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Research Article

The Efficiency of the Technological Levels used in the Production of Wheat Crop in Sharkia Governorate

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Abstract

The wheat crop is one of the most important strategic crops to which the state pays great attention, However, it is characterized by weak productivity to meet its consumption needs of it. Therefore, the study aimed to estimate the efficiency of the technological levels used in the production of wheat crops to raise the efficiency of the exploitation of its resources. To achieve the research objectives, a field study was conducted in Faqous city in Sharkia Governorate during the agricultural season 2020/2021. The results of the research indicate that the fifth technological level is considered the best technological level in the sample in the efficiency of the exploitation of productive resources and the achievement of the targeted productivity thereof, It also showed its positive impact on feddan productivity when measuring the impact of technological change using the Malmquist index as an alternative to the first level that is not used for technology, And that the generalization of its application at the level of the area planted with wheat in both the Faqous city and the Sharkia Governorate will increase the total production of wheat and save hard currency. The study advocates the necessity of Expanding the use of modern technology, Activating the role of agricultural extension in the diffusion of technological innovations while providing agricultural associations with production requirements and the necessary equipment at appropriate prices and wages and the appropriate dates for agriculture.

Keywords: Technical efficiency, wheat yield, Data Envelopment Analysis, DEA model, technological change, Technological productivity, Growth rate.

Introduction

The wheat crop is one of the most important strategic crops to which the state pays great attention, It is also the most important crop in the winter crop composition, as the cultivated area amounted to about 2.96 million feddans, which represents about 39.36% of The area of cereal crops is about 7.52 million feddans during the average period (2015/2019), The wheat crop is at the forefront of crops that have the weak production capacity to meet the consuming needs of society, which requires the state to import large quantities of it to fill that gap, which amounted to about 11.33 million tons during the same period. This indicates the importance of applying modern technological methods that would increase the exploitation of productive resources and thus increase the total

production of wheat to increase the percentage of self-sufficiency and reduce dependence on the outside to bridge the wheat gap.

Research Problem:

Despite the efforts made by the state to increase the total production of grain crops, especially wheat, the local production does not meet the consumption needs of it, this is due to the forced increase in the population, in addition to the poor faddan productivity of the crop, which may be due to the misuse of the productive elements. Which necessitates the need to move towards estimating the efficiency of the use of productive elements, and work to achieve efficient use in proportion to the actual need of them to increase productivity.

Research Objectives

The main objective of the research is to estimate the efficiency of using the productive elements at the technological levels used in the production of the wheat crop in Sharkia Governorate during the agricultural season (2020/2021), To raise the efficiency of the exploitation of its resources, which will achieve an increase in production and a reduction in costs, and thus increase the net return of the farmer, through:

a. Estimating the technical efficiency of the crop at the different technological levels in the study sample.

b. Estimating the efficient use of the most important resources used in the production of the crop and estimate the amount of deficit or surplus of the resources used.

c. Measuring the impact of technological change on the total productivity of the resources used in the production of wheat, in addition to estimating the economic returns for expanding the application of the best-applied technologies.

Methodology

In achieving its objectives, the research relied on the method of descriptive and quantitative analysis, by using the method of Data Envelopment Analysis (DEA) in the output-orientated approach, which works to maximize profit by estimating the amount of lost output from the value of the maximum production that can be achieved with the same The number of resources used, Using the Deap2.1 program prepared by Coelli in 1996, which depends on the linear programming method to measure technical efficiency in light of the constant and variable returns to scale, To analyze the changes in the total factor productivity change (TFPCH) using the Malmquist index for the different technological levels of wheat production.

The study was based on primary data from a stratified random sample collected from Faqous city in Sharkia Governorate during the agricultural season 2020/2021 using a questionnaire that serves the purpose of the study, also the study relied on published and unpublished secondary data issued by the Directorate of Agriculture in Sharkia Governorate.

The research samples

Sharkia Governorate was chosen as a study community, as it occupies the first place in terms of cultivated area and total production, with relative importance estimated at 11.8%,

11.1% of the total republic, respectively. The Faqous city was also chosen to represent the study area for occupying the first places in terms of the cultivated area and the total production of the crop, which consists of 16 villages, the two villages of marine waters and tribal waters were chosen for occupying the first positions in terms of the cultivated area and the number of owners.

It is clear from the combined study sample of 75 farmers that all farmers apply the technology of harvesting and threshing, but they differ in the application of other technologies, Therefore, this sample was distributed to five levels of technological packages applied in the production of the crop, with 15 farmers for each level. Where the first level included the cultivation of low-productivity varieties with reliance on home seeds without any other technological operations, The second level includes the cultivation of high-yielding varieties, while relying on improved seeds for farmers from last year, The third level included the cultivation of high-yielding varieties with reliance on improved seeds and conducting deep ploughing and scissor cultivation, The fourth level includes the cultivation of high-yielding varieties with reliance on improved seeds, conducting the laser levelling process and developing field irrigation, The fifth and final level includes all technological processes applied in the third and fourth levels.

Results and Discussion

Estimation of the technical efficiency of wheat crop in the study sample for the season 2020/2021

Technical efficiency is defined as the amount of output lost from the value of the maximum output that could have been achieved with the same amount of resources and includes both technical efficiency under constant return to scale (CRS), and technical efficiency under variable return to scale (VRS), On which the results of the study depend, due to the mismatch of some productive units in the agricultural field with the hypothesis of constant return to scale as a result of several factors, including the lack of full competition in the markets and the technical and economic constraints faced by the production unit, which causes its work in conditions that do not agree with the optimal capacity of production.

The results of the data analysis in Table (1) show that the average technical efficiency coefficient according to the hypothesis of constant return to scale for wheat crop production at the first, second, third, fourth and fifth technological levels amounted to about 63.8%, 77.1%, 81.6%, 96.3%, 99.9 % respectively. This means that farmers in the study sample can increase the produced quantity of the crop by 36.2%, 22.9%, 18.4%, 3.7%, and 0.1% for the five levels, respectively, without the need to increase the number of economic resources used, This means that the sample farmers of the five levels, which are 100%, 100%, 93.3%, 66.7%, 6.7% suffer from a loss in their used economic resources, which results in an increase in the cost of crop production by about 36.2%, 22.9%, 18.4%, 3.7%, 0.1%, respectively.

As for the hypothesis of variable return to scale for yield, the average technical efficiency coefficient for the production of the wheat crop at the fifth level amounted to about 100%, meaning that all farmers of that level achieved full efficiency from the use of economic resources, While the first, second, third and fourth technological levels amounted to 69.2%, 80.5%, 87.6% and 96.8%, respectively. This means that farmers of these levels can increase the quantity produced from the crop by 30.8%, 19.5%, 12.4%, and 3.2%, respectively

without the need to increase the number of economic resources used, This means that some of the sample farmers who use the technologies applied in the first four levels, and their percentage is 100%, 93.3%, 66.7%, 60% suffer from a loss in their used economic resources, which results in an increase in the cost of crop production by about 30.8%, 19.5%, 12.4%, 3.2 % respectively. As for the scale efficiency (SE), it reached about 92.2%, 95.8%, 93.2%, 99.5% and 99.9% for the five sample levels, respectively, that is, some farmers at these levels have not reached the optimum scale efficiency and they can increase the amount of production by about 7.8%, 4.2%, 6.8%, 0.5%, 0.1% without any increase in the economic resources used at these levels. According to the nature of the return to scale, the percentage of farmers who achieved full efficiency reached 100%, meaning that the used combination of their resources is the optimal combination, about 6.7%, 26.7%, 26.7%, 73.3%, 93.3% of the total number of farmers at each technological level, respectively, The percentage of farmers with a decreased scale return was about 86.7%, 26.7%, 20%, 6.7%, and 6.7%, respectively, which means the need to reduce the number of resources used in them to achieve full efficiency. While the percentage of farmers with increased scale returns was about 6.7%, 46.7%, 53.3%, 20%, and 0%, respectively, which requires increasing the number of resources used and obtaining a greater amount of production.

Table1. The results of estimating the technical efficiency and scale efficiency of wheat crop farmers in the study sample according to the technological levels of the agricultural season 2020/2021.

Technological level	Technical efficiency (TE)				Scale Efficiency (SE)		
	CRS		VRS				
	value	The number of implants that have achieved full efficiency	value	The number of implants that have achieved full efficiency	Efficiency	The nature of the return to scale	number of farmers
first	0.638	-	0.692	-	0.922	decreasing increasing constant	13 1 1
Second	0.771	-	0.805	1	0.958	decreasing increasing constant	4 7 4
third	0.816	1	0.876	5	0.932	decreasing increasing constant	3 8 4
fourth	0.963	5	0.968	6	0.995	decreasing increasing constant	1 3 11
fifth	0.999	14	1.000	15	0.999	decreasing increasing constant	1 0 14
average	0.837	20	0.868	27	0.964	decreasing increasing constant	22 19 34

Source: collected and computed from field sample data analysis using DEAP 2.1 software.

It is clear from the above that the farmers of the fifth technological level are the best sample farmers in terms of technical efficiency in the use of economic resources, as it helped to

increase the efficiency at a rate of 36% in light of the constant of scale, and at a rate of 31% in light of the change of scale, followed by the farmers of the best level.

Estimating the efficient use of the most important economic resources used in the production of wheat crops in the study sample

The average quantity and value of the surpluses of the productive inputs of the wheat crop farmers in the study sample were estimated from the results of the analysis, as the program gives the optimum quantities that can maximize production and by comparing them with the actual quantity of the most important resources used, the amount of the surplus is obtained. The productive resources, which are the amount of water used, seeds, municipal fertilizer, phosphate fertilizer, nitrogen fertilizer, potassium fertilizer, labour, and machinery amounted to about 34.8%, 33.9%, 69.5%, 43.4%, 44%, 45.4%, 13.3% for productive resources Except for the automated work resource, it achieved the optimal use of it at the first level, and it amounted to about 24.3%, 26.4%, 34.5%, 15%, 28.4%, 30.3%, 1.2%, 17.1%, respectively, for the same productive resources at the second level, and about 14.2%, 9%, 20.9%, 9.2%, 2.7%, 11.7%, 2%, 4.1% in the third level, respectively, and reached in the fourth level about 1.9%, 12.2%, 28.2%, 3.4%, 4.9%, 7.8%, 0.9%, respectively, except for the automated work resource, which achieved optimal use of it, while the fifth level achieves full efficiency in the use of productive resources, and therefore there is no A surplus between the actual and optimal use, that is, the maximum volume of profit from production was achieved. The value of these surpluses at the technological levels from the first to the fourth was estimated at 1965, 1315, 926, and 189 pounds, respectively, which indicates the possibility of reducing the costs of acre production by the same value without affecting the quantity of production. From the table, it is clear that the fifth-level farmers outperform the rest of the sample farmers in other technological levels for their access to the optimal use of productive resources, followed by the fourth level in the decrease in the surplus rates of resource use.

Estimating the target productivity of the wheat crop at each technological level in the study sample

By estimating the average target productivity of the wheat crop at each technological level in the study sample from the results of the analysis, as the program gives the profit-maximizing production quantities and compares them with the current productivity as shown in Table (3), It was found that the current values of per feddan productivity for the five technological levels amounted to about 16.6, 17.93, 19.07, 20.53, and 22.6 ardab/feddan for each of them, respectively, While the targeted productivity values, which can be achieved using the same resources, are about 24.05, 22.45, 22.05, 21.24, and 22.6 ardab/feddan, respectively. This indicates the possibility of increasing the productivity per feddan by an estimated rate of 44.9%, 25.21%, 15.6%, and 3.5%, with an average value of about 4954, 3006, 1991, 474 pounds at these levels, respectively, except for the fifth level, where production achieved most of it, which is reflected in its impact on increasing the feddan revenues by the same value.

Table 2. Estimation of the average quantity and value of surpluses of productive inputs for wheat crop farmers in the study sample

technological level / Inputs	first			Second			third			fourth			fifth		
	average surplus	(%) surplus ratio	surplus value (EGP)	average surplus	(%) surplus ratio	surplus value (EGP)	average surplus	(%) surplus ratio	surplus value (EGP)	average surplus	(%) surplus ratio	surplus value (EGP)	average surplus	(%) surplus ratio	surplus value (EGP)
Water (m^3/Fed.)	1062.4	34.8	276	629.3	24.3	183	358.4	14.2	587	33.6	1.9	7.0	–	–	–
Seeds(kg/fed.)	22.9	33.9	126	14.6	26.4	131	4.5	9.0	41	5.98	12.2	54	–	–	–
municipal fertilizer	12.7	69.5	381	5.1	34.5	153	1.9	20.9	57	1.8	28.2	54	–	–	–
Phosphate fertilizer (Kg p/Fed.)	17.2	43.4	224	3.8	15.0	49	2.1	9.2	27	0.8	3.4	10	–	–	–
Nitrogen fertilizer (Kg N/Fed.)	36.9	44.0	406	17.5	28.4	193	1.4	2.7	15	2.2	4.9	24	–	–	–
potassium fertilizer (Kg k/Fed.)	12.2	45.4	183	4.6	30.3	69	1.6	11.7	24	1.2	7.8	18	–	–	–
Labor (man-hour/Fed.)	4.1	13.3	369	0.3	1.2	27	0.5	2.0	45	0.24	0.9	22	–	–	–
Machinery (Hour/Fed.)	–	–	–	5.1	17.1	510	1.3	4.1	130	–	–	–	–	–	–
Total(EGP)			1965			1315			926			189			–

Note: Average surplus= (current quantity - targeted quantity)/ current quantity.
Surplus ratio= (Average surplus/ current quantity) *100.
Source: collected and computed from field sample data analysis using DEAP 2.1 software.

Table 3. Estimation of the average quantity and value of the actual and target productivity of the wheat crop in the study sample.

Description / Technological level	current productivity	target productivity	the amount increase	Percentage of increase	The increase in revenue
	Ardab/fed	Ardab/fed	Ardab/fed	(%)	(EGP)
first	16.6	24.05	7.45	44.9	4954
second	17.93	22.45	4.52	25.21	3006
third	19.07	22.05	2.98	15.6	1991
fourth	20.53	21.24	0.71	3.5	474
fifth	22.6	22.6	-	-	-

Note: Percentage of increase (%) = (the amount of increase/ current productivity)*100.
The increase in revenue= the amount of increase * the farm price, as the farm price was estimated at 665 pounds for the first and second levels, and about 668 pounds for the third, fourth, and fifth levels.

Source: collected and computed from field sample data analysis using DEAP 2.1 software.

And to know the effect of surpluses and targeted feddan productivity on the net return to farmers at each technological level, Table (4) shows an increase in the actual net return from about 2654 pounds to about 9573 pounds in the first level with relative importance estimated at 260.7%, and from about 4621 pounds to about 3006 pounds in the second level with relative importance estimated at 93.5%, and from about 5647 pounds to about 8563 pounds In the third level, with relative importance estimated at 51.6%, and from about 7444 pounds to about 8107 pounds in the fourth level, with relative importance estimated at 8.9%, while the fifth level achieved the highest net return of about 8894 pounds.

Table 4. Estimation of the net yield of the wheat crop according to the surplus and productivity in the technological levels of the study sample

Description/ Technological level	actual revenue	amount of increase	actual costs	deficiency	expected net return	actual net return	the increase
	(EGP)	(EGP)	(EGP)	(EGP)	(EGP)	(EGP)	%
first	13705	4954	11051	1965	9573	2654	260.7
second	14562	3006	9941	1315	8942	4621	93.5
third	15373	1991	9727	926	8563	5647	51.6
fourth	16271	474	8827	189	8107	7444	8.9
fifth	17897	-	9004	-	-	8894	-

Note: Expected net return = (actual revenue + amount of increase) - (actual costs - deficiency). % increase = (expected net return - actual net return) / actual net return * 100.
Source: Collected and calculated from Table (2), and (3).

The effect of technological change at different technological levels on the production of wheat crop

This part deals with the results of the analysis of total factor productivity using the data envelope analysis method for the resources used in the production of the wheat crop in Sharkia Governorate, Faqous city, season 2020/2021, Which is represented in (the amount of water used, seeds, municipal fertilizer, phosphate fertilizer, nitrogen fertilizer, potassium fertilizer, labour, machinery) and crop productivity, this is to find out the most efficient technological level in resource use.

the results of the analysis using the Malmquist index shown in Table (5) indicate that the positive effect of technological change (techch) is superior to the change in technical efficiency (effch), as its positive value greater than the correct one indicates that when moving from a technological level to a higher level, Regarding the effect of technological change on Total factor productivity change (TFPCH), the positive effect of technological change was shown, as the total productivity factor of factors reached about 1.001, 1.096, 1.691, 1.961, at the second, third, fourth, fifth levels, respectively, Which confirms the importance of expanding the use of modern technologies and their impact on the feddan productivity, which is reflected in the process of vertical development of the study crop, which results in increasing production and raising the rate of self-sufficiency.

Using the results of the analysis, the rate of technological change was calculated when using different modern technologies in the second, third, fourth and fifth levels as an alternative to the first level that uses less technologies, It was estimated at 14.3%, 21.8%, 70.5%, and 78.1%, respectively, This indicates the positive effect of technological change, and this is confirmed by the transmission of the function to the highest level when the farmers use higher technological levels. The technological growth rate of productivity was also calculated, estimated at 0.1%, 9.6%, 69.1%, and 96.1%, respectively. The results of these averages indicate that the use of higher levels of modern technology by farmers in Sharkia

governorate leads to an improvement in total factor productivity. These results show that the fifth level is the best technological level used in producing the wheat crop, followed by the fourth level, then the third, and then the second level in terms of technological change and improvement in total factor productivity.

Table 5. The effect of technological change on the technical efficiency and total productivity of wheat crop variables

Technological level	effch	techch	techch%	tfpch	Productivity Growth
frist	-	-	1	-	1
second	0.876	1.143	14.3	1.001	0.1
third	0.900	1.218	21.8	1.096	9.6
fourth	0.992	1.705	70.5	1.691	69.1
fifth	1.101	1.781	78.1	1.961	96.1
average	0.965	1.434	-	1.384	-

Note: effch (Technical efficiency change), techch (Technological change), tfpch (Total factor productivity change).
% techch= (techch-1)* 100.
Productivity Growth= (tfpch-1)* 100.
Source: collected and computed from field sample data analysis using DEAP 2.1 software.

The economic return of applying the best technological level used in the production of wheat crops at the level of Faqous city and Sharkia Governorate

The results of previous analyzes show that the fifth technological level, representing the use of high-yielding varieties, deep tillage, seed drills, laser levelling, and on-farm irrigation development methods, is the best technological level used in the production of wheat crops. Therefore, the study suggests generalizing its application in the study areas. Table (6) shows the generalization results in the Faqous city and the Sharkia Governorate in an area of about 45.14 and 399.35 thousand feddans, respectively, where the feddan productivity increased from about 17.4 and 18.08 ardab/feddan to about 22.6, 22.6 ardab/feddan, with an increase of about 5.2, 4.5 ardab/feddan, respectively, which results in an increase in total production by about 0.034 and 0.254 million tons, and thus an increase in the value of the gross domestic product by about 160.3 and 1209 million pounds, and the provision of hard currency estimated at 9.55 and 71.4 million dollars, respectively.

Table 6. The expected impact of generalizing the application of fifth level technologies of wheat crop in Faqous city and Sharkia Governorate

Description	Faqous	Sharkia
Cultivated area (thousand feddan)	45.14	399.35
Actual productivity (ardab/feddan)	17.4	18.08
Suggested productivity (ardab/feddan)	22.6	22.6
Actual production (million ardab)	0.785	7.22
expected Production (million ardab)	1.02	9.03
The amount of increase in production	0.24	1.81
The amount of increase in production (million tons)	0.34	0.254
Increase in the value of GDP (million pounds)	160.3	1209
Decrease in the value of imports (million dollars)	9.55	71.4

Note: The amount of increase = expected production - actual production.
The increase in the value of the gross domestic product (GDP) = amount of increase * farm price.
Decrease in the value of imports = amount of increase * import price.

The farm sale price of the wheat crop was estimated at about 668 pounds per ardab, and the import price was estimated at 281 dollars per ton.
Source: calculated and collected from the field study results
Data of the Directorate of Agriculture, Sharkia Governorate, Information and Documentation Department, unpublished records.
Trade statistics for international business development (https://www.trademap.org/)

Conclusion and recommendations

The state is interested in developing the domestic production of wheat, as it is the most important strategic crop in Egypt, in order to meet the consumption needs of the community due to its weak production capacity, Thus, reducing the size of the food gap, which amounted to about 11.33 million tons during the average period (2015/2019), and providing hard currency. this calls for the use of modern technologies to raise the efficiency of exploitation of productive resources, which results in an increase in total production and an increase in the net return of farms. Therefore, the research aimed to study the technical efficiency of the technological levels, and to estimate the maximum use of the profit at each level in order to estimate the size of the surplus or deficit in the resources used, It also aimed to measure the impact of technological change and the technological growth rate of productivity at those technological levels, and to measure the economic impact of the best of those levels. To achieve the research objectives, a field study was conducted in Faqous city in Sharkia Governorate during the agricultural season 2020/2021. The sample was divided into five technological levels according to the technological packages applied in the production process. The Data Envelopment Analysis (DEA) model in the output-orientated approach was employed to determine the best technological level. The results of the research indicate that when measuring the technical efficiency of the technological levels in the sample, it was found that the fifth technological level excelled in the production of the wheat crop, representing the use of high yielding varieties, deep tillage, seed drills, laser leveling, and on-farm irrigation development methods, It helped increase efficiency by 36% in light of constant capacity, and by 31% in light of capacity change, followed by the fourth technological level.

When estimating the efficient use of the resources used at the sample levels, it was found that the farmers of the fifth level were superior to the rest of the farmers at other levels, due to their reaching the optimal use of productive resources, It also showed its superiority in achieving the highest yield per feddan of the crop, which amounted to about 22.6 ardeb / feddan, and the highest net yield, which amounted to about 8894 pounds, compared to the rest of the sample levels.

It was also shown by measuring the effect of technological change using the Malmqusit index. The fifth level excelled in the rate of technological change and the rate of technological growth of resources as an alternative to the first level that did not use technology, as it was estimated at 78.1% and 96.1%, respectively. Which refers to the positive impact of the technologies applied at that level on the feddan productivity, and that the generalization of these technologies on the total area allocated for the wheat crop in the Faqous city and the Sharkia governorate leads to an increase in feddan productivity by about 29.9% and 25% of the actual productivity, respectively, and the provision of hard currency estimated at about 9.55 and 71.4 million dollars, respectively. The study recommends the following:

- Work to raise the efficiency of using the productive resources of the wheat crop by using modern technological methods, because of their positive impact on increasing productivity and reducing production costs, and thus increasing the net return for farms.

- Activating the role of agricultural extension to educate farmers about the importance of adopting technological innovations, with the need to conduct training courses to raise the efficiency of wheat producers, extension workers and agricultural workers.
- Agricultural cooperatives play their role in terms of guidance and provision of production requirements, modern varieties and improved seeds at reasonable prices and on time.
- Providing agricultural associations with modern tools used in conducting agricultural operations with appropriate fees.

References

Aboelkhair. Radwa, R. (2022). Economic Study of Technological Methods used in Production of The Most Important Grain Crops in Egypt, Master, Department of Agriculture Economics, Faculty of Agriculture, Cairo University.

Abou Saif. Yasmin. A, Darweash. Mona. A. (2019), Estimate the Economic Efficiency Of The Wheat Crop In The New Land In Fayoum Governorate, Egyptian Journal Of Agricultural Economics, 29:3

Coelli T.J. A Guide to DEAP Version 2.1: A Data Envelooment Analysis (Computer) Program، CEPA Working Paper 96/08، Department of Econometrics، University of New England، Armidale.

Cooper, W.W.; Seiford, L.M. and Tone, K. (2006). Introduction To Data Envelpment Analysis and Its Uses, Springer Science Business Media, USA.

Hassn. R. A. (2019), The Economic Effect of Different Irrigation Systems for Some Field Crops in New Lands in Beheira Governorate (Case Study of West Nobaria, South and West Tahrir), Egyptian Journal of Agricultural Economics, 29:2.

The Directorate of Agriculture, Sharkia Governorate, Information and Documentation Department, unpublished records.

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Ministry of Agriculture and Land Reclamation, Economic Affairs Sector, Agricultural Statistics Bulletin, Cairo, various issues.