


**MEASUREMENT THE PRODUCTING EFFICIENCY AND MARKETING EFFICIENCY OF OKRA CROP (COVERED) IN BAGHDAD GOVERNORATE FOR THE SEASON 2022**

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ARTICLE INFO	ABSTRACT
<p><b>Article history:</b></p> <p><b>Received</b> 01 October 2023</p> <p><b>Accepted</b> 27 December 2023</p>	<p><b>Purpose:</b> The aim of the research is to estimate the production and marketing efficiency of okra under the protected agriculture system and to identify the most important production and marketing problems.</p>
<p><b>Keywords:</b></p> <p>Optimal Production Size; Cost Efficiency; Marketing Efficiency; Marketing Margins; Okra Yield.</p>	<p><b>Theoretical Framework:</b> The least squares method OLS was used to estimate the parameters of the short-term cost function using the statistical program SSPS, and the short-term cubic cost function was adopted.</p>
	<p><b>Design/Methodology:</b> Data were collected through a questionnaire form for a random sample of 62 farmers of the covered okra crop in Baghdad Governorate (Mahmoudiya District) for the season 2022-2023, to measure the production and marketing efficiency of okra under the protected agriculture system.</p> <p><b>Findings:</b> There is economic efficiency in the production of okra, the ratio of return to costs is greater than one, while the production costs function indicated that the crop does not achieve the required level of efficiency, as the optimal volume of production was about 12.22 tons. the average production volume of the selected sample was about 4.3 tons, and the estimated results also indicated that the total cost about 23350570 ID, and the marketing efficiency of the crop about 85%.</p> <p><b>Practical and Social Effects:</b> The study benefits okra farmers through knowledge of the optimal use of available resources, i.e. the production of the largest amount of goods and services using the elements of production available, exploiting the resources available to it to produce goods and services that specialize in its production, farmers achieve marketing efficiency through maximizing the ratio between outputs and inputs.</p> <p><b>Value or Origin:</b> The agricultural sector in Iraq is of great importance among other economic sectors. Meanwhile, it faces many challenges, including population increase, limited land and water resources, inefficient use of available resources, and lack of the seasonality of agricultural production coincides with the periods required for consumption, which makes the transition to protected agriculture necessary to increase agricultural production as one of the means of agricultural intensification to increase agricultural production to meet the increased demand for crops. Therefore., studying marketing efficiency is one of the important studies, as it is the main factor for continuing to deal in the production and of any crop or not.</p> <p>Doi: <a href="https://doi.org/10.26668/businessreview/2024.v9i1.4230">https://doi.org/10.26668/businessreview/2024.v9i1.4230</a></p>

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## MEDIÇÃO DA EFICIÊNCIA DE PRODUÇÃO E DE COMERCIALIZAÇÃO DA CULTURA DE QUIABO (COBERTA) NA PROVÍNCIA DE BAGDÁ PARA A ESTAÇÃO DE 2022

### RESUMO

**Objetivo:** O objetivo da investigação é estimar a eficiência da produção e comercialização do quiabo no âmbito do sistema agrícola protegido e identificar os problemas mais importantes de produção e comercialização.

**Quadro Teórico:** O método dos mínimos quadrados OLS foi usado para estimar os parâmetros do curto prazo função de custo usando o programa estatístico SSPS, e a função de custo cúbico de curto prazo foi adotada.

**Design/Metodologia:** Os dados foram coletados através de um formulário de questionário para uma amostra aleatória de 62 agricultores da colheita de quiabos coberta na província de Bagdá (distrito de Mahmoudiya) para a temporada 2022-2023, para medir a eficiência da produção e comercialização de quiabos sob o sistema agrícola protegido.

**Constatações:** Há eficiência econômica na produção de quiabos, a relação de retorno aos custos é maior do que um, enquanto a função de custos de produção indicou que a cultura não atinge o nível de eficiência exigido, já que o volume de produção ideal foi de cerca de 12,22 toneladas. o volume de produção médio da amostra selecionada foi de cerca de 4,3 toneladas, e os resultados estimados também indicaram que o custo total cerca de 23350570 ID, e a eficiência de comercialização da cultura cerca de 85%.

**Efeitos Práticos e Sociais:** O estudo beneficia os agricultores de quiabos através do conhecimento da utilização ótima dos recursos disponíveis, ou seja, a produção da maior quantidade de bens e serviços usando os elementos de produção disponíveis, explorando os recursos disponíveis para produzir bens e serviços especializados em sua produção, os agricultores alcançam a eficiência de marketing através da maximização da proporção entre as saídas e os insumos.

**Valor ou Origem:** O setor agrícola no Iraque é de grande importância entre outros setores econômicos. Ao mesmo tempo, enfrenta muitos desafios, incluindo o aumento da população, recursos limitados de terra e água, uso ineficiente dos recursos disponíveis, e falta da sazonalidade da produção agrícola coincide com os períodos necessários para o consumo, o que torna a transição para a agricultura protegida necessária para aumentar a produção agrícola como um dos meios de intensificação agrícola para aumentar a produção agrícola para atender à demanda crescente por culturas. Portanto., estudar a eficiência de marketing é um dos estudos importantes, pois é o principal fator para continuar a tratar na produção e de qualquer cultura ou não.

**Palavras-chave:** Tamanho de Produção Ideal, Eficiência de Custo, Eficiência de Marketing, Margens de Marketing, Rendimento de Quiabos.

## MEDICIÓN DE LA EFICIENCIA DE PRODUCCIÓN Y COMERCIALIZACIÓN DE LA CULTURA DE CHIABO (COBERTA) EN LA PROVINCIA DE BAGDÁ PARA LA ESTACIÓN 2022

### RESUMEN

**Objetivo:** El objetivo de la investigación es estimar la eficiencia de la producción y comercialización de okra en el marco del sistema agrícola protegido y determinar los problemas más importantes de producción y comercialización.

**Tabla Teórica:** Se utilizó el método de mínimos cuadrados de la OLS para estimar parámetros a corto plazo función de costes utilizando el programa estadístico SSPS, y se adoptó la función de coste de cubo a corto plazo.

**Diseño/Metodología:** Los datos se reunieron mediante un cuestionario para una muestra aleatoria de 62 agricultores de la cosecha de okra cubierta en la provincia de Bagdad (distrito de Mahmoudiya) para la temporada 2022-2023 a fin de medir la eficiencia de la producción y comercialización de okra en el marco del sistema agrícola protegido.

**Hallazgos:** La producción de okra es más eficiente desde el punto de vista económico, la rentabilidad de los costes es superior a una, mientras que la función de coste de producción indica que el cultivo no alcanza el nivel de eficiencia requerido, ya que el volumen de producción óptimo fue de unas 12,22 toneladas. el volumen de producción medio de la muestra seleccionada fue de unas 4,3 toneladas, y los resultados estimados también indicaron que el coste total fue de unas 23350555577 toneladas 0 ID, y la eficiencia de comercialización del cultivo es de alrededor del 85%.

**Efectos Prácticos y Sociales:** El estudio beneficia a los agricultores de la farmacocinética mediante el conocimiento del uso óptimo de los recursos disponibles, es decir, la producción de la mayor cantidad de bienes y servicios utilizando los elementos de producción disponibles, aprovechando los recursos disponibles para producir bienes y servicios especializados en su producción, los agricultores logran la eficiencia de la comercialización al aumentar al máximo la proporción entre productos e insumos.

**Valor u Origen:** El sector agrícola del Iraq es de gran importancia entre otros sectores económicos. Al mismo tiempo, se enfrenta a muchos problemas, como el crecimiento de la población, la escasez de recursos hídricos y

de tierras, el uso ineficiente de los recursos disponibles y la falta de producción agrícola estacional coincide con los períodos necesarios para el consumo, lo que hace que la transición a la agricultura protegida sea necesaria para aumentar la producción agrícola como uno de los medios de intensificación agrícola para aumentar la producción agrícola a fin de satisfacer la creciente demanda de cultivos. Por lo tanto, el estudio de la eficiencia del marketing es uno de los estudios importantes, ya que este es el factor principal para seguir tratando la producción y cualquier cultivo o no.

**Palabras clave:** Tamaño Óptimo de Producción, Eficiencia de Coste, Eficiencia Comercial, Márgenes de Comercialización, Rendimiento Quiabos.

## INTRODUCTION

The development of the agricultural sector( both plant and animal ), Is an important part of economic development in most countries of the world, And it is considered the main source of achievement food security in the world, But as is known, Agricultural production is subject to risk conditions, This is due to three main reasons: environmental changes that cause uncertainly in production and return, price changes that cause market uncertainly, and lack of information (Zaidan and others, 2023), As to failure to manage risk has direct negative effects on the income of producers, market stability and food security potential,So in order to reduce the level of risk to an acceptable level (Obicke and others,2017), The risk management strategy of hedging method is a significant method and used by different companies within the global marketplace (Shakatreh and others, 2023) ,There are also many difficulties facing agricultural development in Iraq, which is represented in the limited land and water resources, as well as the magnitude of investments necessary for horizontal agricultural expansion, and the long recovery period for these investments, which necessitates the need to increase the productivity of the land, as well as the limited economic resources impose the need for efficient use of them in order to increase the supply of agricultural products, to meet the growing and continuous demand for food (Hassn, 2022). Therefore, the use of modern technologies in the agricultural sector has become one of the most important axes of agricultural development, which requires work to use of modern technology in Iraqi agriculture, that economic development and improved income levels were reflected in the health and social reality, which led to a change in the lifestyle of the population as a result of increasing health and nutritional awareness, so the demand for vegetable crops increased (Ali and others, 2016). It is noted that vegetable crops in Iraq take an advanced economic position among other food crops, due to the steady increase in their consumption, and what increases the importance of food vegetables is their low price if compared with other sources of food, as they can be grown in small areas and even in the vicinity of homes, and vegetables can grow in a short period of time, as well as the possibility

of collecting more than one crop during one season, and achieving quick farm returns, (Mahmoud & El-Sanosy, 2015), due to the different types and varieties of vegetable crops they differ in terms of the needs of the elements of production and are usually relatively large, especially to the hours of manual work at various stages of production and that these needs depend on the form of agriculture and vary according to the types of vegetable crops that require their production like the other agricultural crops The use of the optimal mix of production elements, which achieves the efficient exploitation of the available economic resources, taking into account the requirements of the national economy, and the cultivation system The reserve is a good way to use modern techniques and patterns in agriculture, in order to achieve a high economic return by increasing production and shortening the unit of cultivated area and producing high-quality and pollutant-free agricultural crops in good quantities and qualities in the off-season (Jassam and others, 2018), as well as the economic use of the quantities of water compared to the quantities of water consumed by traditional open agriculture, which makes protected agriculture at the forefront of solutions and means to face the obstacles of agricultural production in Iraq, and the okra crop is one of the widespread vegetable crops where it is grown in all regions of Iraq, and eaten by all classes of society because it contains carbohydrates, proteins and some mineral salts (Al-Mohammadi and Jasim, 1989).

The agricultural sector suffers from marketing problems in addition to production problems, which limit its ability to grow, achieve food security and a better standard of living for workers in the agricultural sector, as the marketing of agricultural products is generally closely related to the production process to the extent that some economists believe that marketing precedes production, justifying the need for the producer to know how to dispose of the product before a production decision (Jassam, 2017).

It cares about everything that is going on from the door of the farm until the arrival of the commodity to the final consumer, where marketing operations and functions overlap, which gives great importance to the study of marketing agricultural crops, including okra, and the importance of research comes from the economic and nutritional importance of the crop as well as the lack of specialized studies on the production and marketing efficiency of this important crop, hence the motivations of researchers to study evaluation of the performance of farmers and to find out the production and marketing efficiency of the okra crop under the protected agriculture system, selected of Baghdad Governorate (Mahmoudiya District) as a case study, through the use of The least squares method OLS was used to estimate the parameters of

the short-term cost function using the statistical program SSPS, and the short-term cubic cost function was adopted.

## MATERIAL AND METHODOLOGY

The study relied on a questionnaire prepared for this purpose for a random sample of 62 farmers under the protected agriculture system in Baghdad Governorate (Mahmoudiya District), to measure the production efficiency and marketing efficiency of the okra for the season 2022-2023, the research was based on the use of descriptive and quantitative statistical analysis methods, using Excel and SPSS.

The research in achieving its objectives was based on estimation and study the indicators of production and marketing efficiency of the okra in Baghdad Governorate, by estimating the cost functions, and then estimating the optimal economic size that maximizes profit, in addition to measuring the marketing efficiency of the crop, and identifying the most important production and marketing problems that hinder greenhouse farmers in the study sample.

## RESULTS AND DISCUSSION

The optimal volume of production is determined at the level at which the average total costs are as low as possible, and at this size, marginal costs are equal to the average total costs, and the share of the production unit of the average variable costs is as low as possible, and at this level of production the efficiency of the factors of production is as great as possible as for maximizing the profit function, the rational product achieves its maximum profits when the cost is equal marginal with marginal revenue of the unit produced, and mathematically can reach to maximize profit as the costs depend on the volume of production and all prices are fixed, production costs are a function of the volume of production plus fixed costs and can be expressed as follows (Al-Thamier, 2016):

$$Tc = TFC + f(Q) \quad (1)$$

Profit as a function of the volume of production can be expressed as follows:

$$\pi = P \cdot Q - F(Q) \quad (2)$$

Where:

$\pi$ : profit

$P$ : represents prices (in thousand dinars)

$Q$ : represents the amount of production (tons)

The optimal volume of production can be determined by maximizing the profit function above, that is, the maximum end of the total profit is achieved when the first derivative of the profit function is equal to zero, that is, the necessary condition for maximizing profit is that the optimal production volume is that volume at which marginal costs are equivalent to the fixed price of the unit produced, but the sufficient condition for maximizing profits requires that the second derivative of the cost function be positive (Al-Asi, 2000), and that the market equilibrium of the product in the market of perfect competition is achieved when the marginal cost is equal to the marginal revenue (Gujarati, 2004).

The position of the product is determined by the price level prevailing in the short-term market, if the price is higher than the average total costs, the product achieves an extraordinary profit and the maximum end of profit is achieved when the marginal cost is equal to the marginal revenue, but if the price is low and less than the average total costs, the product achieves a loss and its loss in the short term is as low as possible (Ali, 2016), to determine the optimal behaviour of the product in achieving its objectives, the cost function is adopted in determining the optimal size of the production unit that achieves economic efficiency, meaning the size that achieves the lowest cost or that achieves the highest profit for the production unit.

Economic efficiency is defined as the use of sources of wealth in such a way that greater production can be achieved at the same previous production costs or the same previous production can be achieved at lower production costs (Mohammed, 2014).

Production efficiency or so-called technical efficiency means the optimal use of available resources, i.e., the production of the largest quantity of goods and services using the elements of production available in society and production efficiency measures the degree of success of the economic unit in exploiting the resources available to it to produce goods and services that it specializes in producing. Thus, the output is maximized for each unit of input used (Al-Frraji et al, 2016). Production efficiency can be estimated in two ways (Jassam, 2022):

1. Equalizing the marginal cost function with the average variable cost function.
2. Find the minimum limit of the variable cost function.

Cost efficiency can also be calculated by dividing the total costs of the actual production level by the total costs of the optimal production level according to the following equation (Mazrou and Eladawy, 2020):

$$CE = TC^A / TC^o \quad (3)$$

Where:

*CE*: Cost Efficiency.

*TC<sup>A</sup>*: Total costs at the actual production level.

*TC<sup>o</sup>*: Total costs at the optimal production level.

As the cost efficiency is achieved when the quotient of one is correct, and if the result is less or greater than one, it is inferred that the crop did not achieve the required level of production efficiency, marketing efficiency is defined as maximizing the ratio between outputs and inputs, where outputs refer to marketing income resulting from consumer satisfaction with goods and services, as inputs refer to the costs of the various elements entering In marketing operations such as work, capital and management, and thus it is clear that the most important components of marketing efficiency are the level of performance of marketing services and the costs of performing these services (Bdeawe and Thamer 2017), if the marketing system includes a decent level of service, but it is expensive, it does not necessarily mean an improvement in marketing efficiency, as it may this means that any changes lead to reducing the costs of conducting a marketing task without accompanying that reducing consumer satisfaction would increase marketing efficiency, but if these changes lead to reducing marketing costs in addition to reducing consumer satisfaction, this may lead to reducing marketing efficiency (Zaidan and Khater, 2013)

The process of measuring marketing efficiency is an important step to work on improving it, and therefore it needs to identify some indicators through which to judge the efficiency of the marketing system for crops in light of the problem of measuring the consumer benefit of the final outputs of the marketing process, which represents the main obstacle to measuring agricultural marketing capacity (Amer, 2018), where marketing efficiency is measured using The following equation (Abdul Hamid and Sharaa, 2017).

$$ME = 100 - \frac{MC}{MC+PC} * 100 \quad (4)$$

Where:

*ME*: Marketing Efficiency  
*MC*: Marketing Costs  
*PC*: Production Costs

Thus, we have a concept that links production activity and marketing activity through costs, and when the differences are equal or when the marketing costs are equal to the production costs, the marketing efficiency is equal to 50%, and it decreases from that percentage if the marketing costs exceed the production costs and vice versa increases from that percentage if the marketing costs Less than production costs, the efficiency of the marketing system for some crops can be measured through the following equation (Al-Frraji, 2015):

$$ME = 100 - \frac{MM}{MM+PC} * 100 \quad (5)$$

Where:

*ME*: Marketing Efficiency  
*MM*: Marketing Margins  
*PC*: Production Costs

The process of measuring marketing margins is the first step to identifying the total marketing costs resulting from the flow of goods and products from production areas to places of consumption through marketing markets until they reach the hands of the final consumer (Faeq and Ali 2019). The marketing margin represents the difference between the price at which the product is sold and the price paid by the consumer at the level of one marketing stage or the level of the entire marketing path, and the evaluation of marketing margins is one of the widest ways to evaluate market performance and marketing efficiency, and includes the costs of the necessary services depending on the type of commodity and its nature and the transfer of the commodity from the producer to the consumer (Bipradas, 2014)

$$\text{Marketing Margin} = \text{Marketing Costs} + \text{Profits} \quad (6)$$

Or:

$$\text{Marketing Margin} = \text{the price paid by the final consumer} - \text{the price of the farm door} \quad (7)$$



The benefit of calculating marketing margins is as follows (Al-Dabbagh, 2014):

- Calculating the costs of marketing services added to the commodity.
- Calculation of dealers' profits.
- Clarifying the relative importance of marketing cost items.
- Estimating the farmer's share of the consumer price.
- Estimating the share of marketing margins from the consumer price.

### First: Productive and Economic Indicators

As shown in Table. 1 it was found that the productivity rate reached (1.87) tons/ dunum, the average price was about (1424.35) thousand dinars per ton, and the total revenue of the dunum was about (6445726) dinars, while the total costs of producing the dunum amounted to about (4744471) dinars, achieving a net return of about (1701.25) thousand dinars per dunum.

The profitability of the spent dinar was about 0.358 dinars, while the return on investment per dinar was about 1.35 Iraqi dinars, which means that there is a high economic efficiency in the production of covered okra because the total rate of return to the total cost rate is greater than one.

Table 1. Productivity and economic indicators of the okra under the protected cultivation system

Productive and economic indicators	Unit	Indicator value
Production rate	tone	4.3
Average area	Dunam	2.29
Productivity rate	Ton/dunum	1.87
Average selling price	Dinar/ton	1424355
Total Revenue Rate	Dinar/dunum	6445726
Fixed cost rate	Dinar/dunum	3162980.67
Variable cost rate before marketing	Dinar/dunum	1581490.33
Average total production costs	Dinar/dunum	4744471
Net Revenue	Dinar/dunum	1701255
Profitability of the spent dinar	dinar	0.358
Returns on investment of the spent dinar	dinar	1.358

Resource: From the work of researchers based on the questionnaire form.

The research calculates indicators according to the following equation:

$$Net\ Revenue = Total\ Revenue\ Rate - Total\ Cost\ Rate \quad (8)$$

$$Profitability\ of\ dinars\ spent = \frac{net\ revenue}{total\ cost\ rate} \quad (9)$$

$$Return\ on\ investment\ of\ dinars\ spent = \frac{total\ revenue\ rate}{total\ cost\ rate} \quad (10)$$

## Second: Estimating the Optimal Production Volum and the Maximum Profit Size for the Covered Okra Crop

After analyzing the data on the production and costs of the covered okra crop at the level of the study sample in the statistical program SPSS, it was found that the cubic formula is more suitable for the studied relationship based on economic, statistical and standard tests, as the estimated model took the following form:

$$Tc = 8061.345 + 2870.015Q - 375.636Q^2 + 15.369 Q^3 \quad (11)$$

$$t \quad (9,728) \quad (4.017) \quad (-2,827) \quad (2,372) \quad (12)$$

Where:

*TC*: The total cost of okra in greenhouses (dinars), where the fixed total cost included the cost of the greenhouse, irrigation networks, devices, equipment, machinery, irrigation basins and water tanks, and the cost of land rent allowance, the cost of interest on the capital invested in the greenhouse and the costs of imposing an alternative to the work of the farmer And his family members, the variable production costs included tillage wages, iron bars, nylon, chemical, organic and compound fertilizers, seeds, pesticides, irrigation water, and hired labour.

*Q*: Quantities of okra produced in greenhouses (tons)

It is clear through the model that the estimated relationship between the total costs and the volume of production of okra crop inside greenhouses according to the cubic formula, came in agreement with the economic logic in terms of the signs of the estimated constants from the estimated cost model and the marginal cost functions and the average cost of the covered okra crop was calculated as follows:

$$MC = 2870.015 - 751.272 Q + 46.107Q^2 \quad (13)$$

$$AVC = 2870.015 - 375.636Q + 15.369Q^2 \quad (14)$$

According to these functions, it was possible to measure the indicators of the productive efficiency of the crop under study, namely:

- 1. Optimal size:** The optimal volume of production that reduces the production cost to the lowest possible extent was calculated by equating the variable average cost function with the marginal cost function as follows:

$$2870.015 - 375.636Q + 15.369Q^2 = 2870.015 - 751.272Q + 46.107Q^2$$

$$2870.015 - 375.636Q + 15.369Q^2 - 2870.015 + 751.272Q - 46.107Q^2 = 0$$

$$375.636Q - 30.738Q^2 = 0$$

By extracting a common factor and performing calculations, we get the optimal volume of production as follows:

$$Q = \frac{375.636}{30.738} = 12.22 \quad (15)$$

It was found that the optimal size of the production of okra in greenhouses amounted to about 12.22 tons, while the actual production of the study sample was about 4.3 tons, meaning that the efficiency rate in the production of the crop amounted to about 35%, and this means that farmers deviate from the optimal production by about 65%.

**2. Cost efficiency:** The cost efficiency of producing covered okra crop was estimated according to the following equation:

$$CE = TC^A \div TC^0 \quad (16)$$

$$CE = \frac{14678.843}{15085.046} = 0.97$$

This means that okra farmers have not achieved the required level of efficiency in the production costs spent on the production of the crop, as the amount of costs at the optimal production volume exceeds the costs at the actual production volume, where the cost efficiency is 97%.

**3. Profit-Maximizing production volume:** This economic indicator was calculated by equalizing the marginal cost function with the average selling price of the crop 1424.355 thousand dinars, assuming.

The farmer operates under conditions of a complete competition ( $MC = MP = AP = P$ ) as follows:

$$2870.015 - 751.272Q + 46.107Q^2 = 1424355$$

In order of the equation:

$$46.107Q^2 - 751.272Q + 1445.66 = 0$$

$$Q = \frac{-B \pm \sqrt{B^2 - 4AC}}{2A} \quad (18)$$

$$Q = \frac{751.272 + 545.701}{92.214}$$

$$Q = \frac{1296.973}{92.214} = 14.06$$

It is clear that the average volume of okra production in greenhouses, which maximizes profit, amounted to about 14.06 tons, while the average actual production volume of the sample was about 4.3 tons, which means that the efficiency rate in the production of the crop amounted to about 31%, which is lower than its counterpart at the optimal production level.

**4. Net return at the level of optimal and profit maximizing production volume:**

Table. 2 shows that the net return achieved at the level of the optimal production volume and maximum profit amounted to about (2320568, 3152671.3) Iraqi dinars for each of them respectively, while the net return achieved at the actual production volume of the sample was about 1701255 Iraqi dinars, and this means that the profits achieved according to the optimal production volume and most of the profit exceed the profits achieved according to the actual production volume of the study sample by 619313, 1451416.3 Iraqi dinars for each of them respectively.

Table 2. Profits achieved at the production leveles actual , optimal and the maximum profit for covered okra crop

Indicators	Actual	Optimum	Maximum
production quantity/ton	4.3	12.22	14.06
Total Revenue Rate/IQD	6445726	17405618	20026431.3
Total cost rate/ IQD	4744471	15085050	16873760
Net Revenue (Profit) / IQD	1701255	2320568	3152671.3
The difference in profit from the actual production volume / IQD	-	619313	1451416.3

Resource: Calculated by the researchers based on the questionnaire and cost function analysis.

### Third: Total Marketing Costs for the Covered Okra Crop

Table. 3 indicates the total marketing costs necessary to market the okra crop in greenhouses in the sample of the study, as the marketing costs amounted to about 23350570 Iraqi dinars, by dividing these costs into their different types, it is noted that the costs of both necessary collection and sorting costs, boxes for packaging, transportation costs and commissions of intermediaries about 10443000, 3527000, 7259000, 2121570 Iraqi dinars, and represents 45%, 15%, 31% and 9% of the total marketing costs respectively, and in the order of those costs in terms of relative importance, it is clear that the costs of collection and sorting came first in terms of importance, followed by the cost of transportation. Then the costs of packing boxes and in the last place the commission costs that brokers receive.

Table 3. Total marketing costs of okra crop under the protected cultivation system (IQD)

Collection and Sorting	Packing box	Transportation	Selling Commission	Total marketing Cost
10443000	3527000	7259000	2121570	23350570

Resource: Calculated by the researchers based on questionnaire.

### Fourth: Estimating the Marketing Margins and the Share of Farmers and Marketing Mediators from the Consumer Dinar

By studying the marketing margins, referred to in Table. 4 the total marketing margins of okra under the protected agriculture system in the study area amounted to about 841774 Iraqi dinars per ton, of which the wholesaler receives about 536129 dinars while the retail seller receives about 305645 dinars, as indicated by the estimated results in Table. 4 The share of the farmer, wholesaler and retail seller of the price paid by the Iraqi consumer amounted to about 63% 24% and 13% each respectively, which indicates the high share of intermediaries and customers from the Iraqi consumer dinar.

Table. 4 Average prices and total marketing margins of okra crop under the protected cultivation system

Average crop prices (IQD/ ton)			Average marketing margins (IQD/ ton)				Iraqi Consumer Dinar Distribution			
Farm Door	Wholesale Markets	Retail Markets	Wholesaler's share	Retail seller's share	Total margins	Percentage of farms	Wholesaler ratio	Retail Seller Ratio	Total percentage of brokers and clients	
1424355	1690484	2266129	536129	305645	841774	63%	24%	13%	37%	

Resource: Calculated by the researchers based on questionnaire.

**Fifth: Estimating the Marketing Efficiency of Okra Under the Protected Agriculture System**

Table. 5 shows the marketing efficiency of one dunum marketed of okra crop under the protected agriculture system in Baghdad Governorate, as the marketing efficiency of the crop under study, was about 85%, The low marketing efficiency of the okra crop covered in the study sample from the required level can be due to the low performance of the functions marketing and its high costs.

Table. 5 Marketing efficiency of okra crop under a protected cultivation system

Total marketing margins (IQD)	Production costs (IQD)	Total costs of the crop (IQD/ dunum)	Percentage of marketing efficiency
841774	4744471	5586245	84.9

Resource: Calculated by the researchers based on the questionnaire and the marketing efficiency equation.

**Sixth: The Relative Importance of the Production and Marketing Problems of the Covered Okra Crop**

Table. 6 illustrates the relative importance of the production and marketing problems faced by the sample farmers, concerning the survey of production problems, the estimated results show that six main reasons can be reviewed according to their importance: The problem of high costs of protected agriculture ranked first in being responsible for the decrease in the production efficiency of the crop by 52%, as the number of farmers in the sample who suffer from these The problem is about 32 farmers out of 62 farmers, followed by the problem of lack of adequate services by 32%, while the problems related to the management of greenhouses constituted 31%, as the number of farmers of the sample who referred to this problem is about 19 farmers out of 62 farmers.

As for marketing problems, the estimated results show that six main marketing problems can be reviewed according to their importance: The problem of considering the selling price of the crop as inappropriate or unrewarding ranked first in being responsible for the low marketing efficiency of the crop by 29%, as the number of farmers of the sample who referred to this problem was about 18 farmers out of 62 farmers, followed by the problem of delayed sales by 21%, while the problem of lack of sufficient information the markets ranked third in being responsible for the low marketing efficiency by 19%, as the number of farmers in the sample who referred to this problem was only about 12 out of 62 farmers.

Table. 6 The relative importance of marketing productivity problems of okra crop under a protected cultivation system

Productivity problems	No. of farmers	%	Marketing problems	No. of farmers	%
High costs of protected agriculture	32	52	Lack of markets for the exchange of quotient	5	8
Problems related to the management of greenhouses	19	31	Delayed sale	13	21
Problems with workers	7	11	The selling price is inappropriate or unrewarding	18	29
Lack of adequate services	20	32	High transportation costs	5	8
Low standard specifications for used plastics	17	27	Insufficient market information	12	19
Lack of supplies for the greenhouse	16	26	The inefficiency of the devices that carry out the marketing process	6	10

Resource: Calculated by the researchers based on questionnaires.

## CONCLUSIONS

1. The results of the study proved the validity of the research hypothesis in that the okra farmers under the protected agriculture system in Baghdad province did not achieve the required level of both production and marketing competencies.
2. The high costs of producing covered okra crop and the lack of optimal utilization of economic resources in the production process, in addition to the lack of use of modern methods and techniques by the sample farmers led to a decrease in production efficiency, as well as a low-cost efficiency ratio as well, according to what was reached from the optimal size and maximum profit.
3. The profits achieved according to the optimal production volume and maximum profit exceeds the profits achieved according to the actual production volume of the study sample, due to the high production costs of the crop in the study sample.
4. The low marketing efficiency of okra under protected cultivation conditions, indicates the poor level of marketing performance of the crop and its lack of modern marketing arts and marketing services, in addition to the control of intermediaries and customers over the selling prices of the crop.
5. The problems of high costs of protected agriculture and the lack of sufficient services to produce the crop in the study area were of great importance in affecting the low production efficiency rate, while the problem of considering the selling price of the crop as inappropriate or unrewarding caused a decrease in marketing efficiency by 29%.

## RECOMMENDATIONS

According to the results of the study, the research recommends: Strictly following modern methods by the farmers of the study sample aimed at increasing the production efficiency of one dunum and achieving the optimal use of available resources to reach the optimal volume of production and improve the efficiency of okra production under the protected agriculture system, the research also recommends the need to educate farmers about the importance of marketing operations that take place within the farm such as packaging, sorting and others, and to make some organizational changes in the vegetable markets in Baghdad, which It leads to improving the marketing functions and services of the crop by following modern marketing methods and drawing up an appropriate price policy, and working to increase the efficiency of the marketing performance of okra under the protected agriculture system.

## REFERENCES

- Abdul Hamid, A. A. and Sharaa, D. (2017). The production and marketing efficiency for the protection of Some vegetable crops in Egypt the Egyptian Journal of Agricultural Economics, 27(2),463-474.
- Al-Asi, A. (2000). The Marketing Between Theory and Applied. Egypt, university of AL-Zaqaziq, college of Trade .2, pp:500.
- Al-Dabbagh, J. M. (2014). The Agricultural Marketing Economic. Part II, the first edition, Al-Mortada Dar publishing Baghdad, Iraq, pp 320.
- Al-Frraji A. (2015). The study of economic analysis for the production and marketing of some vegetable crops in the province of Baghdad agricultural season (summer). PhD Dissertation, Department of Agricultural Economics. College of Agriculture, University of Baghdad. pp: 128.
- Al-Frraji, A. M., Thamer, G. H., and Manhal, M. A. (2016). The marketing efficiency for some vegetable crops in the agricultural province of Baghdad for season summer of 2014. The Iraqi Journal of Agricultural Sciences. 47(3),837-845.
- Ali, E. H., Mohammed, H. J. and Jassem, N. (2016). Use probability regression models to study the factors affecting the efficiency of the production of tomatoes. AL-Furat Journal of Agricultural Sciences is the third scientific conference. pp:111-117.
- Ali, E. H. (2016). Measuring the efficiency of the cows by using the quality response models. The Iraqi Journal of Agricultural Science. 47(2): 600-611.
- Al-Mohammadi, F. M, Jasim. A. (1989). Vegetable production, National Library Deposit No. 308, Baghdad.



- Al-Thamer S, N. (2016). Measuring the production and marketing efficiency of the cucumber crop in Babylon Governorate/ Iraq, for the summer season 2014. *Karbala Journal of Agricultural Science*. 3(1): 71-81.
- Amer, M. K. (2018). An economic analysis of the production and marketing for some summary vegetable crops in Aleppo Governorate. Master Thesis, Faculty of Agriculture Aleppo University, Syria, pp 107.
- Bdeawe, N. L. & Thamer, G. H. (2017). Efficiency of marketing of the table eggs in the private sector in province of Baghdad in 2015. *The Iraqi Journal of Agricultural Science*, 48(4): 10-21.
- Bipradas, R. (2014). Studies on marketing efficiency of agricultural products in India. *International Journal of Multidisciplinary Research and Development*, 1(7): 206-215.
- Faeq, M. F and Ali, E. H. (2019). Using probability regression models to measure management efficiency for broiler projects. *The Iraqi Journal of Agricultural Sciences*. 50(Special Issue): 76-83
- Gujarati, N. D., 2004. *Basic Econometrics*. Mc-Graw – Hill, co. press. 4<sup>ed</sup>. p:580-635.
- Hassn W. O. (2022). An economic analysis of the effect of cultivation in plastic Iraq greenhouses on the efficiency of using agricultural resources in (Babylon province as a case study). Master Thesis, College of Agricultural Engineering Sciences, University of Baghdad, Iraq, pp: 150.
- Jassam, Q. T. (2017), Economic study to measure the efficiency and items of marketing margins of tomato crop year 2015 Al-Tagi District. *The Iraqi Journal of Agricultural Sciences*. 48(3): 791-796.
- Jassam, Q. T. (2022). An economic analysis of some factors affecting in marketing efficiency of dry onion crop using the Tobit regression model. *The Iraqi Journal of Agricultural Sciences*. 53(1): 180-186.
- Jassam, Q., Ali, N. and Ali, S. 2018. Economic study to measure the main vegetable crop Baghdad province for the agricultural season 2016, *Journal of Agricultural and Veterinary Science*, IOSR-JAVS,11 (7):11-15. E-ISSN:2319-2380
- Mahmoud, M. E., and El-Sanousy, H. M. (2015). Marketing efficiency of the tomato crop in Sohag governorate. *Assiut Journal of Agricultural Sciences*, 46(1): 48-57.
- Mazrou, Y. S. and Eladawy, R. S. (2020). Economic and marketing efficiency of Egyptian tomato. *Journal of Agricultural Economics and Social Sciences*,11 (3): 187-194
- Mohammed, H. J. (2014). *Measuring the Economic Efficiency of Honey Production in Iraq Using Random Boundaries and Data Envelope Methods, Baghdad Governorate, Case Study*” Ph.D. Dissertation, College of Agriculture, University of Baghdad, pp 31.
- Obike, K.C. Amusa, T.A. and Olowolafe, H.B. 2017 .Risk Management and Determinants of Farm Output Among Small Scale Poultry Farmers in Ekiti State , Nigeria . *Journal of Tropical Agriculture, Food, Environment and Extension*.
- Shakatreh, S. Rumman, M. A. A., Mugableh, I. M. (2023). Reviewing the Framework of Risk

Management: Policy and Hedging. . Intern. Journal of Profess. Bus. Review., vol 8 (1) .

Zaidan, Ali. G., and Khater, S. F. (2013). Measurement efficiency of producing and marketing for the peanut crop in Diyala province. Diyala Journal of Agricultural Sciences, 5(2): 155-163.

Zaidan, Ali. G., Mohammed, Hawraa. J.,and Ali, Eskander,H., (2023). MEASUREMENT THE ECONOMIC EFFICIENCY AND RISK MANAGEMENT STRATEGY FOR PROJECTS OF TABLE EGGS PRODUCTION IN DIYALA GOVERNORATE. Intern. Journal of Profess. Bus. Review., vol 8(3):