system as that structure that includes a set of processes and procedures compatible with the environmental objectives of the organization and which has important responsibilities in the formation of the organization; (al-azzawi & alnaqqar, 2007, p. 122)

It was also defined as that subsystem of the largest system of the company, used as an effective tool to maintain sustainability and development, through the functions actually granted to it, to put the environmental management system into practical application and responsibility towards the company and society, so this administration appears as a link between the institution and the natural environment with all its contents To suit the continued compatibility of the two systems together and there are no conflicts between them; (el-azzawi & el-naqqar, p. 208)

The standard specification of ISO 14001 is a specification developed by the International Organization for Standardization, is the basic standard for the establishment of environmental management system, and any company willing to develop and improve their environmental management should apply it, The ISO 14001 standard is a standardized tool that represents a set of procedures for companies as it represents a comprehensive methodology of work. It describes the requirements for establishing an environmental management system in order to manage the environmental impacts of companies and reduce them over time; (baracchini, 2004, p. 26)

From what has been mentioned it can be said that the ISO 14001 standard is the main axis in the ISO 14000 series, which is the internationally agreed standard, specifying the requirements of the environmental management system and it helps institutions to improve their environmental performance through the optimal use of resources and reduce waste and reduce pollution, and thus get On a competitive advantage.

## **2.2. The importance of applying the environmental management system**

The practical experiences of many companies have reflected the benefits that accrue when placing environmental problems among their strategic priorities. The Environmental management has achieved economic benefits, mainly in reducing costs, increasing the revenues of the Company , and improving its environmental performance, in addition to the non-material benefits related to improving the image of the company and its reputation.

The importance of implementing the environmental management system in company is shown in the following:

- Improving environmental performance;

- Cost Control;
- Increase productivity;
- Increase revenue;
- Gain a competitive advantage;
- maintains current workers and encouraged hire a further.:

### 3. Toyota Corporation and the orientation towards producing green products

The Toyota company drew the world's attention for the first time in the eighties, so it became clear that there is what distinguishes the quality and the effectiveness of the Japanese, companies. And by the beginning of the nineties, there seemed to be something more distinctive in the Toyota compared to other automakers in Japan, namely the way in which the cars are engineered and manufactured which led to this massive access of the markets, and therefore we will try in the next to provide a presentation of Toyota company and the system that follows in particular in the environmental field and its application of the environmental management system.

#### 3.1 Toyota Motor Corporation and Environmental Management

##### 3.1.1. Toyota Corporation overview

Toyota is a major multinational car manufacturer, established in 1933 and headquartered in Japan. The company is based in Nagoya Toyota in Aichi Prefecture, Tokyo, and produces trucks, buses and various industrial vehicles, as well as manufacturing cars. Toyota provides financial services through its Toyota Financial Services branch, and among its activities is also the robot industry. (jabbari & saad, 2018, p. 502)

Its capital is estimated at 20 067 137 million yen through 2019, and in the same year the enterprise's structure consisted of 370,870 employees worldwide, and as of September 2018 it was the sixth largest corporation in the world in terms of revenue and the largest automobile factory, and is among the first automobile manufacturers In the world, it produces more than 10 million cars annually, while the total production of its cars has exceeded 200 million cars, <sup>12</sup> (- <https://ar.wikipedia.org/wiki/toyota>, 2019) The number of its factories worldwide has reached 89, and this can be illustrated by the following table:

**Table N 01 :( Toyota's factories spread throughout the world until 2017)**

|  | Japan | Asia<br>(excluding<br>Japan) | Europe | North<br>america | Other<br>regions | Total |
|--|-------|------------------------------|--------|------------------|------------------|-------|
|  |       |                              |        |                  |                  |       |

|                                |    |    |    |    |     |     |
|--------------------------------|----|----|----|----|-----|-----|
| <b>Number of factories</b>     | 16 | 24 | 29 | 11 | 09  | 89  |
| <b>Number of distributors</b>  | -  | 20 | 09 | 05 | 113 | 147 |
| <b>Number of R&amp;D bases</b> | 05 | 10 | 03 | 03 | 1   | 22  |

**Source :** (toyota motor corporation, overview of toyota motor corporation, 2017, p. 03)

Through the table it is clear that most of the Toyota Foundation factories are based in Europe , with 29 factories, followed by Asia with 24 factories, and finally North America with 11 plants, but a for the rest of it is distributed across some z countries in the world with 09 factories, as the number of distributors Toyota Corporation has 147 distributors worldwide, and 22 research and development bases.

### 3.1.2. Toyota Environmental Management System

Toyota's work is not only limited in enhancing the comfort of its vehicles, but also focused on marketing the solution of global environmental issues through a variety of activities and proposals, and the development of power generation technology as the basis for improving the environmental performance of vehicles, and this technology is being developed on three foundations:

- Improve fuel efficiency in order to reduce carbon dioxide emissions;
- Make exhaust emissions cleaner to help reduce atmospheric pollution;
- The pursuit of diversification of energy sources, to produce the required vehicle at the right time and in the right place. (jabbari & saad, 2018, p. 503)

It should be noted that Toyota company is working hard to develop hybrid technology to be the basic technology used in all engines.

The implementation of the Environmental Management System was approved by the Toyota Environmental Committee in August 1994, in order to establish an environmental infrastructure. Toyota Corporation obtained the ISO 14001 certificate in 1997 . (<https://toyota-global.com>, s.d.)

### 3.2 Environmental technologies used by Toyota

Toyota company works to develop technical environmental to be as the basis used in all engines , and these techniques are as follows: (nouri & ledjlet, 2012, pp. 7-8)

**3.2.1 Hybrid Technology:** Toyota is considered one of the largest company that supply markets with hybrid cars , and it was the first in the manufacture of hybrid cars represented in its" Prius" model . This technology has developed greatly and extended to the main medium models such as " Camry Hybrid ," and more recently to cars Luxury like "Lexus Hybrid Drive "

**3.2.2 Toyota 's hybrid technology II:** After developing its hybrid which is supplied by several models " Prius " and " Camry Hybrid , " Toyota developed a new system launched by the Toyota hybrid second system , which achieves high levels of compatibility between environmental performance and engine power which has been increased by 1.5 times;

**3.2.3 Electro-hybrid technology :** after the announcement of General Motors the model " Volt electro-hybrid Toyota also released it, where their cars were tested " Plug-in HV " in Japan, America and Europe, which rely on a battery "lithium - ion ," and then announced its intention to produce "Prius Plug The Hybrid " in 2010 , it is expected that the effect of this technical harm less than the impact of the environment hybrid technology

**3.2.4 recycling :** Since the establishment of the recycling Commission in October 1990 , Toyota is working to make the vehicle design facilitates for re - manufactured , by studying the life cycle of the car from the stage of development until the disposal ; Toyota established two system of distribution " use phase " to encourage the re - use of spare parts auto.

**3.2.5 Biotechnology Agricultural:** Toyota sought to preserve the environment ,especially with the progress and development of the world ,by focusing on this type of biotechnology for the following reasons:

- The significant increase in the global population , especially in Asia;
- the Increase in personal consumption of food , due to higher income level;
- the decrease in forest areas as a result of the increase in industrialization and urbanization, and lack of water and food due to increased water consumption and environmental pollution.

Therefore , Toyota has established a business branch of agricultural and landscaping biotechnology and began research and development in January 1998 and has established a Toyota plant biotechnology and agricultural in May 1999 , to help keep up with research and development work in the field of agricultural biotechnology , as they are investing in several business Small , and participate in presenting its technology in several projects in different countries including Indonesia and Australia.

### **3.3. A PRIUS TOYOTA car Environment friendly**

TOYOTA PRIUSIt is a hybrid car, and it is called the green car, medium-sized. Toyota company began producing this kind of cars in 1997 in Japan, making it the first hybrid production car, the sales of this car reached 300 cars inside and outside Japan, .The company has succeeded in marketing where its sales until 2015 reached 5.522.800 cars worldwide, (chahid & dafrour, 2016, pp. 298-299),In the following part of study we present the most important features of the car: (chahid & dafrour, 2016, pp. 297-298)

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-This car works on a modern technology called «HSD-Hybrid Synergy Drive» It is a merger between two engines in the same car, one is petrol and the second is electric, in this technique the adoption of appropriate engine fitting the appropriate time so that efficiency required realized. so during driving at slow speed electric motor works and thus the use of zero fuel and hardly heard of a car sound, while In the case of driving at a high speed, the gasoline engine works to move the car and to drive the electric generator, which will provide the energy necessary for the electric motor, that is, the conventional engine is powered by an internal combustion system and the electric motor stores the energy generated from the internal combustion burner movement and converts it to movement, and also contains a "lithium ion" This is to store energy while the petrol engine is running for use after a while when that engine stops, to save fuel and reduce the environmental impact of the vehicle;

-The green car is distinguished from others by having technologies that limit the emissions of toxic gases and carbon dioxide CO<sub>2</sub> Whereas , the emission is gas CO<sub>2</sub> And other toxic gases are estimated at 104 g per km, by providing 1 ton per year and this is a great achievement. During the period from 1997 to 2010, Toyota succeeded in cleaning the environment in Japan from 4 million tons of harmful carbon dioxide emissions, and rid off the environment around the world of nearly 15 million tons, which is a massive amount of gas that mainly causes global warming;

-the car PRIUS considered as economical in fuel consumption, it consumes only one liter of gasoline per 25 kilometers, compared to the regular cars that we know that consume from 5 to 10 liters;

-Acceleration from 0-100 km per hour takes less than 11 seconds.

A car was marketed as Environmentally friendly in the global markets at the beginning of the new millennium, as it is sold in more than 40 countries and regions around the world, its main market is located in Japan and North America.

### **3.4. The prospects and challenges of the Toyota Company in the eco-friendly auto production**

Toyota company realize the importance of environmentally friendly products and its place among customers , that why Toyota try to develop a strategic plan aimed to provide every Toyota model with hybrid technology by 2030 , whether small , family or four-wheel drive , as well as It is designing a very handy model" Biomobile Misha" for the year 2057 as an additional model , which helps confirm its leading position in environmentally friendly vehicles instead of pumping polluted gases into the air, because this car uses those specific gases as a fuel in the process of "rebalancing nature". " Toyota took into account that the development that will be attached to designs of construction during the decades of the five fortified will narrow streets and rising skyscrapers , thus providing in the new vehicle adjustable size feature with the status of the road in case of passage of the car within a narrow street, it can have deflation easily, Before returning to open in the open spaces to transform into a kind of reception room. (nouri & ledjlet, 2012, p. 13)

Toyota also set six challenges to implement by 2050, in order to achieve zero environmental impact in all activities related to the car. The six environmental challenges for



Toyota can be listed as follows : (<https://blog.toyota.co.uk/toyota-environmental-challenge-2050>, s.d.)

#### **3.4.1 The first challenge: zero emissions CO<sub>2</sub> Of cars**

Toyota challenged itself to reduce CO<sub>2</sub> emissions in the car by 90% Compared to 2010 levels, this will be achieved by 2050, and will be promoted through the development and adoption of next-generation vehicles with low or zero carbon dioxide emissions, Toyota has set the intermediate goal of reducing average carbon dioxide emissions for new vehicles By 22% By 2020, a figure equivalent to about 28% Improvement in fuel efficiency;

In addition to reducing fuel consumption for all motor vehicles, Toyota is developing next-generation cars with low or zero CO<sub>2</sub> emissions, which include gasoline-powered hybrids, gasoline and hybrid vehicles, electric vehicles, and fuel-cell vehicles .

#### **3.4.2 The second challenge: zero emission CO<sub>2</sub> During the car's life cycle**

Toyota has challenged itself to cut all carbon dioxide emissions to zero throughout the life of its vehicles. This includes not only emissions from driving and manufacturing, but also in every possible process of carbon dioxide emissions, from material production to final disposal and recycling of the vehicle, as some Vehicles produce higher emissions than usual in the materials and vehicle production stages, and Toyota is currently developing all of its new cars through the Environmental Vehicle Assessment System, a program that carries out a comprehensive environmental impact assessment of any proposed project by taking into account the entire life cycle, as this process allows the development manager By checking and modifying and thus reducing the environmental impact of the vehicle from the initial stages of development until the eventual disposal, Toyota is also working to develop and expand the use of materials with low carbon dioxide emissions, as well as reduce the amount of materials and parts used in each car, and initiatives are being developed to simplify the construction of the structure The car where each vehicle can be dismantled more easily.

#### **3.4.3 the third challenge: zero emission CO<sub>2</sub> From the factory**

Most vehicles not only emit CO<sub>2</sub> while driving, but CO<sub>2</sub> is created during the manufacturing process, so the challenge of tackling climate change must be directed to production plants, and to achieve zero CO<sub>2</sub> emissions in production plants, Toyota's strategy includes improving Production technology and conversion to various forms of energy as these environmental activities are carried out at Toyota plants worldwide;

Processes are simplified and rationalized, and energy efficiency is improved, thereby reducing carbon dioxide emissions. For example, non-energy processes are introduced wherever possible and reliance on new energy sources such as solar cells, wind energy and hydrogen fuel.

#### **3.4.4 Fourth challenge: rationalizing and improving water use**

Through this challenge, Toyota seeks to introduce a set of measures to save water, and this process includes collecting rain water to reduce the amount of water used by production plants, and increase the rate of water recycling and reuse of wastewater through recycling;

#### **3.4.5 FIFTH Challenge: Create community systems based on recycling**

Toyota try to re-cycling the resources for 40 years, but in the future it will deploy technologies and systems In which it was the leader in Japan throughout the world, to establish a recycling-based community, due to the increased exploitation of resources worldwide with the increase in the population Economic growth and the desire for comfortable lifestyles, and if the situation continues in this way, the widespread exploitation of natural

resources will lead to their depletion, and the increase in the amount of waste, which in turn will lead to environmental pollution;

In order to improve resource efficiency and achieve a society based on recycling, initiatives are needed in four main areas:

- Use of environmentally friendly resources;
- Partial improvement of the life cycle;
- Development of recycling technology;
- Making cars from deadly cars.

Toyota is seeking widespread use of renewable and recycled materials, such as plant-derived plastic for auto parts, and bio-rubber for engine and drive system hoses.

### **3.4.6 SIXth Challenge: Create a future society in harmony with nature**

Toyota promotes environmental conservation activities to create a society in which humans and nature coexist harmoniously, as each year the Earth loses several acres of forest by 14.% Of the total land area of Japan, if humans and nature are to coexist in the future, it is necessary to conserve forests and other rich natural systems throughout the world;

As part of its goal to address biodiversity issues, Toyota has developed a set of biodiversity guidelines. These principles define Toyota's philosophy on these initiatives by following three elements:

- Contribute through technology, that is, to pursue biological, tree and environmental technologies, with a view to achieving a balance between biological diversity and the activities of institutions;
- Cooperation with society, i.e. building cooperative relationships with institutions involved in the promotion of biological diversity;
- Disclosure of information, where Toyota voluntarily disclose biodiversity - related initiatives and results , in order to contribute to the development of sustainable;

To achieve these initiatives, Toyota participates in a wide range of activities, from local tree planting and environmental conservation activities to environmental education. The insights gathered from these activities are shared at the group, region and enterprise level.

## **4.Conclusion**

Environmental problems are widely known , as the deterioration of the water and air situation, the spread of waste, desertification and other environmental problems , have made the relevant authorities and bodies seek to limit their spread more broadly, by establishing mechanisms and establishing central and local bodies, in addition to defining legal frameworks The taxation of environmental protection, which leads companies to integrate the environmental dimension into their strategies through reliance on the environmental management system;

By presenting the Japanese Toyota Corporation experience in protecting the environment and using clean technology, it has been confirmed that the company has environmental initiatives through the use of an environmental management system, as it relied on many environmental technologies in the production of its products, and the Foundation launched its environmentally friendly hybrid car , in addition to To the challenges that strive to overcome and win the bet to reduce pollution and thus protect the global environment

## **research results:**

Through this research, a set of results was reached, which we summarize as follows:

- The implementation of the environmental management system in the company contributes to improving environmental performance, increasing productivity and increasing revenues ... etc.
- Toyota Corporation relied on many environmental technologies to produce its products such as hybrid technology and electro-hybrid technology ... etc.
- Toyota company has environmental perspectives and challenges to achieve by 2050, in order to contribute to environmental protection and support sustainable development.

## **Recommendations:**

Algerian institutions can benefit from Toyota's experience in adopting an environmental management system and improving its products environmentally, through the following:

- Paying attention to adopting environmental management systems to reduce pollution, which is the main cause of climate change;
- Using environmental techniques to improve products environmentally;
- encourage research and development function within companies ;
- Supporting environmental innovations to produce green products.

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