

**Original Article**

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# The Effect of Replacing Imported Material with Domestic Material in Economic Growth and Development of Vaccine Industry and Reinforcing it in The Time of Sanctions with an Emphasis on Resistive Economy

Mahdie Jafari<sup>1</sup>, Masoud Moghaddam Pour<sup>2</sup>, Mahnaz Jafari<sup>3</sup>

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**Abstract:** Today, economy is one of the important components of every country. Special attention to economy is one of the important policies of the Islamic system in order to create tolerance and resistance and confrontation against the enemy's pressures. Diseases and their treatments create numerous economic problems for individuals and states throughout the world. Therefore, the most important goals of each state in public health is to reduce costs using prevention methods. Vaccination is one of the most effective strategies in order to prevent many infectious diseases. With the growth of the vaccine industry and due to the import of some of the materials used in vaccines, the existence of sanctions and the exchange rate, their import has been faced with significant problems and costs. Therefore, the aim of the present study is to examine replacing the imported materials with domestic materials in the sanction era with an emphasis on resistive economy. By comparing the immunogenicity of the vaccine with aluminum hydroxide and oil adjuvant Montanide ISA 70 in poultry and using the SPSS software program, it is concluded that Montanide ISA 70 can be replaced with aluminum hydroxide. It was showed in this study that replacing montanide ISA 70 (imported material) with aluminum hydroxide in poultry vaccines reduces the costs of vaccine production significantly and prevents dependence on foreign countries.

**Keywords:** Resistive Economy, Sanction, Vaccine Industry, Internal Empowerment, Economic Growth

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1 Department of Microbiology, Islamic Azad University, Pharmaceutical Science, Tehran, Iran.  
E-mail: [mhdjafari@yahoo.com](mailto:mhdjafari@yahoo.com)

2 Department of Research and Development, Razi Vaccine and Serum Research Institute Karaj, Iran.  
E-mail: [mmoghaddamp@yahoo.com](mailto:mmoghaddamp@yahoo.com)

3 Department of Agriculture and Natural Resources, Islamic Azad University, Science and Research, Tehran, Iran. E-mail: [mahenazjafari@yahoo.com](mailto:mahenazjafari@yahoo.com)



## 1. INTRODUCTION

With the triumph of the Islamic Revolution and the establishment of the Islamic Republic, major powers have attempted to overthrow this regime through various methods and have demonstrated their enmity with Iran in different ways. In recent years, the sanctions imposed on the country by foreign countries have been an issue for the resolution of which the government and the people have tried with the right planning (Dary Nogourani, 2014). To achieve this goal, the Supreme Leader of the Revolution has referred the resistive economy program to the Expediency Council and they have tried to define this strategy. According to them, resistive economy refers to an economy which is resistant, is not rattled by global provocations and shocks, and the policies of the US and other countries, it is an economy which relies on people (statements of the Iranian Supreme Leader, 2014)<sup>4</sup>. He stated that resistive economy is a scientific model that fits the needs of our nation and this is considered its positive aspect but it is not exclusive to our country; that is, due to the social shocks and economic rummages during the last 20 to 30 years, many countries have thought of a similar model based on their conditions. This economy is endogenous, it rose out of the potentials of our country and our people, yet it is not introverted, which means that we are not trying to limit it only to our country. It is endogenous but extroverted and interacts with economies of the world. In addition, this economy is based on people not the government, and it is the people's will, investment, and presence that make this happen, and the government is responsible for planning, preparation, capacity building, guidance, and help. This economy is knowledge-oriented, meaning it exploits scientific advancements, relies on them, and regards science as the basis of economy. It is justice-oriented, meaning it is not confined to the capitalist economic indicators. Justice in this program does not mean the division of poverty, rather it means generating wealth and increasing the national wealth. Resistive economy is the best solution to the country's economic problems (proclamation of the overall policies of resistive economy). Resistive economy means strengthening and reinforcing the foundations of economy. Such an economy will be fruitful and helps people whether there are sanctions imposed on it or not. Due to capacities such as human and natural resources, and the geographic situation of the country, such an economy is possible. The requirement for the realization of resistive economy is for the government officials to support national products in order for our national wealth to grow. Buying domestic products is a necessity for the reinforcement of economy. Thus, he sees resistive economy as a public duty for all of us today (Dary Nogourani, 2014).

On the other hand, one of the pillars of passive defense which the Supreme Leader has frequently mentioned is thinking about human health, food security and, ultimately, white meat. Therefore, whatever which contributes to food security and prevents possible losses is considered as vital and important for passive defense. In this regard, diseases such as influenza and Newcastle which challenge the with meat industry, i.e. the poultry industry, are of utmost importance. Moreover, losses due to these diseases such as the reduction of poultry products (e.g. egg) have led to the development of a vaccine in order to prevent these diseased and stop them from spreading. Among the favorable features of this vaccine are creating quick protection in the body of the host, its inexpensive price, availability, and having no risks for the host. Successful prevention of diseases through vaccines dates back to the success of Edward Jenner against smallpox in 1976. Prevention against infectious diseases by the eradication of many infectious diseases in developed countries has been through vaccination. In fact, the fundamental principle of vaccination is using a type of killed or weakened infectious agent which itself does not cause sickness but stimulates the protective immune response to prevent the disease (Abol-Abbas, 2012). It must be noted that the developed vaccines are of the killed (inactivated) type and cannot induce a rapid immune response in the host. Therefore, in order to increase the immune response induction, certain materials are added to the vaccine which are named adjuvants. Adjuvants are used to increase the strength of the vaccine (Ghods Foumaniet al., 2012). Among the adjuvants used in the vaccine industry are the oil-based adjuvants which are used in the development of vaccines as emulsions of water in oil (e.g. Montanide ISA70). In addition, other adjuvants named aluminum salts are among the most common adjuvants approved by the FDA for use in human vaccines (Brito & Hagan, 2013).

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<sup>†</sup> [www.Khamenei.ir](http://www.Khamenei.ir)



Currently, in Razi Vaccine and Serum Research Institute, the adjuvant Montanide ISA70 is used to develop inactivated vaccines for poultry. These adjuvants are not produced domestically and, due to foreign sanctions, importing them would prove difficult and costly. This problem has led to the increase in production cost of the vaccines and, as a result, their price for the poultry industry. In addition, there are problems in the import of these products such as the payment of customs duties, transport risks, and the method of transport, which have turned the availability of this material into a very difficult challenge. This has led to long waiting time until the material reaches the production line which, consequently, leads to delays in the development of vaccines (Jafari *et al.*, 2016).

In adherence to the command of resistive economy by the Supreme Leader in the year 2013, as mentioned above, in order to avoid extra costs and the outflow of currency out of the country, a study has been designed to replace the imported expensive material with an available inexpensive material in order to reduce losses in poultry and increase the production of with meat, decrease the dependence of the country on foreign countries, prevention of the outflow of currency from the country and evading sanctions, and economic independence and employment of the youth in order to reach the goals of resistive economy, as well as reducing costs. The present paper attempts to evaluate the issue of replacing foreign adjuvants with domestic adjuvants from the economic perspective in light of the study.

## **2. LITERATURE REVIEW**

Numerous studies have been conducted on resistive economy. In order to explain the concept clearly to the audience, we have tried to list the best of them.

Briguglio *et al.* (2006) used the term economic flexibility in their article. This term means having the ability to recover rapidly from destructive external economic shocks and resistance against these shocks.

According to Rose (2004), economic flexibility can be either static or dynamic. He defines static economic flexibility as the capacity to absorb risks or to show flexibility against them.

Saif (2012) states that, according to the Supreme Leader, the enemy is trying to separate people from the Islamic regime in the issue of economic threats. In his view, resistive economy leads to the maintaining of economic growth and prosperity of the country and decreasing its vulnerability under pressure. Moreover, resistive economy has some conditions and requirements and exploiting the full capacities of the government and the people, development through the execution of Article 44 policies, empowering the private sector, and decreasing the dependence on oil is among them. Based on the components interpreted through the statements of the Supreme Leader, the resistive economy model in Iran can be hypothesized to have four components, including economic growth, economic justice, economic stability, and economic flexibility.

Torabzadeh *et al.* (2013) consider resistive economy as the leverage to face economic sanctions, meaning that it is the search for ways to circumvent sanctions and improve the capacity for tolerance of difficulty and pressure in the national economy. On this basis, the areas subject to sanctions in each period must be observed and actions must be taken in order to substitute them.

Peyghami (2011) claims in another article that resistive economy is a theoretical and scientific expression for the modeling of a type of active economy which is prepared to face sanctions. In this approach, acquisition of national wealth and income are followed through routes that improve the bargaining power of the country in the international political space. That does not mean that the country is forced to abandon their ideological goals in the political sphere because of economic factors.



In the resistive economy conference, Narimani describes and compares two theories of Adam Smith and proposes some principles for industrial-commercial policies:

- 1) Economy as a means for power: Thus, economy is not an end but a means to achieve national authority.
- 2) The need to design local models: Industrial-commercial policies and economic policies, in general, must be in accordance with the economic conditions, capacities, and position in the international area.
- 3) Designing economy based on empowering domestic production and independence: The design of industrial-commercial mechanisms and policies must be in line with empowering domestic production and independence.

The economy and the economic policies of the national economy theory teach us that any country which wants to reach the highest heights of independence and culture and economic prosperity must do everything necessary to protect its economic security against foreign attacks. The pillars of national independence are very weak without the growth of national industries (Abuhamzeh & Narimani, 2012).

Introducing it as the engine of economic development, Schumpeter (1934) considers entrepreneurship as a set of innovations that inject new energy for the growth and success of an economy.

In advancement pioneers congress, Sajedi (2014) proposed the systemic analysis of economy in order to introduce a new aspect of resistive economy. He stated that through these attacks and confrontations, a special new type of economy will be formed which can be called resistant or resistive economy. This is due to the fact that the main feature of such an economy is the capacity to deal with the one-sided and asymmetric game conditions. Although the primary factor for the emergence of such an economy has been to confront the giants of world economy, the resulting economy is a more efficient and capable model (in terms of sustainability and self-reliance) compared to traditional and classic economies. Reinforcement against those elements which are exposed to risks is the real resistive economy. The systemic analysis method is an instrument to create the resistive economy model. In fact, in order to implement resistive economy in practice, we need a practical solution, a solution which can be realized through systemic analysis.

The three pillars of resistive economy are sustainability, self-reliance, and determination, which can be realized through a model named economic closed loops. In short, in order to stabilize the economic circulation of the whole society, the economic circulation of each small loop inside it must become closed and sustainable. The necessity of such an act has become clearer in the light of the current sanctions (Sajedi, 2014).

Nakano and Fuji (2011) define dual economic flexibility (which can be considered as synonymous to resistive economy) as the ability to maintain the products near the capacity level aftershocks and the ability of an economy to reduce the probability of the deepening of a crisis or the partial recovery from it.

As implied by the documents and the constitution of the Islamic Republic of Iran, the economic system of this country is substantially different from the conventional economies of other countries which have accepted most of the values and principles governing economy. In general, an economic system as defined in the constitution of the Islamic Republic of Iran is to realize the underlying economic purposes and, thus, pressures and challenges from the hegemonic system is inevitable. In



this regard, economy will face a strategic crossroads where one route leads to keeping the ideals and the other leads to submitting to power and giving up the ideals. In order to keep the ideals, it is crucial to predict the necessary economic mechanisms to confront the enemy's pressure, which leads to the conditions of resistive economy and results in the model of resistive economy. If, in an economic system, the only purpose is to provide welfare where there are no ideals and aspirations which go against the hegemonic system, there is no room for resistive economy. However, an economy which seeks to realize its fundamental goals, may face two conditions: 1) either it predicts the necessary mechanisms to confront the challenges, or 2) it does not. If it does not predict the mechanisms, it will be faced with austerity economics.

Three levels can be identified in the implementation of resistive economy, namely, internal empowerment, intrinsic stabilization, and global inspirational strengthening. The relationship between these three levels is interactional and their implementation will be complementary. At the same time, each level is a prerequisite to the next and paves the way for the realization of that higher level. On the other hand, higher levels provide capacity and resources for their lower levels. In this regard, these levels strengthen each other and the overall result of these strategies is empowerment, sustainability, and inspiration of the national economy of Iran (Saif, 2013).

In this regard, it seems that the production of raw materials for the pharmaceutical and vaccine industry, which is a very critical industry, can contribute to the two levels of internal empowerment and intrinsic sustainability in this industry and can draw the attention of Islamic countries for the issues of export and support, which can contribute to the third level.

### **3. THEORETICAL FRAMEWORK**

The Supreme Leader has stated the general policies of resistive economy, which include overcoming all the difficulties, defeating the enemy and forcing it to retreat, keeping the country's achievements in different areas, continuing progress, realizing the goals and principles of the constitution and the twenty-year vision plan, realizing a knowledge- and technology-based, justice-based, introvert, dynamic, and pioneer economy in the risky global conditions, and objectifying an inspirational model for an Islamic economic system. In the present study, efforts have been made to align the work done with these issues.

#### **3.1. Pillars of resistive economy in the words of the Supreme Leader of Iran**

##### **3.1.1. The resistance of economy**

One of the requirements of resistive economy is maintaining and protecting the impenetrability of the country against enemies. Economy must be resistant in order to resist against the enemy's conspiracies.

One of the most important factors in the implementation of resistive economy as an appropriate framework for the economy of Iran is the existence of Western sanctions and the problems these sanctions impose on the market and different sections of the economy of Iran. To provide a definition of resistive economy, it can be said that, in short, resistive economy is an economy that turns economic threats into economic opportunities. In this regard, necessary managerial and administrative measurements must be taken in order to minimize the vulnerability of Iran's economy against destructive internal and external shocks and disturbances, especially the sanctions, and pave the way for achieving the sustained economic advances (Saif, 2013).

Since the raw material for the production of poultry vaccine are imported adjuvants, the import of which has been blocked by the sanctions, an appropriate alternative must be developed for it in order



to neutralize the conspiracies of the enemy in this regard. It is proposed in the present study that aluminum hydroxide adjuvants can be used instead of Montanide due to its low cost and domesticity.

### **3.1.2. Supporting national production**

Another pillar of resistive economy is supporting national production in industry and agriculture. Supporting national production is the endogenous part of resistive economy.

Realizing justice along with economic development and progress requires a unique Islamic-Iranian model of local development which is in the resistive economy framework and aims to neutralize the sanctions. In the resistive economy framework, it is pointless to discuss the relative advantages of strategic products and industries and self-sufficiency must undoubtedly be obtained in the production of agricultural products and other strategic products such as steel, machinery, electronics, and chemical products. Refusing to trust the global labor division and adopting the appropriate strategy to support all the domestic industries and businesses along with supporting special industries and businesses can be efficient (Sorkhedeji, 2013).

Aluminum hydroxide is produced as powder and must be turned into the form of gel in order to be used in vaccines. This change can be made in small quick-yielding businesses which will create jobs and increase national production. Whereas, Montanide must be imported from France, which increases the outflow of currency from the country. On the other hand, using aluminum hydroxide leads to the development of the country's industry and using the work force in order to decrease unemployment. In this case, the goal of supporting national production in resistive economy will be realized through this.

### **3.1.3. Management of foreign exchange resources**

Management of foreign exchange resources is an important issue and a firm decision must be taken for its implementation.

In order to realize this goal of resistive economy, this study suggested that by replacing montanide, which costs around 16 € a kilogram and the outflow of currency from the country, with aluminum hydroxide, which costs around 420,000 Rials a ton, we can prevent the outflow of currency from the country and manage foreign exchange resources.

### **3.1.4. The enemy's purpose from economic pressures**

The country's wise resistance against the enemy's pressures and sanctions slowed down their plans and prevented them from repeating. A few years ago, resistive economy was introduced by the Supreme Leader, and it was obvious that the goal of the enemy is economic pressure on the country and damaging the national growth and employment so as to disrupt national prosperity and cause problems for the people and separate them from the Islamic regime.

According to this view, it is obvious that the country's foreign exchange system must be structured in such a way that the threats to the country's economy, especially in terms of foreign exchange, are turned into opportunities so that the economy can be managed in the face of threats and do not face crises. In this regard, a foreign exchange system tailored to the economic characteristics and structure of Iran which is, at the same time, consistent with resistive economy framework and is capable of converting threats into opportunities must be introduced. In order to propose an optimal foreign exchange system, the relationship between the foreign exchange and export, import, and production of the country must be studied and analyzed (Saif, 2013).



In this regard, the import of oil adjuvant to the country has been sanctioned so that in the years 1997 and 2002, the first study on the use of aluminum hydroxide instead of oil adjuvant was conducted. The results of the study suggested that the aluminum hydroxide adjuvant is a proper substitute for oil adjuvants in the induction of an immune response.

### **3.1.5. Requirements of resistive economy**

One of the requirements of resistive economy is reducing the dependence on oil. Today, we should use this opportunity to replace oil with other gainful economic activities. Knowledge-based industries can fill this void to a large extent. In addition, we must reduce our dependence on foreign countries with the help of the different capacities in the country.

Moreover, competition between the vaccine produced using aluminum adjuvant and the foreign vaccine produced in neighboring countries can create revenue as its cost is less than that of the vaccine with oil adjuvant. Therefore, developing countries can easily use it.

### **3.1.6. Making maximum use of time, resources, and facilities**

Moving according to plan is an indispensable element in this field. Sudden decisions and changing the rules hurts resistive economy and the resistance of the nation.

Based on this, when the sanctions became serious, Razi Vaccine and Serum Research Institute designed this project so that the sanctions do not disrupt the process of vaccine development. Eventually, this project was successful in nine months.

### **3.1.7. Resistive economy, a meaning of entrepreneurship**

The existence of a true resistive economy in a country implies entrepreneurship. Circumventing the sanctions and the failure of those responsible for it is only possible with the cooperation of the people and the government and everyone must try to create jobs and make entrepreneurial efforts.

Today, throughout the world, population change, technology, inflation, unemployment, underdevelopment, and other environmental factors have caused changes to human society in ways very different than before and new challenges and opportunities have been introduced. Among the reactions and responses to these changing forces, the emphasis was on entrepreneurship from governments, organizations, and public opinion as the engine to economic development. Therefore, entrepreneurship is a concept that has always been with human beings and has had an important role in the economic development and advancement of countries as a novel phenomenon so that it is a key factor in the competitive and market-based economy. Thus, ensuring the survival of a country requires innovation, invention, and creation of new products and services (Modarresi, 2014).

It should be noted that if we replace oil adjuvant, which is a processed and prepared material, with aluminum adjuvant, which has to be converted to gel form by processing the aluminum hydroxide powder, jobs will be created, unemployment will be reduced, and the wealth and domestic production of the country will increase.

## **4. METHODOLOGY**

Due to the importance of resistive economy, using another material such as aluminum hydroxide as an adjuvant for the development of inactivated poultry vaccines instead of expensive and imported materials such as Montanide ISA70 seems economic and logical.

Thus, in this regard, in Razi Vaccine and Serum Research Institute, single and dual influenza and Newcastle vaccines with aluminum hydroxide (with dilutions of 10% and 20%) and oil adjuvants



were developed and inoculated to the chickens. Then, their immune responses were measured and compared with each other. Afterwards, the price of each dose of vaccine with Montanide and aluminum hydroxide was calculated and compared in the periods of one year and 10 years.

## **5. FINDINGS AND RESULTS**

Since aluminum hydroxide is capable of inducing immunity just as much as Montanide (in the Newcastle vaccine, the induction of immune response was even faster and higher), it is concluded that Montanide can be replaced with aluminum hydroxide.

In addition, comparing the 10% and 20% amounts of aluminum hydroxide suggested that as the amount of aluminum hydroxide gel increases, the induction of immune response occurs with more power and more intensely. Thus, the result are very similar to those of oil adjuvant.

Given the benefits of aluminum hydroxide adjuvant in poultry vaccines compared with oil adjuvant and due to the fact that the country is capable of producing aluminum gel and the fact that it is inexpensive, using aluminum gel instead of oil adjuvant is recommended.

### **5.1. Comparing the prices of aluminum hydroxide and Montanide adjuvants**

Montanide ISA70 is imported to the country with the price of 16 € a kilogram while the price of each ton of aluminum hydroxide powder is around 14 \$.

### **5.2. The costs of aluminum hydroxide and Montanide adjuvants for every dose of vaccine**

The cost of Montanide adjuvant for each dose of poultry vaccine is around 117.6 Rails, while the cost of aluminum hydroxide gel adjuvant used in each dose of vaccine is around 54.1 (in order to use aluminum hydroxide as adjuvant in vaccines, the powder needs to be converted into 2% aluminum hydroxide gel). The cost of each dose of oil vaccine is 2.1 times as much as the cost of a dose of vaccine with aluminum hydroxide gel.

### **5.3. Calculating the annual costs of vaccines**

Every year, 500 million doses of vaccine are produced in the country, which cost according to this formula:

$$TC = CX \cdot X$$

$$TC_{ISA70} = 500,000,000 \times 117.6 = 58,800,000,000$$

$$TC_{AH} = 500,000,000 \times 54.1 = 27,050,000,000$$

Where TC is the total cost, CX is the price of input, and X is the amount of input.

The annual costs of producing vaccines using Montanide ISA70 and aluminum hydroxide (AH) adjuvants have been calculated. Production of oil vaccines costs 58,800 million Rails a year, whereas using aluminum hydroxides in these vaccines instead of oil-based adjuvant (Montanide ISA 70) costs 27,050, which half as much the cost of producing vaccines using Montanide adjuvant. Around 500 million doses of oil vaccines is produced annually in Razi Vaccine and Serum Research Institute and Pasouk Co. In Razi Vaccine and Serum Research Institute, in a period of 10 years, the number doses produced annually has increased from 50 million to 300 million. Moreover, in Pasouk Co., in a period of seven years, the production of oil vaccines increased from 100 million doses to 250 million doses





annually. Thus, since 70% of the volume of every .5 ml of vaccine is constituted of oil, the annual cost can be calculated.

The cost of oil for each dose of vaccine is 22,400 Rials. In the first year, given the production of 50 million doses, the cost is calculated to be 11,200 million Rials. Given the 60-fold increase in the production of these vaccines in the last 10 years, the cost of purchasing oil in the last 10 has been around 67,200 million Rials.

Given the long history of vaccine production in Razi Vaccine and Serum Research Institute, it must be noted that the launch of this production line, an amount of 27,050 million Rials will be saved annually in the production of these vaccines (it must be noted that this cost estimate refers only to the cost of the adjuvants used in the vaccines). If the production of this product is resumed during the next 10 years, an amount of 270,500 million Rials will be saved in the costs of the adjuvants used in the production of poultry vaccines. In addition, we will avoid other costs such as expensive machinery, customs, and the outflow of currency out of the country, which paves the way for the economic growth and development of the country, given that we have taken a step forward in order to improve the health of the people of the country by producing healthy poultry products.

## **6. CONCLUSION**

Resistive economy or, in other words, the decrease in dependence and emphasis on the benefits of production and endeavor for self-confidence is one of the ways to manage the economic conditions in the current state of the country (Hossein Zadeh Bahraini, 2013).

Academics and educators play an important part in the resistive economy strategy and they are expected to try to realize the resistive economy which is based on knowledge, technology, and justice, one which is endogenous, dynamic, and pioneering, and it expected of them to make efforts in order to solve economic problems and propose appropriate solutions according to the conditions of resistive economy. If the role of academia elements in the realization of resistive economy is proposed as a conceptual model, it consists of four major components: the role of the structure, the role of human resources, the role of the management of the efficient use of financial and material resources, and the role of concepts and training courses (Amiri, 2014).

Also, a study was conducted on the knowledge-based economy in order to overcome economic sanction of China, and results suggest that China has developed in non-optimal conditions by relying on a knowledge-based economy. Therefore, inspired by China, Iran can adapt this model in order to circumvent sanctions and develop in spite of them (Shah Abadi & Bahari, 2013).

Mohammadi Moghaddam et al. (2013) concluded in their study that there is a positive relationship between resistive economy and tendency towards entrepreneurship and knowledge management.

In addition, Gholami (2012) found a significant relationship between resistive economy and tendency towards entrepreneurship.

Mili Monfared (2013) also considers maximum benefit from existing resources and facilities as a function of efficient management of financial and material resources.

Having analyzed the effects of the components of resistive economy on creating competitive advantages in organizations, Faezi (2014) showed that resistive economy and all its components, especially the two components 'emphasis on domestic production' and 'increasing efficiency', are highly influenced by the creation of competitive advantage in the organization. After analyzing the



data, it was showed that domestic production affects the creation of competitive advantage in the organization, among which the production and self-sufficiency of major products such as food, agricultural and medical products, raw materials, and knowledge can be named. In this regard, organizations and agencies require official governmental support. In addition, supporting non-oil products affects the creation of competitive advantage in the organization. Increase in innovation and independence from oil industry encourages organizations to innovate.

Results of the analysis suggest that sanctions have been converted into opportunities so that, in some cases, the increase in pressure and intensity of sanctions led to self-sufficiency in industries and efforts in order to neutralize the threats.

Economic sanctions affect the people of a country in various ways. The most direct way is their effect on public health through the lack of proper nutrition and the decrease of food import, which lead to the decrease of the calories consumed. Thus, children and vulnerable groups are more susceptible to chronic diseases and more vulnerable to diseases such as tuberculosis, measles, and other infectious diseases. In addition, the increase if food price leads to malnutrition in individuals such as pregnant women which can have adverse effects on the baby. These examples suggest the sanctions affect not only the economic and financial aspects of a country but also its health and food. This aspect of sanctions is too harsh and unfair (Ghasemi, 2014).

One of the factors affecting the economy of Iran is non-oil export as a channel of communication with the world economy. Thus, extensive research is necessary in order to extend non-oil export and increase its diversity in order to decrease vulnerability which is one of the goals of the economic development of the country. Results of the analysis of non-oil export and predicting the changes in business partners of Iran using econometric techniques and based on the anticipated sanctions suggest that during the coming years, export of non-oil products to the neighboring countries will increase (Bastani, 2014).

Research and development are the main factors in the economic development of countries which lead to innovation, improvement in quality and diversity of products and services, reducing costs and increasing the strength of competition and interdependence. Variable of knowledge in developed countries suggest that they spend around 2-3% of their gross domestic products for research and development while this amount is less than 1% in developing countries. Since the international trade of the country is able to use foreign technologies and the knowledge and technology required to convert raw materials to high-quality products for export and increasing the interactions and interdependence among countries, by analyzing and studying the role of knowledge factors in non-oil export of Iran and in order to increase the degree of interdependence and reducing vulnerability against sanctions, we observe a clash of power and the decrease of the dependence of Iran's economy on global economy (Shah Abadi, 2014).

In resistive economy, we must be able to devise a local industrial development model based on progress together with justice while neglecting the revenues of oil and gas and in spite of the sanctions. Also, by analyzing the strategy of supporting national production during sanctions, approaches towards industrialization have been proposed, among which the most widely accepted one is emphasis on replacing imported products with products produced by domestic manufacturers. Given the sanctions and the decrease in oil revenues, the economic costs of Iran have increased and each time the plans have been accurate and the governmental interventions planned and informed, the sanctions have been ineffective or less effective. For example, in military and oil industries, the determination and will caused by the bottlenecks have led to significant advancements. Therefore, it



can be stated that, through knowledge, we can not only neutralize sanctions, but also reach significant advancements with a knowledge-based and local development model free of corruption, like Japan and South Korea which are devoid of oil revenues and natural resources. Undoubtedly, resistive economy facilitates the route to this goal in this framework by neutralizing the sanctions. Thus, in order to adapt the proper strategy for industrial development in resistive economy, and in spite of the sanctions, solutions such as strengthening the internal solidarity, informed governmental interventions, creating a productive rather than a consuming economy, replacing foreign products with domestic ones, and extending technology, research, and development are essential (Sorkhedehi, 2013).

Despite their vast expenses, America's sanctions have failed to reach their goals. We cannot, however, consider these sanctions as completely ineffective as they have succeeded in worsening the wounds of Iran's economy. Nevertheless, these effects are in the sideline (Alikhani, 2005).

The common interpretation of resistive economy is confronting economic sanctions. This means that, firstly, it seeks for ways to circumvent the sanctions and, secondly, it increases the tolerance of hardship and pressure within the national economy (Torabzadeh, 2013).

The results of the comparison between the dimensions of resistive economy in both the academia and the society suggest that the factors paying attention to entrepreneurship, relying on the knowledge of economics, paying attention to knowledge-based companies, consumption management, and maximum use of resources and time were of the highest priority (Yari Naserieh, 2014).

The results of Ramezani's (2014) study showed that by paying attention to the implementation and the necessity of entrepreneurship in order to reach the goals of resistive economy, external threats and pressures can be converted into opportunities and the improvement of internal forces and focus on domestic innovation.

In a general conclusion, it can be said that Iran has been subject to sanctions for years. These sanctions have even affected the acquisition of raw materials for vaccines and medicines. Thus, it is crucial that proper theoretical frameworks be proposed in order to confront sanctions and reduce their negative effects. In this regard, the Supreme Leader introduced the concept of resistive economy and its overall policies in order to strengthen the economic structure and neutralize the enemy's conspiracies.

The present study aims to realize the goals of resistive economy in vaccine industry by replacing an expensive imported material (the import of which posed problems during the sanctions) with an inexpensive domestic material in poultry vaccines so that dependence on foreign countries is reduced and the effects of sanctions are neutralized.

As mentioned, using aluminum hydroxide in the production of vaccines reduces the costs of production to half. Given the increase in the production of these vaccines in recent years, the annual costs of producing vaccines with aluminum hydroxide adjuvants are 27,050 million Rials.

Aluminum hydroxide is an available and inexpensive material, unlike Montanide which is produced in France and costs a lot of time and money for us to acquire it. Thus, using aluminum hydroxide instead of Montanide seems logical. The sustainability of oil vaccines is high in the body of the host and the residual vaccine remains in the body for a long time. Carcinogenicity of this product has been confirmed by studies and that it causes harmful side effects in the body of the host at the site of the inoculation. However, these adverse effects have not been observed in aluminum hydroxide and as mentioned by the previous studies, aluminum hydroxide is completely safe.



Producing vaccines with oil- based adjuvants is usually a complex and difficult process which requires experienced and advanced experts and advanced and high-tech machinery, all of which impose great costs. In addition, the acquisition of such machinery is difficult and costly. Compared with this method, producing vaccines with aluminum hydroxide is very simple and does not require expensive and high-tech machinery.

Therefore, using aluminum hydroxide gel as adjuvant in the production of these vaccines cost half the as much as the use of oil-based adjuvant. During the last 10 years, with the 60-fold increase in the production of these vaccines in the country, an amount of 67,200 million Rials has been spent on it. Thus, using aluminum hydroxide is more cost-efficient and prevents the dominance of other countries on Iran and leads to the circumvention of the sanctions.

As a result, by producing vaccines with aluminum hydroxide, we can reach self-sufficiency in the production of vaccines and create jobs for the youth.

Replacing Montanide with aluminum hydroxide in the production of vaccines and the decrease in production costs, the price will be lowered and due to the localization of this product, influenza and Newcastle vaccines will be more available to poultry houses. As a result of the timely use of these vaccines for the poultry, the losses in the poultry industry will be reduced which leads to the decrease of financial losses caused by these casualties.

Moreover, the production of this product prevents the outflow of currency from the country. The export of this product can even cause the inflow of currency for the country and reduce the dependence on oil revenues and help the economic improvement of the country and the realization of resistive economy. The ultimate goals are to minimize the costs in accordance with resistive economy, using domestic materials in order to reduce the dependence on foreign countries, creating jobs for the youth, using domestic products, decreasing the outflow of currency from the country, exporting products to the neighboring countries and bringing in currency, and removing imported products and the development of self-sufficiency in Iran.

With the present study, it is obvious that the goals of resistive economy in the view of the Supreme Leader, which include supporting national production, entrepreneurship, management of foreign exchange reserves, circumventing sanctions, reinforcement of the economy, and reducing dependence on foreign countries, will be realized.

## **7. SUGGESTIONS**

Since vaccination is an integral part of the program of preventing communicable and dangerous diseases and since Razi Vaccine and Serum Research Institute and the private sector import their raw materials such as adjuvants and their culture mediums, it seems that the country's biological center must be supported more by the government and the private sector of the vaccine industry needs to be strengthened and supported in order to fulfill their raw material needs. Moreover, with the comprehensive and complete introduction of the vaccine industry and with the entrance of the private sector into the industry, more development is to be expected in the near future so that at least this industry can become totally self-sufficient and rely on the domestic infrastructural industries and free the regional markets, especially those of the Islamic countries from the dependence on Western and Eastern countries. It can be said that vaccine industry is a never-depleting oil well which is essential and the public health of the country needs it day and night. On the other hand, in the case of the stoppage of this industry due to sanctions or other reasons, the price of the so-called inexpensive vaccines sold to Iran by international countries will be multiplied.



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## **ETHICAL CONSIDERATION**

Authenticity of the texts, honesty and fidelity has been observed.

## **AUTHOR CONTRIBUTIONS**

Planning and writing of the manuscript was done by the authors.

## **CONFLICT OF INTEREST**

Author/s confirmed no conflict of interest.

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