# Protection and comparative advantage of walnut production in Iran: A Policy analysis matrix

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## Abstract

This paper seeks to quantify the extent to which Iran has a comparative advantage in the walnut and determined that how far the current set of policies is consistent with the comparative advantage. The domestic resource cost (DRC) has been applied. DRC method relies on production cost data to compare efficiency. Distortions may require the estimation of shadow prices to reflect true social opportunity costs but, when adjusted, the country that has the lowest DRC has a comparative advantage. The DRC method is dynamic, providing useful information to decision-makers. However, DRC were used for the analysis of data for the five harvesting years, 2007-2008 to 2011-2012. The analysis was carried out in the context of Policy Analysis Matrix (PAM). The Domestic Resource Cost (DRC) analysis for Iran concluded that Iran had comparative advantage in producing walnut for the study period.

Keywords: Domestic resource cost; Comparative advantage; Iran; Walnut.

## Introduction

There are two major varieties of walnuts grown for its seeds, the English walnut and the Black walnut, the English walnut originated in Persia. The commercially produced walnut varieties are nearly all hybrids of the English walnut. Various species of walnuts are economically important trees for both their wood and their edible fruits which may be gathered in the wild but are now mostly grown in plantations. In Iran, walnut is one of the most valuable tree species based on price per board foot. It has long been in high demand throughout the world for wood products because of its beautiful color, strength, durability, dimensional stability after drying, and excellent machining qualities. Besides wood products, walnut trees produce edible nuts, wildlife food, and beauty, while protecting soil and water resources. When you plant and care for walnut trees, you are making an investment that may pay off handsomely in future years. [1]

Production of walnuts in Iran has oscillated over the last two decades but has also followed an increasing trend (Fig.1). Much of the variability in production is due to the alternate bearing nature of walnut trees. Of course, yields per acre have also been variable over the years and also have shown more significant decreases in the last decade. Walnut yields have generally decreased

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from about 5.5 tons per acre in the early 1983s to around 2.9 tons per acre in 2010.According to government policies regarding the development of walnut cultivation in Iran, two new varieties of Persian walnuts Jamal and Damavand in Iran is growing. The two new varieties yield more than five tons per hectare. [5] (Fig. 2)

The value of production of walnuts in Iran has followed a clear upward trend for decades, although sometimes notably. The Iran values of walnut production in 2009 totaled a record $1734 million, which made walnuts the 4th highest valued fruit and tree nut, crop in Iran. [6]

Bearing acreage of walnuts increased from 1983 into the early 2010s. Acreage increases were noticeable after 1995; when each subsequent year acreage remained either at present levels or increased. In 2010, bearing acreage reached a record 122000 acres. [5] (Fig.3)

Roughly 99.99 percent of Iran walnut production is utilized domestically, with an additional .01 percent kept for export market. [6](Table 1)

Despite the significance of walnut in the economy of Iran, walnut production has been subject to instability due to fluctuating weather, changing government policies, rising cost of production(particularly because of high prices of fertilizers, insecticides and pesticides) and year to year variability in output prices. This has adversely affected the profitability of walnut growers as well as the welfare of Gardening sector. It has been generally believed that Iran has an overwhelming competitive advantage in the production of walnut, even without additional technological change but it does not specialize as much as would have been profitable.

However, trade liberalization under WTO regime, increasing competition and relative competitiveness of different countries poses a challenge to the competitiveness to the Iran walnut. One of the most important questions that arise is, should we specialize in walnut production or should we diversify our cropping system and produce several crops so that total gains from the production of many crops are maximized. It necessitates that the allocation of limited resources to different crops should be guided by some economic performance criteria of which the international competitiveness stand out to be the most critical.[27] It brings in the principle of comparative advantage to use it as a guiding factor in the allocation of scarce resources. So comparative advantage and policy analysis are of crucial importance for planners, policymakers, administrators, price fixing authorities and others concerned with the farming sector, to know whether or not current set of policies are consistent with the comparative advantage .[8,9,10]

In economics, the law of comparative advantage refers to the ability of a party (an individual, a firm, or a country) to produce a particular good or service at a lower opportunity cost than another party. It is the ability to produce a product with the highest relative efficiency given all the other products that could be produced. It cans be contrasted with absolute advantage which refers to the ability of a party to produce a particular good at a lower absolute cost than another. Comparative advantage explains how trade can create value for both parties even when one can produce all goods with fewer resources than the other. The net benefits of such an outcome are called gains from trade. [11] It is the main concept of the pure theory of international trade (Pearson et al., 2003). [36, 34] Here, after Bruno (1963). [5, 33] Leontief (1974). [23] Heley (1985). [10] Tweeten (1986). [39] Hook (1992).[13] Memedovic (1994).[29] Winter(1995).[43] Fang al.(2000).[8] Shahabuddin and Dorosh (2002).[33,37] Huang (2003).[12] Lagos and Mardones (2003).[22] Khan et al. (2004).[21] investigated the comparative advantage of agricultural and industrial products in different countries; Haji Rahimi (1999).[14] Hadrbady (2001).[15] Dehghani (2003).[6] Mahanta (2005).[32] Karbassi et al. (2005).[20] Azizi and Yazdani (2006).[1] Mehdipour and Nejad (2006).[24] Shahnvshy et al. (2007).[38] Daneshvar et al. (2007).[7] Zhu, X., Demeter, R. and Oude Lansink, A. (2008a).[45] and Ahmed. (2011). [3] Quddus (2011). [35] Reviewed the policy and comparative advantage.

The objective of this study is to develop a basic, yet systematic framework for assessing country comparative advantages in competing walnut production activities, discuss how this framework can help entrepreneurial and policy decision-making in walnut development, and illustrate the practical application of the framework. The study was conducted to determine international competitiveness of Iran walnut and to assess that how far the current sets of policies are consistent with existing pattern of comparative advantage.

## MATERIALS AND METHODS

The PAM is a computational framework, developed by Monke and pearson (1989) and augmented by masters and Winter-Nelson (1995), for measuring input use efficiency in production, comparative advantage among commodities, and the degree of government intervention. The basis of the PAM is a set of profit and los identities that are familiar to any businessman (Nelson and Panggabean, 1991). The basic format of the PAM is a matrix of two-way accounting identities (Table 2). [11, 37 and 44]

The data in the first row provide a measure of private profitability (N), defined as the difference between observed revenue (A) and costs (B+C). Private profitability demonstrates the competitiveness of the agricultural system, given current technology, prices for input and outputs, and policy. The second row of the matrix calculates the social profit that reflects social opportunity costs. Social profits measure efficiency and provide a measure of comparative advantage. In addition, comparison of private and social profits provides a measure of efficiency. A positive social profit indicates that the country uses scare resources efficiently and has a static comparative advantage in the production of that commodity at the margin. Similarly, negative social profits suggest that the sector is wasting resources that could have been utilized more efficiently in some other sector. In other words, the cost of domestic production exceeds the cost of imports, which indicates the sector cannot survive without government support at the margin. The third row of the matrix estimates the difference between the first and the second rows. The difference between private and social values of revenues, costs, and profits can be explained by policy intervention. [40]

The PAM framework can be used to calculate important indicators for policy analysis. [41, 44] The nominal protection coefficient (NPC), a simple indicator of the incentives or disincentives in place, is defined as the ratio of domestic price to a comparable world (social) price. The other two indicator that can be calculated from the PAM include the effective protection coefficient (EPC) and domestic resource cost (DRC). [2, 16, 24]

Domestic resource cost the most useful indicator of the three, is used to compare the relative efficiency or comparative advantage between agricultural commodities, and is defined as the shadow value of no tradable factor input used in an activity per unit of tradable value added (F/(D-E)). [42] The DRC indicates whether the use of domestic factors is socially profitable (DRC<1) or not (DRC>1). [2, 16, 24 and 33]

The study covers the analysis of three major producing regions i.e. Hamadan, Fars and Semnan provinces of Iran, for the period of five years from 2008-2012. The provinces were selected on the bases of their contribution to total walnut production. The Hamadan, Fars and Semnan accounts for 56 percent in production. In our study, production cost estimates were based on data obtained from Ministry of Agricultural. The data were also supplemented by domestic and international prices of inputs and outputs to get representative budgets for walnut crop. The data collected were analyzed by using the Domestic Resource Cost analysis (DRC), through the Policy Analysis

Matrix (PAM) approach given in Table 1. Empirically, the policy analysis matrix (PAM) is a convenient tool for the DRC analysis [26, 30, and 34].

The approach was used to determine international competitiveness of Iran Walnut and the effect of current set of policies on the existing pattern of comparative advantage of Iran Walnut.

## RESULTS AND DISCUSSION

In this study, financial processes, including costs and revenues is reviewed from walnut producer in the province of Hamadan, Fras and Semnan. Costs include rent, labor, land, equipment, water, machinery, fertilizer and etc. Income includes income from product sales a year. Clearly after the shadow price of production and raw materials, possible indicators of comparative advantage comes from providing walnut production. Tables 3 show the results of policy analysis matrix. DRC in Table 3 is less than one. This means that there is comparative advantage in walnut production.

Historically Hamadan has been the leading province in walnut production due to its natural and geographic location.

## CONCLUSIONS

This study is an application of policy analysis matrix (PAM) to measures the international competitiveness of walnut in Iran, and determines whether or not the existing policies are consistent with the existing pattern of production and export Overall results of the study depict that Iran under WTO regime has comparative advantage in producing walnut as export crop. However, agricultural policies are not consistent with the existing comparative advantage. [38] The findings of the paper suggest exploiting available potential in the cultivation of walnut to cater the local needs as well as for the earning of foreign exchange. Concerted efforts are needed to improve performance of walnut production and processing sectors. In the face of emerging WTO challenges macroeconomic policies need to be conducive, for which following are suggested.

As one percent of walnut production in Iran is exported at the present time, and this amount does not match to the walnut production in Iran, It is necessary to stabilize the prices in order to increase the export of this product. [10, 39] Moreover, the government should subsidize the required things for the walnut production such as chemical fertilizers and pesticides to increase

the walnut export. [2] At par with reform of factor markets, the efficiency of input delivery system should also be improved. Black marketing, under invoicing and sale of substandard fertilizers and pesticides should be eradicated through strict punitive actions, open market sales and breaking the grading and standardization of the products to bring them at par with international standards must be ensured.[38]Iran should invest heavily in packaging, grading and procurement and delivery system technologies for an effective entry to export market. Along with other factors the total productivity of the crop depends on the quality of walnut. Therefore, production and provision of quality seed must be ensured indirect tax regime should be revisited in order to reduce cost of production. Reduction in indirect tax will help reduce cost of production. However the benefits of trade reforms accruing to Iran are heavily dependent on the response of developed countries to reform measures especially in terms of opening up of their markets.

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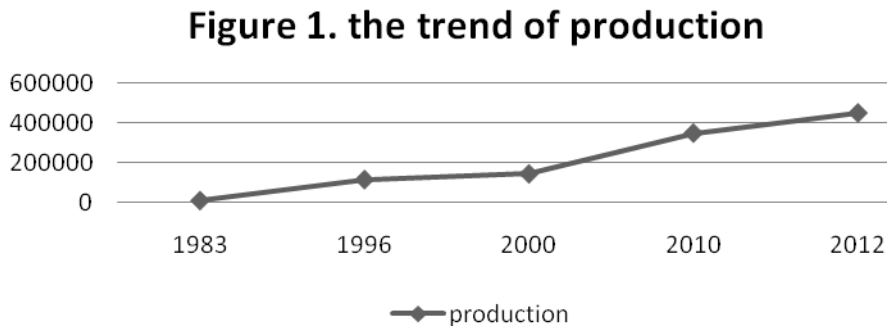
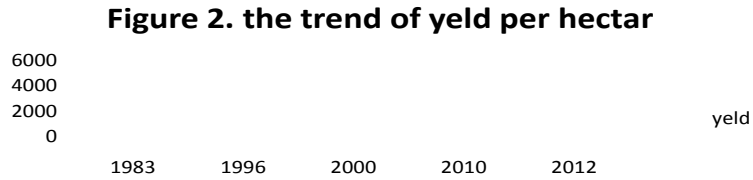
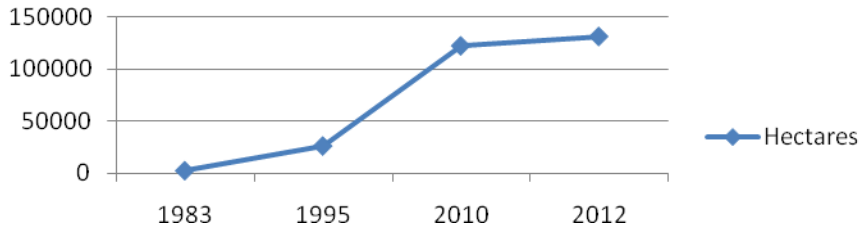



* *Source:* Ministry of Agriculture of Iran




* *Source:* Ministry of Agriculture of Iran

**Figure 3. The trend of harvested area in Iran**




* *Source:* Ministry of Agriculture of Iran

**Table 1. The export of shelled walnuts and walnuts with shell**

| 1961 | | 1980 | | 2000 | | 2010 | | 2011 | |
|---|---|---|---|---|---|---|---|---|---|
| Ton | percent | Ton | percent | Ton | percent | Ton | percent | Ton | percent |
| 0 | 0 | 0 | 0 | 23.5 | 3.18 | 62 | 0.4 | 157 | 0.08 |
| 2952 | 7.03 | 850 | 2.71 | 21 | 0.018 | 217 | 0.171 | 351 | 0143 |

* *Source:* Trade Promotion Organization of Iran

**Table 2. Policy analysis matrix (PAM)**

| Value of input | | Value of input | | profit |
|---|---|---|---|---|
| | | Tradable | Domestic cost | |
| Private profit | A | B | *C* | N |
| Social profit | D | E | *F* | O |
| Output transfer | G | H | *I* | P |
| Private profit | N = A - (B+C} | Input transfer | H = B - E | |
| Social profit | O = D - (E+F) | Factor transfer | I = C - F | |
| Output transfer | G = A - D | Net policy transfer | P = N - O | |

Developed by Monke and Pearson (1989). [31]

**Table 3. Domestic Resource Cost (DRC) Coefficients of walnut**

| Year | Hamadan | Fars | Semnan |
|---|---|---|---|
| 2007 - 2008 | 0.28 | 0.34 | 0.39 |
| 2008 - 2009 | 0.29 | 0.36 | 0.40 |
| 2009 - 2010 | 0.31 | 0.38 | 0.42 |
| 2010 - 2011 | 0.35 | 0.38 | 0.45 |
| 2011 -2012 | 0.37 | 0.39 | 0.47 |
| 2012 - 2013 | 0.38 | 0.37 | 0.44 |
| Average | 0.33 | 0.37 | 0.43 |

*Source: Author's computation*