*Iran Agricultural Research* (2022) 41(1) 75-82

## Research Article

Shiraz University

# Financial evaluation of wheat seed processing lines in domestic systems and the value of seed losses

**H. Asadi[1*], H. R. Gazor[2], A. Shirvanian[3] , A. Mohaddes Hosseini[4], N. M. Abyar[5], A. Hamidi[6], M. H, Saeidirad[4], J. Habibi Asl[7], M. H, Razzaghi[5], M. A. Behaein[3], M. Mahmoodi[1], A. Eyvani[2], E. Dehghan[2]**

[1] Seed and Plant Improvement Institute (SPII), Agricultural Research, Education and Extension Organization (AREEO), Karaj, I.R. Iran
[2] Agricultural Engineering Research Institute, Agricultural Research, Education and Extension Organization (AREEO ), Karaj, I.R. Iran
[3] Agricultural Research and Education and Natural Resource Center of Fars Province, Agricultural Research, Education and Extension Organization (AREEO ), Shiraz, I.R. Iran
[4] Agricultural Research and Education and Natural Resource Center of Razavi Khorasan Province, Agricultural Research, Education and Extension Organization (AREEO), Mashhad, I.R. Iran
[5] Agricultural Research and Education and Natural Resource Center of Gholastan Province, Agricultural Research, Education and Extension Organization (AREEO), Gorghan, I.R. Iran
[6] Seed and Plant Certification and Registration Institute (SPCRI)**,** Agricultural Research, Education and Extension Organization (AREEO), Karaj, I.R. Iran
[7] Agricultural Research and Education and Natural Resource Center of Khuzestan Province, Agricultural Research, Education and Extension Organization (AREEO), Ahvaz, I.R. Iran

* hormoz.asadi3@gmail.com
DOI: 10.22099/IAR.2022.41462.1458

**ARTICLE INFO**
***Article history*:**
Received **25 August 2021**
Accepted **03 Oct 2022**
Available online **08 November 2022**
***Keywords*:**
Economic analysis
Losses value
Processing line
Wheat seed

**ABSTRACT** - This study was carried out in order to determine the cost and benefit of investment, cost price, margin safety ratio, gross margin, benefit-cost ratio, and economic value of the wheat seed losses in processing lines of domestic systems of Ar-Mashin, Arvin-Sanat, Ramsanat Bhareh, and Azaran Boojar lines, located in Fars, Khorasan Razavi, Khouzestan and Golestan provinces, respectively in 2018. In this case, profitability analysis and engineering economic indicators were considered to achieve the research objectives. According to results, the average cost price of wheat seed (per kg) in target processing lines and provinces was estimated to be 19633.9 Iranian Rials, which was lower than selling price in most of the provinces. Average gross margins for processing lines in Jovein Cultivation and Industry, Fars Thousand Khoosheh Talayehdaran, Amiran Zagros Taha, Army Sample, Sabz Dasht Sorkheh, and Razmandegan Companies in target provinces were positive and was 11.2 billion Iranian Rials, but, this gross margins in Marvdasht Rural Cooperative Company, Rural Cooperative Company of Gonbad, and Zarrin Daneh Benvar Company in Khouzestan were negative. Average benefit-cost ratio in domestic processing lines was 1.05 during the analysis period. Also, average useful waste separated from the seed processing line was 20.2%, and the value of lost seeds was 958.6 million Iranian Rials. Therefore, it is recommended that profitable companies continue their activities by increasing the amount of purchased inbound seeds to minimize losses and receive positive economic benefits.

## INTRODUCTION

The agricultural statistics of the Ministry of Jihad-e-Agriculture in 2017-2018 crop year reported that wheat production and area were 13.3 million tons and 5.4 million hectares (ha), respectively (Ahmadi et al., 2019). The shares of irrigated and rain fed wheat productions were 62.9 and 37.1%, respectively. Besides, shares of irrigated and rain fed wheat areas were 36.2 and 63.8%, respectively. Also, irrigated and rain fed wheat yields were 4282 and 1432 kg/ha. In Tehran Province, wheat production, area, and yield were 232767 tons, 38923 ha, and 6084 kg/ha, respectively (Ahmadi et al., 2019).

Seeds are one of the most critical inputs for crop production. Although high-quality seed production is the goal of all seed producers in countries, According to Center for Agricultural Research in the Dry Areas (ICARDA) annual report, the health of this input and its

role in countries' food security is one of the most vital tasks of agriculture (Van Gastel et al., 1996).

Food security is cornerstone of a developed society and the main element of the society's intellectual, mental, and physical health. In contrast, food insecurity is an actual and potential image against the country's fundamental values. Also, food security plays a crucial role in national security policies. Indeed, providing an optimal level of national security requires the optimal level of food security preparation. At macro level, food security is a fundamental priority for the country's national security, which will be made through rural and agricultural development. However, rural development must empower and enhance the capacity of villagers to meet their material and spiritual needs (Khezri, 2003). Therefore, optimal and timely use of existing capacities and capabilities to achieve development in the agricultural sector by managers and professionals is one of the basic strategies to take advantage of opportunities in this field (Samadi et al ., 2003).

Wheat is recognized as one of the fundamental agricultural products. Indeed, providing this product for societies such as Iran, where wheat has a special place in the nutrition pattern, means food security. Also, it has been shown that social welfare of the middle and weak classes is strongly influenced by this product (Clafferty, 2000). One of the processes related to wheat losses is called post-harvest losses. In this stage, the most vital losses are associated with transportation and warehousing. According to the average price of wheat purchased in Iran in 1996-2002, the value of losses at this stage was estimated to be 277500 tons, worth 416 billion Iranian Rials ($ 52 million). It was suggested that an alternative to reduce wheat threshing losses was to apply high-yield threshing machines and adjust them accurately to minimize grain loss and set up a preliminary wheat threshing system in all shopping malls and large wheat (Mostofi Sarkari, 2005).

Threshing is one of the most critical and essential prices for marketing and agricultural seed marketing. The results obtained from evaluating three types of cleaner machines made in Iran (i.e., threshing cars made by Armachin Company, Ram Ghasemi Company, and Rezaei Rafsanjan Company) on tropical cultivars of irrigated wheat and rainfed Ilam province showed that threshing cars made by Armachin Company had the highest total threshing yield. Also, it was found that the most significant factors affecting total threshing yield were the type of machine and seed cultivar (Egbali & Borgei, 2006).

Another study investigated three types of threshing machines in the northern region of Khuzestan province (i.e., the Iranian-made threshing Armachin machine, the Danish-made threshing Kimberia machine, and the Gold threshing GOLSAT machine made in Germany) to select type of threshing machine with the lowest wheat loss (Ghaseminejad and Ghaseminejad, 2017). The results demonstrated that Kimberia and Armashin machines had the lowest and highest losses with average values of 1.17 and 1.91 percent, respectively. Also, the Goldstach machine had an average loss of 1.74. Javadi et al. (2017) showed importance of the seeds lost in various processing stages in main output of the seed processing line. However, wear and tear, high age of the devices, high feed to the processing line, non-compliance with the regulations, and lack of sufficient knowledge of operators about devices were the factors influencing the placement of healthy seeds in waste processing machine. In addition, some machines cannot utilize nominal capacity and proper adjustment due to wear and tear (Javadi et al,. 2017)

Cost is one of the most remarkable economic parameters, which plays a vital role in efficiency of production growth and optimal allocation of production inputs, especially seed inputs. Also, it has been shown that it has different mechanisms in various economic systems (Bikzadeh and Mahdavipour, 2005). In the agricultural sector, the capital factor has been recognized as one of the most limiting factors of production (Shadmani and Saleh, 2007). Indeed, correct and optimal use of this input significantly affects the country's economic growth. Nevertheless, the proper use of the capital factor in agricultural projects requires an accurate economic evaluation of the investment (Shadmani and Saleh, 2007).
Investment, especially in the agricultural sector, is one of the most crucial elements for economic growth and development in any country. In this sector, the continuous increase in demand for food and other agricultural products can improve production and employment. However, there is no incentive to invest in agriculture due to the high risk of production, high maintenance costs of products, lack of rial and foreign exchange credits, lack of development of conversion industries, lack of incentive system, and greater profitability of other sectors, especially services (Bahrami Mahneh et al., 2007).

Asadi et al. (2007) evaluated minimum price of wheat production in the Glidagh area in Kalaleh city of Golestan province. The authors employed the lead analysis by selecting 84 sample operators through a sampling method to determine the cost price and breakeven price of wheat among target groups and compare its pay based on the selling prices in the 2002-2003 crop year. In the exploitation groups with less than 2 hectares of land, the price points for each kilogram of rain fed wheat in the Zagros cultivar were 1260 and 2641 Rials under personal and rental circumstances, respectively. Also, price points for irrigated wheat in Tous cultivar were estimated to be 694 and 1385 Rials under personal and rental conditions, respectively. In this group, the minimum price (breakeven price) in the leased circumstances was higher than current market price, and income obtained from the selling price could not compensate for the variable production costs. In exploitation groups with land between 10-20 hectares, the price point at the top of the price was estimated to be 1957 Rials for each kilogram of irrigated wheat in rental conditions. This value was more than the current selling price of the product (1450 Rials per kg). Therefore, revenue generated by the selling price could not offset the variable production costs. In the Operating group with land above 50 hectares, the net profit from the positive selling price was assessed under personal and leased ownership conditions.

Through another study, Asadi et al. (2022) investigated the losses value and economically assessed the wheat seed processing lines in Alborz and Kordestan provinces using profitability analysis. In the Ram-Sanat Bahare processing lines in Alborz Province, the breakeven price and gross margin of irrigated bread wheat (Pishgam cultivar) were

14675 Iranian Rials per kg and 14000 million Iranian Rials, respectively. Also, the benefit-cost ratio of this line was 1.05. In the Akyurek Technology line in Kordestan Province, the breakeven price and gross margin of dry bread wheat (Sardari cultivar) were 17575.2 Iranian Rials per kg and 20340 million Iranian Rials, respectively. In addition, the benefit-cost ratio of this line was 1.12 in analysis periods.

Gazor (2020) performed a technical and economic assessment of the Iranian and imported wheat seed processing systems in the Western Azarbaijan Province using profitability analysis. The results showed that total revenue (TR) and total variable cost (TVC) in the Iranian processing system were estimated to be 21822.4 and 19214.5 million Iranian Rials, respectively. These values in the imported processing system were 216486.3 and 203298.5 million Iranian Rials, respectively. Also, benefit-cost ratios for the Iranian and imported seed processing lines were 1.23 and 1.05, respectively. In addition, net present values for the Iranian and imported processing lines were estimated to be 19850 and 74355.4 million Iranian Rials, respectively.

The contribution of the present study was to carry out several financial assessments for analyzing different domestic processing lines. These assessments were based on determining and evaluating the cost and benefit of investment, cost price and safety margin ratio, gross margin, benefit-cost ratio, and economic value of the wheat seed losses.

## MATERIALS AND METHODS

The present study was carried out in 2018. The profitability analysis by engineering economic methods was the proposed approach for this study. In this case, total fixed cost (TFC) included items such as the cost of purchasing and installing machines and equipment and cost of building a shed and factory. Also, total variable cost (TVC) involved items such as consumables, wheat purchase costs, labor wages, fuel, water, electricity and telephone, service depreciation of factory, shed and processing line, insurance, interest on facilities, and maintenance. In addition, complete processing line of irrigated wheat seeds (i.e., pre-cleaner machine, cleaner machine, small and indented cylinders, gravity table, poisoning system, weighing, and bagging system) was related to domestic producers, including Ram Sanat Bahareh, Ar-Machine, Arvin Sanat, and Iranian Azaran Boojar processing line. The following equations were considered to estimate total cost, per capita price per kg of seed (ATC), margin of safety ratio (SM) of this price, gross margin (GM), program efficiency, and economic profit ( $\pi$) (Oskounejad, 1996).

$$\mathrm{TC} = [\mathrm{TVC} + \mathrm{TFC}] \quad (1)$$
$$\mathrm{ATC} = [\mathrm{TC}/\mathrm{Y}] \quad (2)$$
$$\mathrm{SM} = [(\mathrm{MP}) - \mathrm{MP}/\mathrm{ATC}] \times 100 \quad (3)$$
$$\mathrm{GM} = [\mathrm{TR} - \mathrm{TVC}] \quad (4)$$
$$\pi = [\mathrm{TR} - \mathrm{TC}] \quad (5)$$

where TC is Total cost, TVC is Total variable cost, TFC is Total fixed cost, ATC is Average total cost, Y is Quantity of seed Processed, SM is Margin of safety ratio, MP is Market price, GM is Gross margin, TR is Total Revenue, and $\pi$ is Profit.

More additional information on economic indicators is presented in Table 1.

The straight-line depreciation method was applied to calculate the depreciation cost of buildings, factories, and facilities (Equation 6). Also, a declining balance depreciation method (Equations 7 and 8) was utilized to compute the depreciation cost of equipment and processing line machinery (Oskounejad, 1996; Soltani, 2007).

$$\mathrm{D} = [(\mathrm{P} - SV)/n] \quad (6)$$
$$\mathrm{Di} = \frac{2}{\mathrm{n}}[\mathrm{Book\ Value}] \quad (7)$$
$$\mathrm{Book\ Value} = [\mathrm{Pi} - \mathrm{accumulated\ depreciation}] \quad (8)$$

where D is the amount of annual linear depreciation for buildings and facilities, Di is the amount of declining balance depreciation for processing line machinery and equipment, Pi is the initial cost of purchase and installation, SV is the Salvage value and n is the useful life of the asset.

The single payment and uniform series formulas were employed to convert the annual cash flow of costs and revenues of processing systems to present value.

$$\mathrm{P} = \mathrm{F}[1/(1 + \mathrm{i})\text{^}\mathrm{t}] \quad (9)$$
$$\mathrm{P} = \mathrm{A}[(1 + \mathrm{i})^{\mathrm{t}} - 1)/\mathrm{i}(1 + \mathrm{i})\text{^}\mathrm{t}] \quad (10)$$

## RESULTS AND DISCUSSION

where P is the present value of the device, F is the Future value of the device at the end of the operation period, A is the amount of annual cost or revenue of the system during the operation period, r is the discount rate (15%) and t is the Period

Finally, the net present value and benefit-cost ratio were estimated in the period of analysis 2017-2026. Thus, a company will have economic activity if the benefit-cost ratio is more than one.

$$NPV = B_n - C_n = \sum_{n=1}^{N} \left(\frac{B_n - C_n}{(1+r)^n}\right) \quad (11)$$
$$BCR = \left(\sum_{n=1}^{N} B_n/(1+r)^n\right) / \left(\sum_{n=1}^{N} C_n/(1+r)^n\right) \quad (12)$$

where $B_n$ is the Gross benefit of activity and $C_t$ is the Cost of activity.

According to the economic council decision and meetings related to pricing and approval of wheat production costs held in the Ministry of Jihad-e-Agriculture in 2018, the subsidies allocated to one kg of irrigated and rain fed certified wheat were 1545 and 3845 Rials, respectively. Also, the selling prices of one kilogram of irrigated and rain fed certified bread wheat were estimated to be 19500 and 17500 Rials, respectively. Based on the selling price of certified bread wheat seeds and subsidies allocated to rain fed and irrigated wheat seeds, the potentially lost seeds in waste were calculated for the target provinces.

**Table 1.** Description of economic indicators

| TFC | TVC | ATC | SM | GM | π |
|---|---|---|---|---|---|
| total fixed cost (including the cost of purchasing and installing machines and equipment and the cost of building a shed and factory) | total variable cost (such as consumables, wheat purchase costs, labor wages, fuel, water, electricity and telephone, service depreciation of factory, shed and processing line, insurance, interest on facilities, and maintenance ) | The total cost (TC) divided by yield (Y) | The Margin of safety ratio: The difference between the market price of certified seed (MP) and average total cost (ATC) multiplied by 100 | Gross margin: The difference between Total Revenue (TR) and total variable costs (TVC) | Profit. The difference between Total Revenue (TR) and TC |

Data

The necessary data were collected through a questionnaire from the target companies in the target provinces, including Khuzestan, Golestan, Fars, and Khorasan Razavi provinces. In this study, the domestic wheat seed processing lines were economically evaluated using cost and benefits of investment, breakeven price, safety margin ratio, calculation of program yield, economic profit, economic value, and amount of seed lost in losses methods (Hamsi and Nikomaram, 2003; Daneshvar Khaki et al., 2006; Heisey and Brennan, 1991). In other words, cost-benefit ratio of the target processing systems was calculated using a ten-year analysis period, the present value index, discount rate, one-time payment formulas, and uniform series.

## RESULTS AND DISCUSSION

Cost and Profitability Indices

According to Table 2, the average total costs (current and capital) of wheat seed processing lines in 2018 were estimated to be 102.4, 124.2, 74.4, and 113.1 billion Iranian Rials in Khouzestan, Golestan, Fars, and Khorasan Razavi provinces, respectively. In these provinces, average input seeds to processing lines were 3766.7, 5635, 3454.1, and 6522 tons, respectively. Besides, the average processed and sold seeds in these provinces were 3446.7, 4577.4, 3020.8, and 5706.9 tons, respectively. Also, average processed losses in these provinces were 276.3, 548.7, 452.8, and 815.1 tons, respectively. In addition, the average gross incomes of wheat seed processing lines based on seed sales and processed losses were estimated to be 76.9, 111.2, 68.3, and 124.4 billion Iranian Rials in Khouzestan, Golestan, Fars, and Khorasan Razavi provinces, respectively.

According to Table 3, the minimum average breakeven prices of certified wheat seed (per kg) in 2018 were estimated to be 19053.8, 24750.8, 17626.8, and 17104.2 Iranian Rials in Khouzestan, Golestan, Fars, and Khorasan Razavi provinces, respectively. These minimum breakeven prices of seeds were lower than the seed sale price in Khouzestan, Fars, and Khorasan Razavi provinces. Also, the benefit-cost ratios of this activity were estimated to be 1.06, 1.05, 1.08, and 1 in Khouzestan, Golestan, Fars, and Khorasan Razavi provinces, respectively. In these provinces, the average benefit-cost ratio of this activity was 1.05.

In general, the profitability indices revealed that following companies could continue their wheat seed processing lines. These included the Ar-Mashin line of Razmandegan Company and Ramsanat Bhareh line of Sabz Dasht Sorkheh Company (Khouzestan province), Arvinsanat line of Army Sample Company (Golestan province), Azaran Boojar line of Amiran Zagros Taha Company and Arvinsanat line of Fars Thousand Khoosheh Talayehdaran Company (Fars province), and Arvin Sanat line of Jovein Cultivation and Industry Company (Khorasan Razavi province). Indeed, these companies' activities were economic, and they can continue their activities and increase purchased input seeds to minimize losses and achieve positive economic benefits.

The Value of Lost Healthy Seeds in Useful Losses

According to Table 4, the useful losses separated from the seed processing lines averagely contain 31.6, 19.7, 12.2, and 17.5% healthy seeds in Khouzestan, Golestan, Fars, and Khorasan Razavi provinces, respectively. These seeds were removed from the factory together with crushed seeds (useful losses). Also, mean values of these wasted seeds based selling price of seeds and subsidy were 1181.6, 873.8, 261.3, and 1517.7 million Iranian Rials in Khouzestan, Golestan, Fars, and Khorasan Razavi provinces, respectively.

**Table 2.** The cost and benefit of domestic wheat seed processing lines in each company in 2018

| Target provinces | Company | | Establishment year | Costs (billion Iranian Rials) | Total Revenue (billion Iranian Rials) | | | |
|---|---|---|---|---|---|---|---|---|
| | Name of company | Type of line | | | Quantity of seed (ton) | Quantity of processed and sale (ton) | Quantity of processed losses (ton) | Total Revenue (TR) |
| Khouzestan | Razmandegan Company | Armashin line | 2003 | 46.5 | 2300 | 2140 | 129 | 47.2 |
| | Zarrin Daneh Benvar Company | Ramsanat bhareh line | 2016 | 163.8 | 4000 | 3600 | 300 | 81.1 |
| | Sabs Dasht Sorkheh Company | Ramsanat bhareh line | 2016 | 96.85 | 5000 | 4600 | 400 | 102.4 |
| Gholestan | Rural Cooperative Company of Gonbad | Arvinsanat line | 2015 | 185.2 | 7474 | 6250 | 635.3 | 151.4 |
| | Army Sample Company | Arvinsanat line | 2010 | 63.3 | 3796 | 2904.8 | 462.1 | 71 |
| Fars | Amiran Zagros Taha Company | Azaran boojar line | 2018 | 93.5 | 5600 | 4800 | 840 | 112.7 |
| | Marvdasht Rural Cooperative Company | Arvinsanat line | 2010 | 42.38 | 1762.3 | 1762.3 | 158.5 | 39.8 |
| | Fars Thousand Khoosheh Talayehdaran Company | Arvinsanat line | 2015 | 93.3 | 3000 | 2500 | 360 | 52.5 |
| Khorasan Razavi | Jovein Cultivation and Industry Company | Arvinsanat line | 2011 | 113.11 | 6522 | 5706.9 | 815.1 | 124.4 |

Source: Research data

**Table 3.** Profitability of wheat seed processing lines of companies in analysis period in target provinces

| Target provinces | Company | | The year 2018 | | | Analysis period | Benefit-cost ratio (BCR ) | Net present value (billion Iranian Rials) |
|---|---|---|---|---|---|---|---|---|
| | Name of Company | Type of line | Minimum breakeven price (Rials/kg) (BEP ) | Safety margin ratio (%) (SM ) | Gross margin (GM) (billion Iranian Rials) | | | |
| Khouzestan | Razmandegan Company | Armashin line | 19302.6 | 9.4 | 1.4 | 2003-2018 | 1.04 | 42.3 |
| | Zarrin Daneh Benvar Company | Ramsanat bhareh line | 18855 | 11.5 | -77.7 | 2016-2018 | 1 | - |
| | Sabz Dasht Sorkheh Company | Ramsanat bhareh line | 19003.7 | 10.8 | 8.5 | 2016-2018 | 1.14 | 105.6 |
| Gholestan | Rural Cooperative Company of Gonbad | Arvinsanat line | 28261.2 | - | -25.2 | 2015-2018 | 1 | - |
| | Army Sample Company | Arvinsanat line | 21240.4 | - | 9.1 | 2010-2018 | 1.11 | 73.6 |
| Fars | Amiran Zagros Taha Company | Azaran boojar line | 15331.6 | 28 | 26.9 | 2018 | 1.25 | 185.2 |
| | Marvdasht Rural Cooperative Company | Arvinsanat line | 20842.9 | 2.1 | -0.224 | 2010-2018 | 1 | - |
| | Fars Thousand Khoosheh Talayehdaran Company | Arvinsanat line | 16705.8 | 21.6 | 8.7 | 2015-2018 | 1 | - |
| Khorasan Razavi | Jovein Cultivation and Industry Company | Arvinsanat line | 17104.2 | 19.7 | 12.8 | 2011-2018 | 1 | - |

Source: Research data

**Table 4.** The economic value of the lost seed in useful losses in the wheat seed processing lines in 2018

| Target provinces | Name of Company | Type of line | Useful annual seed losses (kg) | The healthy seeds lost in useful losses (kg) | Differences between the real value of wheat seed sales and the healthy seeds sold as losses without subsidy | | Loss of seed sales as waste with subsidies* | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Quantity (million Iranian Rials) | % | Quantity (million Iranian Rials) | % |
| Khouzestan | Razmandegan Company | Armashin line | 230000 | 67850 | 508.9 | 38.5 | 613.7 | 43 |
| | Zarrin Daneh Benvar Company | Ramsanat Bhareh line | 400000 | 138800 | 1179.8 | 43.6 | 1394.2 | 47.7 |
| | Sabz Dasht Sorkheh Company | Ramsanat Bhareh line | 500000 | 153000 | 1300.5 | 43.6 | 1536.9 | 47.7 |
| Gholestan | Rural Cooperative Company of Gonbad | Arvinsanat line | 600000 | 106200 | 690.3 | 33.3 | 854.4 | 38.2 |
| | Army Sample Company | Arvinsanat line | 500000 | 109000 | 599.5 | 29.7 | 893.3 | 38.7 |
| Fars | Amiran Zagros Taha Company | Azaran Boojar line | 560000 | 69440 | 486.1 | 35.9 | 593.4 | 40.6 |
| | Marvdasht Rural Cooperative Company | Arvinsanat line | 80000 | 10000 | 39 | 20 | 54.4 | 25.9 |
| | Fars Thousand Khoosheh Talayehdaran Company | Arvinsanat line | 210000 | 24570 | 98.3 | 20.5 | 136.2 | 26.3 |
| Khorasan Razavi | Jovein Cultivation and Industry Company | Arvinsanat line | 720000 | 126000 | 1323 | 53.8 | 1517.7 | 57.2 |

Source: Research data

* Description: The harm of selling seeds as losses (i.e., subsidies) is the difference between the real cumulative value of wheat sold in losses and healthy seed, which is sold as losses

Gazor (2020) conducted a study to evaluate benefit-cost ratio for the Iranian and imported seed processing lines in Western Azarbaijan Province. The author found that the benefit-cost ratios in these processing lines were 1.23 and 1.05, respectively. Also, net present values were estimated to be 19850 and 74355.4 million Iranian Rials in the Iranian and imported processing lines, respectively. In another study performed by Asadi et al. (2022) in Alborz and Kordestan provinces, the benefit-cost ratios of wheat seed processing lines were estimated to be 1.05 and 1.12, respectively. This issue showed that these lines' activities were economic. Also, these results were consistent with outcomes obtained from most processing lines in target provinces in present study. However, these results were not matched with some of the processing lines, including the Ram Sanat Bhareh line of Zarrin Daneh Benvar Company (Khouzestan Province), Arvinsanat line of Rural Cooperative Company of Gonbad (Golestan Province), and Arvinsanat line of Marvdasht Rural Cooperative Company (Fars Province).

## CONCLUSIONS

The analyses demonstrated that wheat seed processing lines' activities were economic in studied companies in target provinces during the analysis period. Based on fixed and variable costs of the processing line in Khouzestan province, minimum average breakeven price of certified wheat seed (per kg) was estimated to be 19053.8 Iranian Rials. During the analysis period, the average net present value and benefit-cost ratio in these lines were estimated to be 73.9 billion Iranian Rials and 1-1.14, respectively. The minimum average breakeven price of certified wheat seed (per kg) in Fars province was estimated to be 17626.8 Iranian Rials. During the analysis period, average net present value and benefit-cost ratio in these lines were estimated to be 185.2 billion Iranian Rials and 1-1.25, respectively. The minimum average breakeven price of certified wheat seed (per kg) in Golestan province was estimated to be 24750.8 Iranian Rials. During the analysis period, the average net present value and benefit-cost ratio in these lines were estimated to be 73.6 billion Iranian Rials and 1-1.11, respectively. In Khorasan Razavi province, the minimum average breakeven price of certified wheat seed (per kg) was estimated to be 17104.2 Iranian Rials. During the analysis period, average benefit-cost ratio of these lines was 1. In addition, the useful losses separated from the seed processing line average had 20.2% healthy seeds in target provinces. These seeds were removed from the factories along with crushed shredded seeds (useful losses). Furthermore, the value of lost seeds was calculated to be 958.6 million Iranian Rials. This value was achieved considering the selling price of seeds and the subsidy allocated to them.

It is suggested that investment in wheat seed processing lines in which their activities were economic and they were mentioned in the results section should be carried out considering the loan amount and the method of paying it off to make the processing line profitable. Also, quality process in Iranian plants can be improved by applying some changes in policy, technical, and execution procedures. In addition, it is recommended to provide an efficient collaboration between governmental sectors (e.g., the ministry of Jahad-e-Agriculture and the institute of standard and industrial research) and non-government (N-G) sectors (e.g., seed process industries, factories, and scientific N-G Organizations).

## REFERENCES


Ahmadi, K., Ebadzadeh, H. R., Hatami, F., Abdshah, H., & Kazemyan, A. (2019). Agricultural statistics of 2017-2018. Crop production. Information and Communication Technology Center. Deputy of Programing and Economics, Ministry of Jihad-e-Agriculture. Tehran, Iran. (In Persian)

Asadi, H., Gazor, H. R., Hamidi, A., & Eivani, A. (2022). Study of value losses in wheat seed processing lines and its economical assessment. *Iranian Journal of Seed Science and Technology*, 10(4),137-147. (In Persian)

Asadi, H., Barikani, E., & Hajizadeh Fallah, N. (2007). Investigation of minimum price of wheat production in different exploitation groups in Kalaleh city. Proceeding of the 6th Iranian Conference of Agricultural Science and Natural Resource. 27-28 Nov. The Islamic Azad University, Karaj Branch. Iran. (In Persian)

Bikzad, H., & Mahdipour, A. (2005). Investigating the effect of policy on determining the guaranteed price of agricultural products on the free rate of other products. Proceeding of the 5th Iranian Conference of Agricultural Economics of Iran. 29-31 Aug, The University of Sistan and Baluchestan. Zahedan, Iran.

Bahrami Mahneh, F., Soltani, S., & Alishahi, M. (2007). Study of the investment situation in Iran's agricultural sector and ways to increase it. Proceeding of the 6th Iranian Conference of Agricultural Economics of Iran. 29-30 Oct. The University of Ferdowsi. Mashhad, Iran. (In Persian)

Clafferty, B. (2000). Ensuring food security in Egypt: Food subsidy, income generation and market reform. *Food Policy*, 25, 219–224.

Daneshvar Kakhki, M., Dehganian, S., & Serouri, A. A. (2006). Investigation of milk production economy in industrial units: Case study of Astan Quds Razavi Institute. *Science*, 20(1), 207-214.

Egbali, A., & Borgei, A. M. (2006). Determination of return and assessment of wheat seed threshing machines in dry and semi-tropical regions. 4th Iranian National Conference of Agricultural Machinery and Mechanization. The University of Tabriz, Tabriz, Iran. (In Persian)

Gazor, H. R. (2020). Technical and economical assessment between Iranian and imported wheat seed processing systems in order to improve seed processing in Iran. Final research report. Agricultural Engineering Research Institute, Agricultural Research, Education and Extension Organization, Ministry of Jahad-e-Agriculture, Karaj. Iran. pp. 304. (In Persian).

Ghaseminejad, M., & Ghaseminejad, R. (2017). Investigation the amount of waste after harvesting wheat seeds in threshing machines. Proceeding of the 7th Iranian National Conference of Sustainable Agriculture and Natural Resources. 5 July. The Mehrarvand Education Institute, Tehran, Iran. (In Persian).

Hamsi, A. H., & Nikomaram, H. (2003). Feasibility of dough factory and printing and writing paper using bagasse as a raw material. *Agricultural Science*, 9(1), 63-78.

Javadi, A., Vahedi, A., Ghazor, H. R., & Unesi Alemouti, M. (2017). Technical and economical assessment of wheat seed processing systems. National project research report No. 52318, Agricultural Engineering Research Institute, Agricultural Research, Education and Extension Organization, Ministry of Jahad-e-Agriculture, Karaj. Iran. (In Persian).

Khezri, M. (2003). Food security and national security. Proceeding of the 1th Iranian National Conference on Agriculture and National Development. 8-9 Dec. Agricultural Planning and Economics Research Institute, Tehran, Iran. http://www.agri-peri.ir (In Persian).

Heisey, P. W., & Brennan, J. P. (1991). An analysis model of farmers' demand for replacement seed. *American Journal of Agricultural Economics*, 73(4), 1044-1052.

Mostofi Sarkari, M. R. (2005). Wheat losses from planting to storage in Iran. Proceedings of the 2nd methods of preventing the loss of national resources. 9 June, The Academy of Sciences Islamic Republic of Iran, Tehran, Iran. (In Persian)

Oskounejad, M. M. (1996). *Engineering economics or economic evaluation of industrial projects*. Seventh Edition. Tehran: Publication center of Amirkabir University. (In Persian).

Samadi, S., Karamolyan Sichani, M., & Zahedi, M. (2003). Interaction between agriculture and macroeconomics compared to other sectors. Proceeding of the 1th Iranian National Conference on Agriculture and National Development. 8-9 Dec. Agricultural Planning and Economics Research Institute, Tehran, Iran. losses is called post-harvest losses. In this stage, the most vital losses are associated with transportation and warehousing. http://www.agri-peri.ir (In Persian).

Shadmani, A. R., & Saleh, A. (2007). Investigating the methods used in financial economic and evaluation of investment projects in Iran's agricultural sector. Proceeding of the 6th Iranian Conference of Agricultural Economics of Iran. 29-30 Oct. The University of Ferdowsi. Mashhad, Iran. In Persian.

Soltani, G. R. (2007). *Engineering economy*. Shiraz: Publication of Shiraz University. (In Persian)

Van Gastel, A. J. G., Pagnotta, M. A., & Proceddu, E. (1996). Seed science and technology. International Center for Agricultural Research in the Dry Areas (ICARDA) annual report, Aleppo, Syria. 114 pp Aleppo, Syria.

تحقیقات کشاورزی ایران (۱۴۰۱) ۴۱(۱) ۸۲-۷۵

# ارزیابی مالی خطوط فرآوری بذر گندم در سامانه‌های داخلی و ارزش تلفات آن

**هرمز اسدی[۱*]، حمید رضا گازر[۲]، عبدالرسول شیروانیان[۳]، احمد محدث‌حسینی[۴]، نورمحمد آبیار[۵]، آیدین حمیدی[۶]، محمدحسین سعیدی‌راد[۴]، جعفر حبیبی‌اصل[۷]، محمدحسین رزاقی[۵]، محمدعلی به‌آیین[۳]، مریم محمودی[۱]، افشین ایوانی[۲]، الیاس دهقان[۲]**

۱ مؤسسه تحقیقات اصلاح و تهیه نهال و بذر،سازمان تحقیقات، آموزش و ترویج کشاورز ی، کرج، ج.ا.ایران

۲ مؤسسه تحقیقات فنی و مهندسی کشاورزی، سازمان تحقیقات، آموزش و ترویج کشاورزی، کرج، ج.ا.ایران

۳ مرکز تحقیقات و آموزش و منابع طبیعی استان فارس، سازمان تحقیقات، آموزش و ترویج کشاورزی، شیراز، ج.ا.ایران

۴ مرکز تحقیقات و آموزش و منابع طبیعی استان خراسان رضوی، سازمان تحقیقات، آموزش و ترویج کشاورزی، مشهد، ج.ا.ایران

۵ مرکز آموزش و تحقیقات کشاورزی و منابع طبیعی استان گلستان، سازمان تحقیقات، آموزش و تحقیقات کشاورزی، گرگان، ج.ا.ایران

۶ موسسه تحقیقات کنترل و گواهی بذر و نهال، سازمان تحقیقات، آموزش و تحقیقات کشاورزی، کرج، ج.ا.ایران

۷ مرکز آموزش و تحقیقات کشاورزی و منابع طبیعی استان خوزستان، سازمان تحقیقات، آموزش و ترویج کشاورزی، اهواز، ج.ا.ایران

*نویسنده مسئول

**اطلاعات مقاله**

***تاریخچه مقاله:***

تاریخ دریافت: ۱۴۰۰/۰۶/۰۳

تاریخ پذیرش: ۱۴۰۱/۰۷/۱۱

تاریخ دسترسی: ۱۴۰۱/۰۸/۱۷

**واژه‌های کلیدی:**

ارزش تلفات

بذرگندم

تحلیل اقتصادی

فرآوری خطوط

**چکیده** - این مطالعه به منظور تعیین هزینه و منافع سرمایه‌گذاری، قیمت تمام شده، نسبت حاشیه ایمنی، بازده برنامه‌ای، نسبت فایده به هزینه و تعیین ارزش اقتصادی میزان بذر از دست رفته در ضایعات در خطوط فرآوری بذر گندم آبی در سامانه‌های داخلی شامل آرماشین، آرویـن صنعت، رام صنعت بهاره و آذران بوجار به ترتیب در استان‌های فارس، خراسان رضوی، خوزستان و گلستان در سال ۱۳۹۷ اجرا شد. برای دستیابی به هدف‌های پژوهش، از واکاوی سودآوری و شاخص‌های اقتصاد مهندسی استفاده شد. طبق نتایج، میانگین قیمت تمام شده هر کیلو بذر گندم در خطوط فرآوری بذر در استان‌های هدف ۱۹۶۳۳/۹ ریال برآورد شد که در اکثر خطوط در استان‌ها کمتر از قیمت فروش بود. میانگین بازده برنامه‌ای خطوط فرآوری در شرکت‌های کشت و صنعت جوین، هزاران طلایه داران خوشه، امیران زاگرس طاها، نمونه ارتش، سبز دشت سرخه و شرکت تعاونی رزمندگان در استان‌های هدف مثبت و ۱۱/۲ میلیارد ریال بود ولی در شرکت‌های تعاونی مرودشت استان فارس، تعاونی روستایی گنبد استان گلستان و زرین دانه بنوار خوزستان منفی محاسبه شد. میانگین نسبت فایده به هزینه خطوط فراوری داخلی مورد هدف ۱/۰۵ طی دوره واکاوی بود. میانگین ضایعات مفید جداشده از خطوط فرآوری ۲۰/۲ درصد و ارزش بذرهای تلف شده با احتساب قیمت فروش بذر و یارانه ۹۵۸/۶ میلیون ریال محاسبه شد. بنابراین با توجه به نتایج، پیشنهاد می‌گردد شرکت‌های دارای سود با ادامه فعالیت خود و افزایش میزان ذر خریداری شده ورودی در پی حداقل کردن زیان و کسب سود اقتصادی مثبت باشند.