Research Article

Assessing Strategic Agricultural Policies for Sustainable Development in Iran: A Retrospective and Delphi-Based Evaluation on Progress in Economic, Social, and Environmental Dimensions

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Abstract

Sustainable development in agriculture requires strategies that align with economic, social, and political priorities while also adhering to global standards such as the Sustainable Development Goals (SDGs). This study employs a retrospective approach and the Delphi method to assess strategic agricultural policies in Iran as a developing country, evaluating past policy effectiveness and proposing future directions. A combination of library surveys and expert opinions reveals that, in the short term, prioritizing cultural programs for food security and comprehensive free-market agriculture hold the highest significance. In the mid-term, initiatives such as knowledge-based agriculture (political), village-based entrepreneurial efforts, and industrial agricultural research (economic) emerge as critical areas of focus. Long-term strategies emphasize justice-oriented progress, effective water resource management, and transformational industries. The study's findings contribute to developing standards and metrics by which agricultural policies can be assessed for sustainable efficiency, performance, and progress.

Keywords: Policymaking; Sustainability; Agriculture; Foresight study; Retrospective concept.

INTRODUCTION

The increasing demand for agricultural products worldwide usually contrasts with environmental protection goals [1]. While agriculture is the mainstay of food security, it is also the biggest user of the earth's freshwater resources, which results in massive energy consumption [2]. On the other hand, food, water, and energy are three basic elements of human life and socioeconomic development, which make them exceptionally interlinked.

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The scale of the problem becomes more evident when research shows that more than 1.5 billion people in the world, or two billion people inhabited in developing countries, will face drastic water scarcity as we pass the 21st century [3] since food production is responsible for more than 90 percent of freshwater consumption globally [4]. Thus, it seems necessary to employ methods that guarantee a sustainable and reliable way of agriculture in the future, as depicted in Fig.1, besides meeting sustainable development goals (Fig.2). However, this is important for governments in what way to select between different possible strategies in a country.

Social	Land rights	Gender gap	Rural poverty	Under nourishment	Food affordability	Crop diversity
Economic	Food loss	Trade openness	Government supports	Price volatility	Finance access	Labor productivity
Environmental	Water consumption	N Surplus	P Surplus	Land use change	Greenhouse gas	Soil erosion

Figure 1. Sustainable agriculture components matrix [5, 6]

Figure 2. Sustainable development goals [7,8].

There are several methods for aiding decision-makers, like Interacting groups in which the level of control on interactions between the members is at the lowest level [9, 10]. Staticized groups; Groups of individuals who never meet and make suggestions or estimate quantities often have only one interaction of input, and their information are combined into a master list if they are making suggestions or averaged if they are making quantitative estimates [11, 12, 5]. The Nominal Group Technique (NGT) is another structured method using a face-to-face interaction technique that represents guidelines and suggestions in the shape of a group judgment [13, 14, 15]. Also, Delphi is a structured method of forecasting based on the expert's opinion and allows many individuals to

address a problem as a whole. Among all consensus methods, NGT and Delphi are more popular and dominant [16, 17, 18].

In addition to some limitations which should be considered during the implementation phase, Delphi has particular advantages of a wide range of access to required experts [19], design simplicity, and flexible application [20, 21], anonymity [22], democracy [23] and cost-effectiveness [22, 21]. Furthermore, Delphi is easy to link with foresight methods like the 3-Horizons model.

Using these techniques to explore policies and methods of refining agriculture would result in some benefits, such as representing more sustainable approaches in agriculture that consequently redeem mentioned progressing problems and also bring in valuable managerial insights which help reach the sustainable development possible [22, 24, 25]. It should be considered that implementing targeted policies needs different apparatuses and tools [26, 27, 28]. By looking at Table 1, it is obvious that in foreign research, neither the historical course of agricultural developments in Iran has been comprehensively evaluated nor has a model to show how the progress has been established (especially after the 1979 revolution). This is while micro and detailed studies on different sections have been conducted, but not with a macro perspective and the aim of extracting patterns for progress. Also, the approach of the studies is based on Western views and not on the element of justice. At the same time, the research process of the present study can cover this research gap to localize the operational models of the country's agricultural development.

Table 1. International studies on agricultural developments in Iran.

No.	Year	Description	Reference
1	1985	Assessment of agricultural development policies	[29]
2	1995	Analysis of some questions about sustainable agricultural development in Iran	[30]
3	2007	A multiple criteria evaluation of sustainable agricultural development models	[31]
4	2011	Agricultural cooperatives for agricultural development	[32]
5	2011	Investigation of Farmers' participation in agricultural development	[33]
6	2013	Conceptualizing sustainable agriculture (time section)	[34]

7	2013	Exploration of Agricultural development in Iran (based on cloud computing theory)	[35]

Researchers have worked on plenty of sustainable agricultural strategies to overcome probable food supply difficulties in the future. [36] proposed a framework to categorize agribusiness strategies and then used this framework to identify short-, medium- and long-term strategies to be pursued by responsible organizations in Canada. [37] examined employing emerging technologies as a more sustainable strategy for the future, among other alternatives, and prioritized investments in new technologies in Denmark. [38] represented strategies in management practices and breeding procedures to mitigate food insecurity under 2050 scenarios. [39] also scrutinized possible ways of changing the food supply system toward a more sustainable supply chain by some farmer-based communities in Hungary. [40] explored how cultural policies affect agricultural changes, he analyzed the intersection of mechanisms and cultural politics in an Amazonian agrarian reform in Brazil.

[41] researched an agroecological perspective of sustainable agriculture and technological approaches in the United States to reach a more self-sufficient and independent farming system. [42] conducted a profound review of research to show how politics takes part in global concerns with food. [26] explored the most important and technology-based surveys in the last two decades to clarify beneficial technology advancements applicable to more sustainable agriculture in the future. [43] investigated strategies for future sustainable crop production in China and also discussed how the recent development of new integrative omics tools, advanced genome-editing tools, and synthetic biology approaches could achieve these goals. [44] also assessed mutualistic microbes associated with plants for more sustainable agriculture in the future. [45] reviewed the most important energy-saving strategies based on solar-driven technologies to provide an eco-friendlier and less fossil fuel consumption in farming. Also, [46] reviewed the research between 2010 and 2020 to create a roadmap for researchers to ease the implementation of microalgae as a bio remedy to mitigate the adverse effects of pesticides while increasing food security. [47] analyzed the necessity of considering peasants' demands on agricultural policies and how they are neglected among reformist and revolutionary strategies.

According to reviewed literature, the application of strategy assessment technique by integrated historical data analysis, Classical Delphi (CD), and Three-Horizons System (THS) are not evaluated, and the outcomes of this appraisal with a concentration on sustainability aspects for futurization studies can fill the research gap in this study area.

The present study aims to: Extraction of agricultural strategies in Iran and study after 1976 with library assessment of upstream documents; Categorization of extracted strategies in three politico-regulatory, economic, and socio-cultural groups as per experts' ideas; Comparing the strategies of both era (After revolution and before) through the

visual-logical methods through time; Implementation of integrated CD-THS for exact strategy buildings for agriculture of Iran in the mentioned groups and consideration of short-, middle, and long-time programming schemes; Evaluation of Sustainable Development Goals (SDGs) according to outcomes of this study; and Presentation of managerial insights for the short-time, middle-time, and long-time.

In the following, the materials and methods with emphasis on descriptive techniques, statistical methods, and other computational systems are scrutinized in Section 2. Likewise, the argument of the present study's outcomes with other research is evaluated as per Section 3. Then, the managerial insights are presented in Section 4. Finally, the main outputs and suggestions for future studies are expressed based on Section 5.

MATERIALS AND METHODS

The case study, the big picture of the study, the research scheme, and the futurization techniques are described in this section of the study.

Case Study

Throughout the history of Iran, each era and government have addressed the issue of agriculture based on their intended purpose and direction. However, in some cases, based on the attitude of the government of that time, the policies have acted quite differently. The macro-policies of a country in terms of governance determine the strategies of that country, which in general, directs all its actions [48]. For example, in the first Pahlavi period, Iranian agriculture sought to imitate Western governments and world powers blindly, but in the second Pahlavi period, governance processes sought to completely extract power from farmers and create a single power in the hands of the king [49, 30]. This is while in the Republic period, the attitude is entirely independent of Western thoughts, and the ultimate goal is to create self-sufficiency in meeting the country's needs by farmers [50].

Field and historical investigations indicate that governments and countries are moving towards a specific issue based on macro patterns and fundamental idealisms. Many countries establish large-scale issues based on global development models (Sustainable Development Models). These development policies are, in fact, pre-determined versions for the realization of a unified world. However, it should be noted that different world regions' needs, culture, beliefs, and indigenous thoughts are entirely different and cannot be considered based on the same patterns.

Attention to indigenous origins is one of the most critical challenges in implementing the same pattern worldwide. Resource conservation may be particularly important in sustainable development policies, which with a mechanistic view of the world, could be a higher priority than the survival of humankind and purposeful living. However, in the Iranian model (After revolution) of progress, the realization of justice-oriented progress takes precedence over all necessities and is given special attention by the rulers. Finally, a schematic flow of transitions and developments in Iranian agriculture from the Achaemenid period to now is shown in Fig. 3.
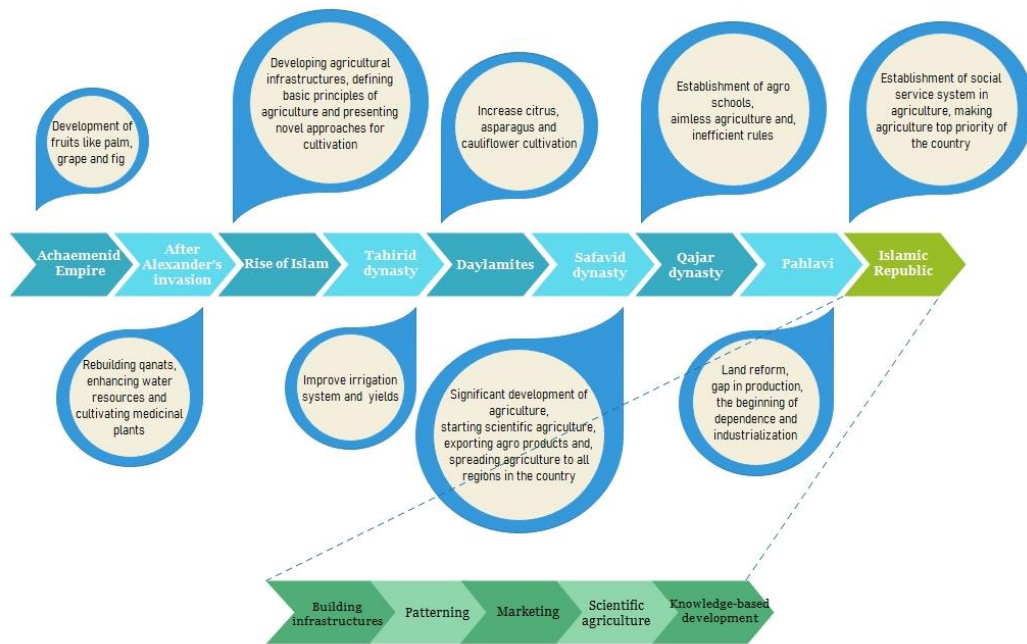
Figure 3. An overview of the evolution of agricultural history in Iran [29, 51, 32, 52, 53, 54, 55].

Comprehensive overview of the research

The general process and components of the strategic analysis of Iran's agricultural policies in the historical periods of the Republic and the second Pahlavi are shown in Fig. 4. As it is evident in this figure, in the first step of this research, all written documents are evaluated, and the interviews and oral histories are analyzed in the next step. In the following, each politico-regulatory, socio-cultural, and economic strategies in width (between the Republic period and the second Pahlavi) and length (between different politico-regulatory, economic, and socio-cultural issues in a single system) are compared and evaluated. After extracting the conceptual models, feedback is obtained at each step using a meeting of experts consisting of proponents and opponents. Feedback was provided through expert meetings, face-to-face, and online interviews (telephone and Internet).
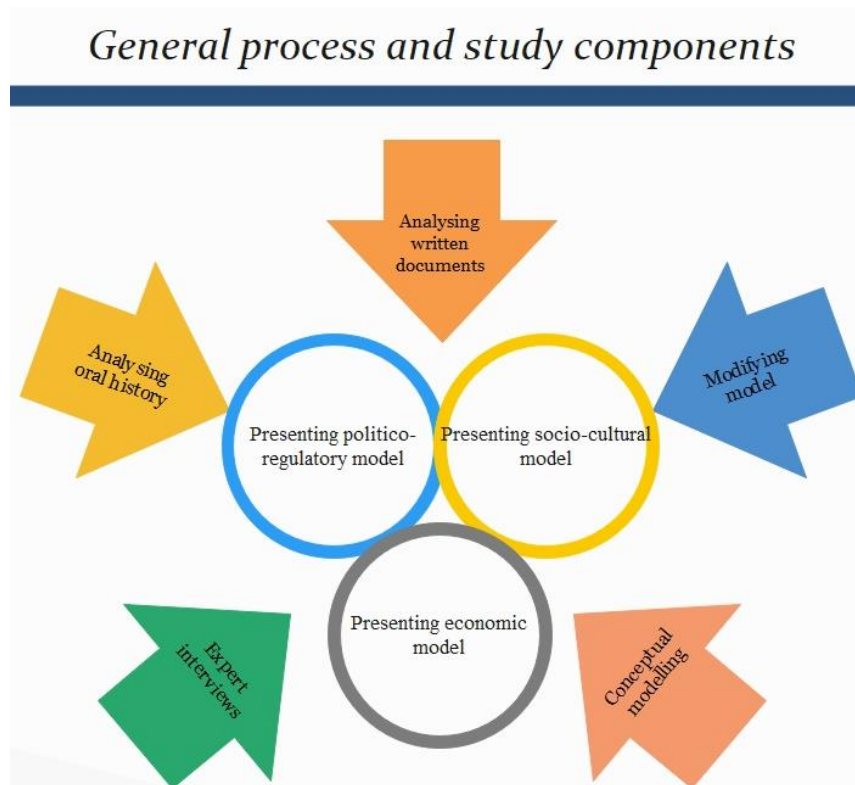
Figure 4. The general process and components of the present study.

Research scheme

The overall procedure of materials and methods of this research is shown in Fig. 5. As described in this flowchart, the primary information in this study is obtained in three ways (i) data received from government agencies (Ministry of Agriculture, Statistics Organization, etc.), (ii) extraction of data in scientific articles, and (iii) scientific interviews with the experts. In the following, the received information is classified, validated, and accredited, and then the trend of agricultural developments based on economic, socio-cultural, and politico-regulatory indicators is examined separately.

After that, each indicator will evaluate all the developments based on temporal and spatial distributions (different provinces and comparisons with neighbors such as Egypt, Turkey, and Pakistan). In the next stage, after comparing the Spatio-temporal of Iran's agricultural developments, key development points are extracted, and conceptual models (justice-oriented model) are designed. The obtained conceptual models are presented based on the three horizons (3H) method, and the classical Delphi model is used to examine the model feedback.
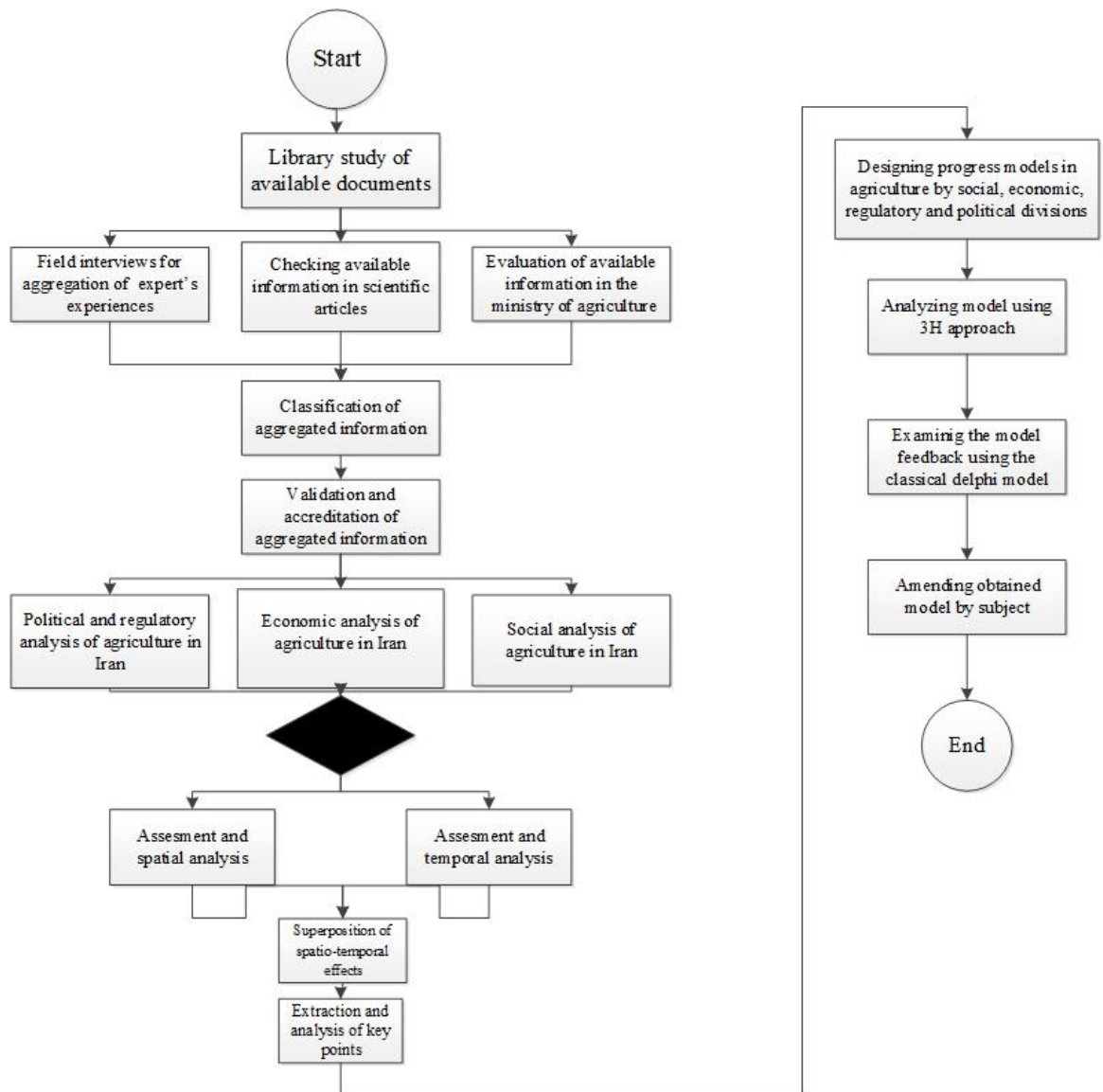
Figure 5. The overall algorithm of materials and methods of the research.

Futurization techniques

McKinsey Consulting Group mostly use three horizons analysis [56]. It creates a framework for a set of series to analyze and plan the potential opportunities for sustainable organizational growth in the near and distant future without any reduction in efficiency at the current state. In other words, the stated goal of this model is to connect today's capabilities to future opportunities so that the organization's R&D and innovation processes are integrated with current processes and prevent their isolation. This model was first introduced in the book "The Alchemy of Growth." According to this analytical technique, the first horizon is related to the current situation when collections should recognize their competitive advantage and try to achieve high profits and cash flow. For the second horizon, which encompasses the short term, organizations need to analyze

emerging environmental opportunities and build reliable profitability. The third horizon is related to ideas for the future that will lead to the organization's sustainable growth, but the ambiguity and the investment risks are still critically high (Fig. 6) [57, 58].

In this part of the study, a justice-oriented model is presented according to the steps achieved toward the goals of the Republic of Iran period. But in compliance with the 3-Horizons strategy, this model should be expressed in three time sections; short-, middle- and long-term. So that in the short-term horizon, planning is based on the existing conditions of society. In the medium term, justice-oriented development is achieved chiefly and will be planned more idealistically. In the final step (third horizon), it is assumed that the previous plans have been fully established, and all plans will be prioritized for the ideal situation or the justice-oriented agricultural utopia. In other words, in the three horizons strategy, the model is presented with different degrees of idealism to traverse the path of excellence fully.
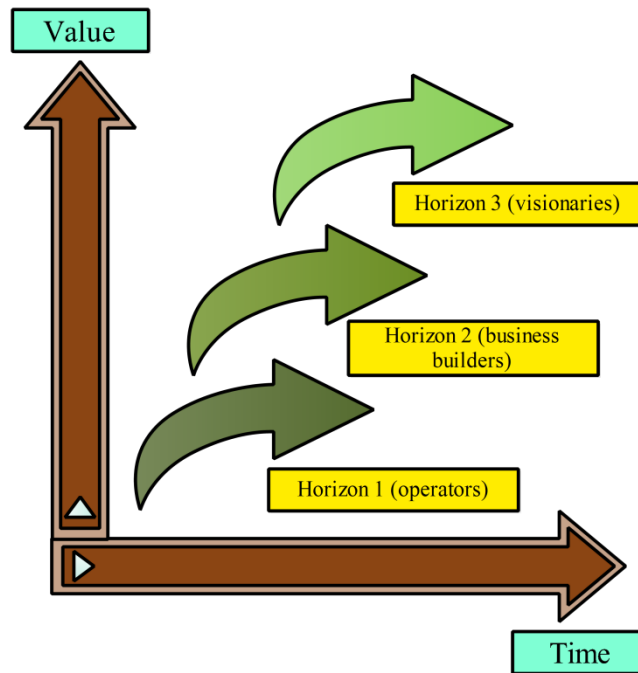

Figure 6. The general pattern of the 3-Horizons analysis method.

Delphi is one of the most common and well-known methods of future research [59]. Delphi is obtained by collecting the experts' opinions using consecutive questionnaires to show the convergence of opinions and identify differences or divergence of opinions. The Delphi method is divided into four main methods: Classic Delphi, Political Delphi, Decision Delphi, and Delphi Group Work [60].

This research has used the classical Delphi method and quasi-numerical judgments following its thematic appropriateness, shown in Fig. 7 [58]. In this part of the study, to extract the model and determine the patterns of justice-oriented progress in Iran's

agriculture, the 3-Horizons strategy will be utilized, and, in each step, to get feedback on every solution, it is necessary to have the expert and specialist feedback. It should be noted that the feedback process is consistent with the classic Delphi method and in the form of face-to-face interviews.
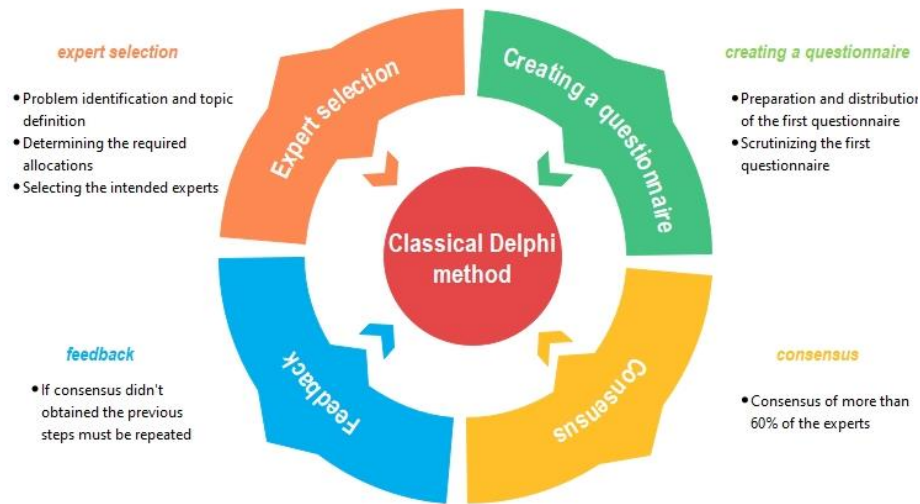

Figure 7. Classical Delphi stages in this research.

As stated earlier, in this part of the study, all the analyses are done under the economic, socio-cultural, and politico-regulatory divisions. However, each division includes conceptual analysis, quantitative and qualitative narrative analysis (different experiences and management styles), and practical progress (large-scale policies) narration. In the final part, the narration of practical progress, all indicators of justice in agriculture are first designed and then evaluated and examined.

The final part of this study (narratives of practical progress based on a justice-oriented approach) is implemented based on the model in Fig.8. Considering Fig.8, it can be seen that justice indicators include evaluating the social services in different parts of society, evaluating the comprehensiveness of agricultural infrastructure, growth opportunities in agriculture, evaluating the level of equity and justice in agricultural services, and examining international competition behavior and market dynamics. The main points in Fig.8 are part of the priorities of the justice-oriented agricultural perspective, which will be evaluated more earnestly during this research. Justice is a comprehensive concept that should be analyzed based on the subject and redefined in each case.
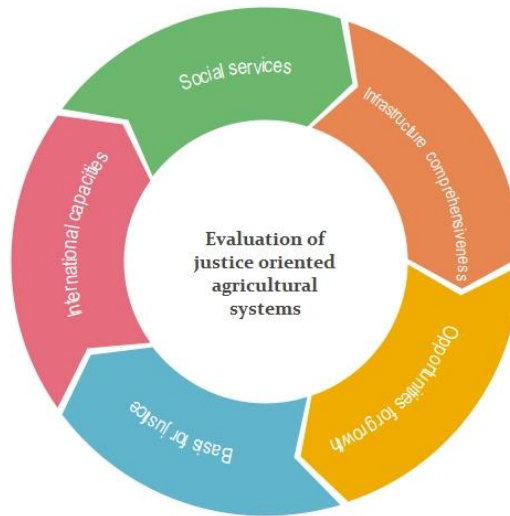
Figure 8. Investigating justice-oriented patterns in agriculture.

RESULTS AND DISCUSSION

This part of the research presents the Iran Republic's agricultural strategies, the second Pahlavi era, and classical Delphi outputs as a foresight study.

The Republic Era (February 1979 - Present)

From political, social, religious, and cultural views, agriculture is one of the most essential elements in Iran. However, a large part of the current political, social, or even religious views are related to this vital debate. According to official statistics, the total production of the agricultural sector from 1977 to 2018 has increased from 26 million tons to about 122 million tons, which shows the current government concern for food security. During this period, the agricultural sector's share of GDP increased from 5.8% to 10%. Also, the share of agricultural added value in the national economy is more than 32.5%, indicating this sector's role and importance in the national economy.

Despite the country's economic fluctuations, the agricultural sector, as a stable sector, has a positive growth rate, and in some years, the country's economic growth has been due to the growth of the agricultural sector. The growth rate of agricultural value added at the current price in 1977 was four percent, which continued till 2018 and reached 4.1 percent with a slight increase. According to these statistics, it can be seen that agriculture has been one of the main goals of the different states in Iran after revolution, which will be examined in the large-scale strategies

Politico-regulatory strategies

The politico-regulatory approach of the Government of the Iran between the years 1979 to 2020 is expressed in 8 general strategies. It should be noted that justice-oriented terms are a standard part of all these politico-regulatory processes. Considering the government major policies can be seen that according to the experience of the Iran-Iraq war, the enemy targets the country's infrastructure during wartime and pursues a policy of dependence.

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At the same time, agriculture and food production, along with other infrastructures such as refineries, power plants, etc., has an important fundamental position that must always be prepared for a force major situations. Simultaneously, the country's geographical location, susceptible to political tensions, Middle East war, earthquakes, and floods, necessitates bolstering its agricultural and food production to avert food crises.

Therefore, maintaining and developing agricultural infrastructures, especially during crises, could be considered the foremost strategy in the Iran's agricultural plan. [61] stated that four primary reasons comprised the four vast and other minor food crises in Ethiopia since the 1970s, including lack of foreign exchange, high defense spending of civil war, insufficient infrastructure, and a lack of famine response strategy in the government [62, 63] the same problems existed in Iran during the 70s and 80s due to the war and revolution reforms and lack of a coherent government. This is while 64 have also noted that land preservation as an approach to sustainable agriculture was a part of early local food policies in several regions in the USA. Likewise, [65] has recommended improving village infrastructure and food logistics network as a long-term action to tackle high food prices and famines, especially during crisis times. Paying particular attention to agricultural infrastructures has always been important in other parts of the world, as [66] note that an effective agricultural development strategy must include investments in physical infrastructures such as roads and storage facilities or institutional, like extension programs and farmer training. The Canadian federal government regulated grain transportation in 1897 through the Crow Nest Pass Agreement and designated transportation rates for some products. However, through the 1970s, The Canadian Railroad faced a significant business problem. Several years later, the Government decided to alleviate the problem by 13000 new hopper cars, rehabilitating grain lines, and directly paying the railways to cover shipping costs [67].

Lower transportation costs boosted farm grain revenues and encouraged production for export. On the other hand, this subsidy increased the price of feed grains and reduced livestock production. It also prevented certain types of value-added processing and production of what was not eligible for transportation subsidies, such as potatoes [68]. Lack of proper infrastructure can also adversely affect the implementation of other strategies. In Tanzania, for example, when the government decided to reform its state-run minimum price marketing setup in the late 1980s and early 1990s to allow private traders to buy and transport grain, but because no improvements were made in infrastructure, the reform led to increased price volatility [69]. The economic crisis of 2008 affected rice production more than every other food [70, 71], leading to growing concerns in many countries and policymakers to reconsider rice production strategies. This was illustrated in 3 major areas, one of which is a separate budgetary resource for rice production infrastructure, e.g., in Tanzania to double rice production by 2018 [72]. Additionally, [73] argue that while the centrality of metropolitan food infrastructure as a food provider has become clear, it is also crucial to recognize it as a lever for broader benefits (e.g., jobs, ecological services, etc.). In a survey they conducted in 2020 USA, 50% of respondents, 73% of whom were working

for or on behalf of local governments in the USA, said that their local government supports middle infrastructure practices via policy implementation tools [73].

After the 1979 revolution, Iran lacks decent diplomatic relations with many western countries, views most of them as mere trading partners, and is unwilling to enter into trade agreements. This pushed Iran to think about a self-sufficient country in terms of strategic agricultural products. Therefore, applying tactics to manage the market and production is one of the leading agricultural strategies of Iran. The realization of the justice-oriented development model in this sector depends on implementing policies leading to sustainable government-farmer interactions. In other words, the enemy's plans can be curbed if the government and the farmers act in parallel. Governments are responsible for establishing structures for sustainable interaction, support, and fair purchase of agricultural products. This strategy is still running in Iran for many Agri-food products, especially wheat. China's government also introduced a minimum price purchasing program for rice and wheat and some reserve products, such as soybean, corn, and pork, in 2004 [74]. This policy and production subsidies aim to maintain grain self-sufficiency and rural income growth [75]. Therefore, the government continuously increased the minimum price till 2015 to support farmers despite the world price falling in 2008.

However, this price gap encouraged farmers to produce more, increased lower-priced imports and left the government with large stockpiles since 2010 reaching high records. Also, in 2013 using fertilizers in China was three times higher than the world average [76]. These policies were threatening China's agriculture market [77], accompanied by a failure to meet China's commitments to the World Trading Organization (WTO) because of excessively high subsidies to agriculture [78]. These together forced China's governments to debate how to reform its price support program to reduce price interventions, manage imports, and balance stockpiles of agricultural commodities [79]. Also, as China is a predominant soybean importer, [80] argue that China's support policies contributed to an increase in world soybean price variability and the negative world net welfare change. Also, in India, the Agricultural Prices Commission (APC) first introduced Minimum Support Prices (MSP) in the mid-1960s for 25 agri-food products, including paddy, wheat, cotton, oilseeds, and pulses, due to the food scarcity and price volatility intensified by the Pakistan war aimed at i) providing enough grain for the food distribution system, ii) assuring affordable prices for consumers and, iii) inducing adoption of new technologies [81].

This policy was controversial since its commencement because some believed it would only favor areas with surplus production [82] and food crops over other crops [83]. As a result, a large portion of fertile lands went under paddy and wheat crops instead of pulses, oilseeds, and other important products resulting in a disparity in the supply and demand of several products [82]. In other parts of the country, the pricing policy is considered inefficient because the government is less interested in procurement due to small surpluses. Therefore, it is argued that wheat and paddy market prices in these areas are lower than the MSP in the post-harvest period and increase during lean periods, which is

usually not the case in surplus production areas [84]. This policy was primarily successful in surplus states and merely did its best in deficit states [85]. For instance, as [81] discusses, the MSP is best organized in Punjab and Huryana states, with 114 principal markets and 519 sub-yards during the procurement season and approximately 1645 purchase centers dominated the procurement of paddy from the beginning and wheat later on. He then enumerates reasons as i) suitably large marketable amount of paddy and wheat, ii) Well-regulated machinery with sophisticated marketing infrastructure, iii) politicization procedure, iv) Surplus historical amount for public distribution, and v) significant awareness of farmers about the scheme. Also, in Uttar Pradesh, the administration and functioning of MSP have been much defective due to the providing more leverage of MSP for traders than farmers.

It has been effective at the procurement level, but the lack of proper infrastructure caused the problem. In Maharashtra, a dominant millet state of the country, the policy did not work well for most of the products except sugarcane and cotton because i) inadequate surplus of major MSP products, including paddy and wheat, ii) procurement of the millets was not a priority of the state, and, iii) well operation of MSP for cotton and sugarcane discouraged other grains. Notably, the availability of infrastructures like motor roads, warehouse facilities, market intelligence, etc., in the state helped the MSP be at hand for all [81]. Furthermore, [86] used the dynamic partial equilibrium model to evaluate and analyze the effects of India's food policies on wheat. Their study investigates the provisions of the National Food Safety Program in India on wheat through political tools. The results showed that implementing wheat's minimum purchase price policy would increase production by more than 8% compared to the cash payment to wheat producers' and consumers' policies.

It also could be seen that after the Iran-Iraq war, agriculture became so important in the large-scale policies of Iran. And the governments decided to follow the long-term development plan, in which wheat self-sufficiency was the most important issue. And the promise of the rulers and leaders to the people was to follow this program and keep agriculture at the top until self-sufficiency is achieved. Also, review and re-planning will be highly important in case of any failure in functional structures.

Furthermore, strengthening agriculture is considered one of the most severe axes of rural empowerment [87]. This is not reachable until employing science, experience, and optimal exploitation of natural and human resources. A complete change in the agricultural system is in progress, defining a new term called "Agricultural Fight", carried out by the Leaders' order. In this new structure, agriculture was recognized as a supra-organizational and extra-functional matter, and the necessity of a members perspective (maximum power and preference for national interests over personal) was emphasized.

Although there is a belief that refining the agriculture sector in a country would result in poverty reduction [88, 65], some scientists challenge the negative relation between agricultural growth and poverty reduction [89, 90, 88, 91]. For instance, rural life heavily

depends on agriculture in Indonesia, and poverty reduction is impossible without agricultural development. For over three decades' governments have tended to develop rural areas by strengthening the agricultural sector [92]. This strategy has helped the government to decrease the percentage of poor people by 0.25% between September 2018 till March 2019 [92]. Also, the agricultural production rate has steadily increased by 3.2% from 2007 to 2016, primarily due to the Total Factor Productivity (TFP), which increased by 2% per year during the same period [93]. Also, Vietnam had more than 60% of the population involved in agriculture-related activities 2006 and has experienced a relatively fast poverty reduction and agricultural growth [91]. However, a survey conducted in Vietnam in 2010 investigated the data from Vietnam Household Living Standard Surveys between 2002 - 2004 and concluded that the production of crops and forestry does not have statistically significant impacts on per capita expenditure or income. The livestock production increases the per capita income of households by 6.3%, while per capita expenditure stays the same. On the other hand, the increase in aquacultural production improves per capita income and expenditure by 7.3% and 4.7%, respectively, implying the probability of growth in savings or investment of households [91].

According to studies, about 47% of the total calories per capita consumption in Iran is provided by wheat and its products [94], which makes wheat the staple element of the country's diet and with owing more than 60% of arable lands [95]. According to statistics, Iran's population is 1% of the world population, but it consumes about 2.5% of the total world wheat consumption and is one of the largest consumers of wheat in the world [96]; due to the increasing population and political situation, the importance of achieving self-sufficiency in wheat production is increasing every day.

Consequently, self-sufficiency in wheat production has been one of the main desired strategies in Iran since the last political revolution [97], which has not been successful. The reason is the political complexities of reforming the agricultural structure and the consecutive governments' contradictory policies [98]. A similar strategy has been implemented in Austria to safeguard a sufficient supply of grain and bread. However, as [99] argued, the government performance was highly inefficient. They then mention five reasons causing the inefficiency 1) uncertainty of demand and supply, 2) uncertainty of strategy side-effects, 3) policy inertia, 4) path dependency, and 5) implicit policy objectives.

Socio-cultural strategies

One of the main reasons for the special consideration of agriculture in Iran is the strong relationship between agriculture and the Iranian people's cultural, social, and religious beliefs [100]. Additionally, farmers are one of the most basic strata of society, and the need to maintain their satisfaction with the government has always been important [101]. One of the main differences between the Second Pahlavi and the after-revolution era is how to pay attention to farmers. Meanwhile, the recent government has tried to pay attention to the satisfaction of this class, but the second Pahlavi has tried to separate them from power. The mentioned strategies in the Republic period are i) Creating empathy among all classes,

ii) Creating social movements to move toward Agricultural fight, and iii) Creating empathy between the country's officials and the people.

Economic strategies

Agricultural economics is one of the most monumental issues in rural development and stabilizing the country's food production processes. From the perspective of livelihood and employment, the agricultural economy is the main factor in the continuance of rural life and food security at the national level. But there is a big difference between the Islamic view of agricultural economics and capitalist or communist countries. In the Islamic Republic, a foundation of Islamic thought tries to link the farmers' economy with halal and sustainable income and provide a high level of welfare for them. In this view, unlike the capitalist ideas, the farmer does not move towards land ownership and land dealings, nor, like the communist ideas, keep the farmers, low income social class. This type of economic idea seeks to enhance the personality and improve society's economic conditions, so that every individual has minimum standard welfare, more or less the one we see now a days in Scandinavian countries.

Creating free trade is based on breaking the monopoly of agricultural and trade processes and utilizing national resources. One of the main policies after the 1979 revolution in the realization of the free economy and economic development is to eliminate the monopoly of particular groups. These monopolies can seriously damage lower and middle-income classes [102] by raising prices and creating barriers to entry of market. As [103] emphasize, free trade benefits all countries regardless of their economic size and development at both domestic and international levels. Conversely, some argue that a country's potential to benefit from free trade depends on its development levels and sizes. Free trade increases the size of the economy, but there is no guarantee to distribute the added value evenly in society [104].

The free trade era started in 1989 in Pakistan with some new strategies and political reforms in the country, and the government took some steps through trade liberalization by reducing tariffs from more than 90 percent to 45 percent, lifting some product bans and quantitative restrictions, and simplifying import and export rules which may not help the country shortly but is expected to improve the economic status in long-run [105]. The results of another study on 50 years of Pakistan's agriculture strategies showed that policies were biased against exports, however, they have significantly improved since a reform of tariffs and starting to expand exports [106]. [107] investigated the dynamic impacts of economic reforms and trade liberalization policies on the agricultural export performance of Pakistan. He concluded that change in domestic factors derived from economic reforms has more impact on agricultural export performance. He then argues that the diversification of export goods and the degree of openness play a crucial role in agricultural export performance.

Furthermore, many studies in Nigeria show that free trade significantly impacts the agricultural sector. [108] examined the impact of trade liberalization on performance in the

Nigerian economy with specific reference to the agricultural and manufacturing sectors. They found that free trade had a positive and substantial effect on agricultural production, while there was a negative but noteworthy relationship between trade liberalization measures and productivity in Nigeria. They also found that the exchange rate has a positive but slight effect on agricultural production, while the effect of inflation on agricultural production in the period under study is positive and meaningful. [109] acknowledged that the degree of openness of agriculture and the ratio of agricultural exports to import prices have an important relationship in Nigeria. They confirmed that trade positively affects agriculture, and that free trade has strengthened Nigeria's agricultural sector.

Another study on the paradox of agricultural free trade in Tanzania and Bangladesh investigated the data from the pre-liberalization and post-liberalization periods. They analyzed the correlation between domestic and international prices of several agricultural products and the level of agricultural productivity. The results showed a meaningful positive relationship between productivity and openness to global markets, while there was large price volatility during the post-liberalization period [110]. Also, [111] researched the impact of trade liberalization on coffee production in Uganda, as it is the heart of agriculture there. By analyses of export trends, production, and consumption, they reported a boom and an increase in competitiveness in this sector.

Moreover, [112] assessed the impact of trade liberalization on agriculture in Cameron using data between 1980 and 2015. They found that in the post-liberation period, free trade policies in Cameroon provide space for easy transfer of agricultural products and increased agricultural production. Also, indicators like agricultural capital formation, foreign direct investment, permanent cropland, interest rates, and real effective exchange rate positively impact agricultural value-added.

Land distribution has a long history in Iran, returning to the White Revolution and the Pahlavi period land reform. The debate that there is an inverse relationship between land size and productivity [113, 114] pushed recent governments in Iran to implement this policy. The strategy of the current government regarding land reform is classified into three general levels. Level 1, fair division of land, creation of frameworks to deal with land grabbing. Level 2, learning from successful global examples, linking land and household income, and development based on public participation. Level 3, utilizing priests in religious matters of land.

Land reform and industrial privatization pose significant challenges. Every government in Iran has faced significant challenges during the transition period [115]. As in South Africa was the case. Land distribution was one of the major challenges for the post-apartheid governments in South Africa. The Government committed itself to transferring 30% of the 82 million hectares of land owned by whites to black people by 2014.

To achieve this, many frameworks have been implemented, but as [116] stated, they did not reach about 7.95% of the former white-owned land, which benefited more than 250,000 people [117]. [116] further explains; i) the Underwriting the property position by the constitutional provisions; ii) the Insufficient budget allocated by the government to land restitution; iii) the Low enthusiasm of the government to implement a coherent reform program and implement a demand-led approach instead [118]; iv) preference for financial compensation by most of the claimants; v) Not using the restituted land productively because of poor post-settlement support challenges [119]; vi) Land tenure security on white-owned farms. Also, by a detailed investigation of land reform policies after a Communist regime transition in Romania, [115] concluded that the unsuccessful land reform policy roots in; a) the wrong belief that land reform by itself can solve the problem of low productivity; b) The misconception that rural markets, for example, for labor and capital, arise naturally as a result of the restitution of private property rights to land; c) A compartmentalized view of the economy, with the view that agricultural policies can be designed separately from those of other sectors of the economy.

Additionally, China has implemented several grassland reform programs since 2003, known as "separating three property rights". It does not affect the public ownership of the land but divides the households' contractual and use rights into non-tradable household contractual rights and tradable rural land use rights [120]. The results showed that the reform balances economic efficiency and the principles of social justice, maintains grassland food production and provides social welfare for rural migrant workers. However, it has also caused severe degradation of pastures in the study area. This degradation is mostly caused by the local government's policies on grassland use rights [121].

Import substitution is another economic strategy of the country's agricultural sector. The saved money obtained through optimizing costs can be spent in the agriculture sector and the process of self-sufficiency. The synergy of industry complements this strategy synergy of industry and agriculture complements this strategy by utilizing industrial achievements in the agriculture sector like machinery, etc. Using this approach, industrial agriculture will be realized, and production will be significantly developed. [122] analyzed the development of agro-industrial regions while implementing the import substitution of agricultural products strategy in Russia and expressed challenges constraining the development of the agro-industrial sector. They stated threshold depreciation of fixed assets as the technological deterrent factor, dependence of agriculture on imported components and materials; over-indebtedness of the real sector and lack of long loans as structural factors, growth of fallow land areas and soil pollution as environmental factors, and lack of development institutions implementing the import substitution strategy as organizational factors, insufficient development of general infrastructure support for clustering around points of economic growth; absence of the necessary logical systems that unite the production, storage, processing and realization of production in the framework of agro-industrial complexes as the infrastructure factors. The import ban strategy has

stimulated agricultural production in Russia as grain exports in 2014–2016 were 50% higher than in 2011–2013 (though production-enhancing favorable weather was also a cause) [123].

The second Pahlavi era

During the king Pahlavi, the government made extensive changes in Iranian agriculture to centralize power. This is while the highest level of change was achieved according to the six-step plan of Shah Pahlavi II. In the following, all the strategies of the government are classified based on three categories of Politico-regulatory, socio-cultural and economic strategies, which will be evaluated in detail [124].

The grand strategy of the agricultural policies was based on selling oil and importing agricultural products. It is worth mentioning that at the second Pahlavi time, the main trade strategy was more concerned with the interaction of technology and the import of engineering techniques from developed countries. A comprehensive study shows that the policies are changed drastically after the 1979 revolution, and this topic will be further scrutinized [125].

Politico-regulatory strategies

Land reform was one of the most basic and important strategies of the second Pahlavi governments, the main purpose was to cross from rural to urban areas and increase production (as a surplus) for the industrialization of agricultural products. In other words, the emphasis of the second Pahlavi system was on the country's industrialization and did not create economic prosperity in food industries for agricultural development. Also, by eliminating communal agricultural decision-making systems by dividing and distributing land to farmers and diminishing integrated revenue streams [125].

Additionally, the second Pahlavi would create a balance of costs and profits between the peasant groups (manpower) and the landowners (water, land, and seeds). Using this strategy, the equitable distribution of facilities, manpower, and financial income would take place. But in practice, the results showed that the land was not well distributed, and some settlers (non-peasant people) became marginalized, and due to the unfair distribution of land among ordinary people (people other than chiefs) the financial profit margins of many people decreased (land under 5 hectares) and resumed selling land as a commodity (not as a permanent asset) and settled on the outskirts of cities [124].

Therefore, the outcomes, a cycle of planning, performance (strengthening both industry and agriculture with a focus on agriculture for the industry), control (monitoring the control of corruption in the country's executive systems), and operations (maximum oil sales to cover construction costs) has been drawn which was used as a roadmap.

Socio-cultural strategies

The main socio-cultural strategy of the second Pahlavi is the modernization of cities and villages in the country as a result of changing rural jobs and developing the capacity of urban manpower by villagers (migrating to cities) as well as reforming the social

structure of the villages by demolishing local rural cooperatives that led to the integration of the villagers' performance [126, 127].

Economic strategies

As mentioned earlier, in Pahlavi's policies, the keywords of industrialization and single man of power were intertwined. In accordance, Iranian agriculture moved towards the production of cotton, beet, and rice products (water-rich products that were not in line with Iran's water shortage condition) which were aligned with industrialization (agriculture for industry, which is exactly the opposite of the after-revolution strategy of the industry for agriculture). Meanwhile, Iran's main agricultural products, wheat and barley (65% of Iran's production in those days) were marginalized due to non-compliance with the industrialization strategy [124, 125].

Foresight study outputs

Based on both eras' resumes, this research section presents some strategies based on integrated classical Delphi and 3H models obtained per experts' ideas.

The strategic preview of Iran's Agriculture

At the end of this part of the study, based on the combination of the 3-Horizons model and the classical Delphi method, and also considering the strengths and weaknesses of the strategies of the before revolution and after revolution, Iran's future strategies for achieving justice-oriented agriculture were designed. To achieve this, a group of 8 major groups in this was interviewed. Based on the classic Delphi method, all opinions were exchanged with all interviewees three times, and consentaneous strategies (more than 60%, i.e., five people have a positive opinion) were presented. Lastly, the aforementioned strategies were planned for short-term, middle-term, and long-term periods for the development of the agricultural justice plan of the country in all three subgroups: politico-regulatory, socio-cultural, and economic.

The strategic justice-oriented politico-regulatory model of Iran's agriculture

Based on the combination of classical Delphi and 3-Horizons techniques, Iran's strategic agricultural politico-regulatory model (Fig.9) includes; 1) Comprehensive program of food security management (centralized production of strategic products of the country in climates compatible with the cultivation pattern- 100% agreed, building macro-agricultural management infrastructure to control and guide cultivation of all lands - 75% agreed, and implementation of drought-compatible agricultural models to increase the resilience of the country's food production - 75% agreed) – Short-term model.

2) Establishment of Agricultural fight knowledge-based agriculture in Iran (improvement of determined activities and processes including volunteer groups, private and knowledge-based companies towards agricultural activities - 87% agreed, guiding the country's financial flows to sustainable agriculture compatible with climate - 87% agreed, and, supporting startups to increase agricultural productivity to encourage fresh manpower for entering rural areas - 62% agreed) - Medium-term model.3) Stabilization

program of the politico-regulatory model of justice-oriented progress (development of food industries - 87% agreed, industrialization and mechanization of agriculture - 75% agreed, and exemplification and promotion of Iran's agriculture at the global level – 62% agreed) – Long-term model.
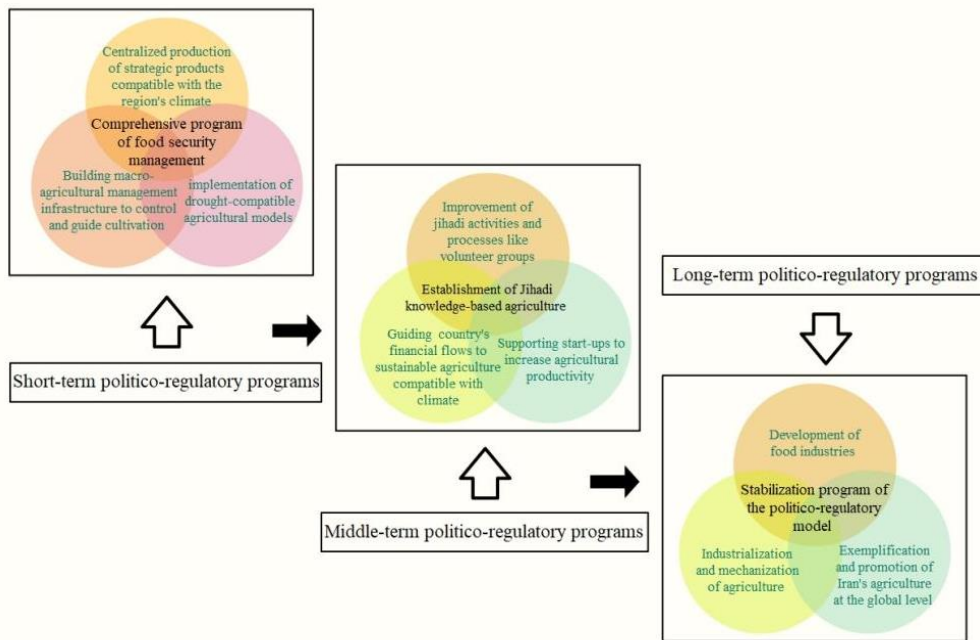

Figure 9. The conceptual politico-regulatory model of Iran's agriculture

The strategic justice-oriented socio-cultural model of Iran's agriculture

The main factors in this area include three general plans for establishing public social services in Iran's agriculture, the reconstruction of agricultural culture in rural areas, and a comprehensive plan for managing water resources, which is described below and presented in Fig.10.

1) Establishment of public social services in Iranian agriculture (restructuring the social service organizations- 87% agreed, creating an excellent position for farmers in the national valuation cycle and highlighting agriculture in minds - 75% agreed, and creating infrastructure for evaluating officials and governing systems based on farmers' satisfaction - 75% agreed) – Short-term model.

2) Reconstruction of agricultural culture in villages (extensive media activities as well as providing special entrepreneurship facilities in rural areas to stimulate youth emotions - 100% agreed, national fight against an agricultural intermediary to increase financial productivity and encourage young people for agriculture - 100% agreed, and branding of regional agriculture of Iran to plan indigenous structures and identity in each region- 62% agreed) - Middle-term model.

3) Comprehensive program of water resources management (modification of cultivation pattern in accordance to the local skills- 100% agreed, development of research

to improve agricultural productivity following water resources - 100% agreed, and creating incentives and privilege systems to use special government services based on low-water agriculture) - 62% agreed - Long-term model.
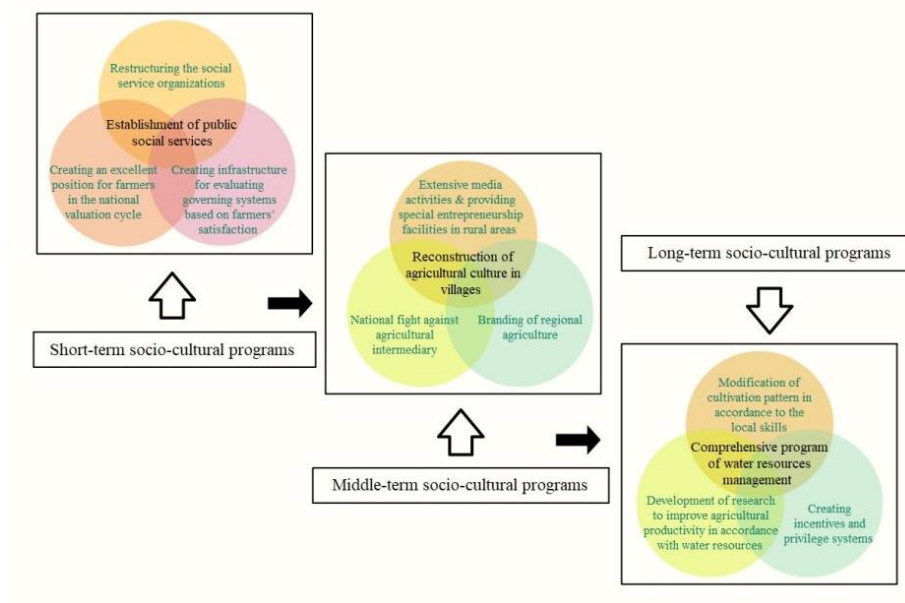

Figure 10. The conceptual socio-cultural model of Iran's agriculture

The strategic justice-oriented economic model of Iran's agriculture

Iran's strategic agricultural economic model (Fig.11) includes;

1) Comprehensive agricultural program based on a free economy (strengthening agricultural NGOs to fight monopoly in production - 100% agreed, production in accordance to the domestic agricultural necessities and neighbors - 75% agreed, and creating customs infrastructure and specialized agricultural markets inside and outside the country - 62% agreed) - Short-term model.

2) Synergy model of industry and agriculture (development of industrial agriculture research - 87% agreed, the possibility of using technology transfer processes from developed countries - 75% agreed, and standardization and improvement of agricultural production processes by monitoring devices to increase productivity and quality - 75% agreed) - Medium-term model.

3) Development of food industries (comprehensive study of the potentials of food industries in all provinces - 100% agreed, the establishment of food industries by NGOs - 87% agreed, and creating economic facilities for promoting agricultural products to encourage private enterprises independent of governments - 75% agreed) - Long-term model.
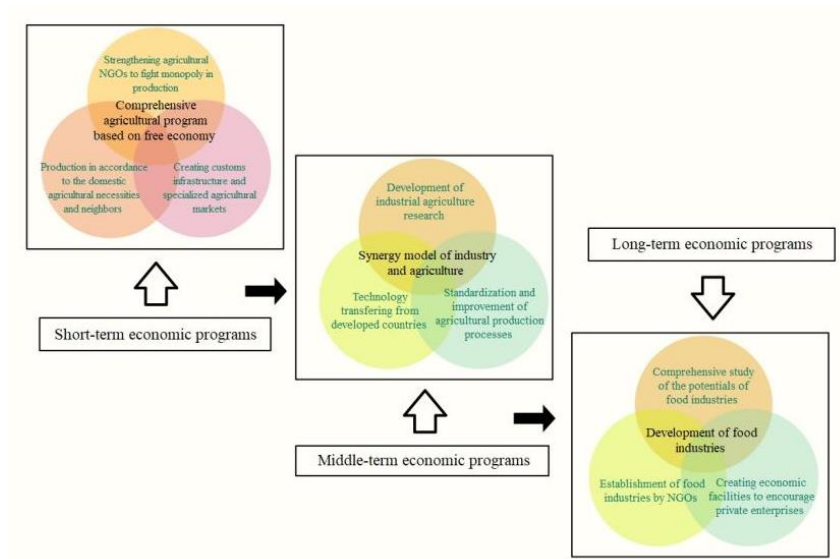
Figure 11. The conceptual economic model of Iran's agriculture

CONCLUSION

Considering the importance of agricultural development and the creation of self-reliance approaches in developing countries, the study has presented a new approach to determining the future strategies of third-world countries based on retrospective futurist perspectives from the two previous regimes ruling Iran. Likewise, after classifying and narrating the strategies of the two previous systems, the future research process was realized with the help of the consensus of the expert groups and as per the classical Delphi method. This research mainly aimed to determine short-term, medium-term, and long-term frameworks in three economic, political, and cultural sub-sectors. General investigations indicated that in the pre-revolutionary period, policies emphasized the industrialization of the country and strengthened the supply chain in the final production stage of the agricultural sector. The most important reason for this kind of management is related to the limitations of water resources and cost-benefit computations. Meanwhile, the new system after the revolution, due to the existence of different foreign policies, needs to strengthen the country's self-sufficiency in benefiting from the full implementation of the agricultural cycle in the country. Classical Delphi method outputs illustrated that in the economic field of free economy approaches, synergy in different industry sectors and increasing the level of secondary production can be most effective. At the same time, education has the most important role in the cultural and social sectors and can be considered a platform for reengineering agricultural culture. Finally, from a political point of view, paying attention to food security, endogeneity, and basic knowledge of agriculture can be fruitful. For future research, dynamic systems models can be used to evaluate the performance of each strategy dynamically. In the next step, the public feedback on each strategy can be operationally evaluated so that managers can plan the future with the least error. Also, applying quantitative data analysis (MAXQDA) models can be attractive in

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scientific communities. Finally, it is worth noting that structural equation modeling (SEM) can be helpful for the exact determination of cause-and-effect features' roles in the agricultural policy-making process.

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DATA AVAILABILITY STATEMENT

The study's original contributions are contained within the paper; further inquiries may be directed to the corresponding author.

CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest associated with this publication.

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