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Value Chain Analysis in dried fig and chestnut: The case of Aydin province

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Abstract

Purpose: The main objective of this research is to reveal the economic contribution of each link of the value chain in dried fig and chestnut production. In this context, it aims to measure and analyze the economic contribution of these products to the province of Aydın by examining all actors in the value chain, including producers, intermediaries, processors and exporters in dried figs and chestnuts.

Design/Methodology/Approach: The material of the research consists of fig and chestnut actors who contributed to the value chain in the districts and villages of Aydın between February and July 2022. A total of 241 survey data were used in the study, including 90 dried fig producers, 81 chestnut producers (171 producers in total), 20 dried fig intermediaries, 20 chestnut intermediaries (40 intermediaries in total), four dried fig processors, three chestnut processors (seven processors in total), 20 dried fig exporters, three chestnut exporters (23 exporters in total). In calculating the value chain, gross margin, absolute marketing margin, relative marketing margin, value added and proportional margin of value added calculations were used.

Findings: In the first step in the proportional distribution of dried figs by actors, intermediaries have the highest share (73.4%), while processors have the highest share (69.91%) in chestnuts. According to the calculated absolute marketing margins, the marketing margin of dried fig processors is 66.09 TL/kg and the marketing margin of chestnut processors is 74.78 TL/kg. In both products, processors have the highest relative marketing margin, while producers have the highest proportional margin of value added.

Originality/Value: It is the first study to quantify the value chain of dried figs and chestnuts.

Key words: Value Chain Analysis, marketing channels, marketing margin.

Kuru incir ve kestanede Değer Zinciri Analizi: Aydın ili örneği

Özet

Amaç: Bu araştırmanın temel amacı, kuru incir ve kestane üretiminde değer zincirinin her halkasının ekonomik katkısını ortaya koymaktır. Bu kapsamda kuru incir ve kestane özelinde üreticiler, aracılar, işleyiciler ve ihracatçılar olmak üzere değer zincirinin tüm aktörleri incelenerek, bu ürünlerin Aydın iline sağlamış olduğu ekonomik katkılarının ölçülmesi ve analiz edilmesi amaçlanmaktadır.

Tasarım/Metodoloji /Yaklaşım: Araştırmanın materyali, 2022 yılı Şubat-Temmuz aylarında Aydın'ın ilçeleri ve köylerinde değer zincirine katkıda bulunan incir ve kestane aktörlerinden toplanan verilerden oluşmaktadır. Çalışmada 90 adet kuru incir üreticisi, 81 adet kestane üreticisi (toplam 171 adet üretici), 20 adet kuru incir aracısı, 20 adet kestane aracısı (toplam 40 adet aracı), dört adet kuru incir işleyicisi, üç adet kestane işleyicisi (toplam yedi adet işleyici), 20 adet kuru incir ihracatçısı, üç adet kestane ihracatçısı (toplam 23 adet ihracatçı) olmak üzere toplam 241 adet anket verisi kullanılmıştır. Değer zincirinin hesaplanmasında; brüt marj, mutlak pazarlama marjı, nisbi pazarlama marjı, yaratılan değer ve yaratılan değerin oransal marjı hesaplamalarından faydalanılmıştır.

Bulgular: Kuru incirin aktörlere göre oransal dağılımındaki ilk basamakta en yüksek payı (%73.4) aracılar alırken, kestanede ise en yüksek payı (%69.91) işleyiciler almaktadır. Hesaplanan mutlak pazarlama marjlarına göre kuru incir işleyicilerinin pazarlama marjı 66.09 TL/kg, kestane işleyicilerinin pazarlama marjı 74.78 TL/kg'dır. Her iki üründe nisbi pazarlama marjına göre en yüksek orana sahip aktör işleyiciler; yaratılan değerin oransal marjına göre en yüksek orana sahip aktör ise üreticilerdir.

Özgünlük/Değer: Kuru incir ve kestanenin değer zincirini niceliksel olarak ortaya koyan ilk çalışmadır.

Anahtar kelimeler: Değer Zinciri Analizi, pazarlama kanalları, pazarlama marjı.

INTRODUCTION

Although the foundations of the concept of value were treated by Aristotle as use value and exchange value in the periods before BC (Fleetwood, 1997); value chain has begun to be considered as a concept and objective to understand and analyze industries (Peppard and Rylander, 2006).

The term value chain was first coined by Michael Porter (1985) in the 1970s and 1980s as an attribute reflecting the added value of business processes within the boundaries of the company. The value chain is a concept that refers to the process starting from the idea of a product or service, its production at various levels, its delivery to the final consumer and its disposal (Kaplinsky, 2000). According to Porter, the value chain is the most basic tool for systematically analyzing all of a company's operations in the integration process, which he considers a key factor in gaining competitive advantage. The most important aspect of the value chain is that it is a set of activities that create value for any firm in any industry, from the basic sources of raw materials to the final goods and services distributed to customers (Shank and Govindarajan, 1992). However, the value chain can also be seen as a means by which new modes of production, technologies, logistics, business processes, new organizational relationships and new networks are introduced (Ivarsson and Alvstam, 2005; Trienekens, 2011).

The purpose of value chain analysis is to create an innovative approach in the chain by developing products and services that meet the demand of the end consumer and that they are willing to pay for (Aktoprak, 2019). Although the value chain concept and the supply chain concept have similarities, the supply chain is defined as the coordination and cooperation between channel partners such as intermediaries, third parties, service providers, and customers, emphasizing the steps related to production and distribution (Pundir et al., 2019).

Value chain analysis (VCA) has become a widely used approach to thoroughly examine a sector and understand the capitalist dynamics within the chain (Özalp and Ören, 2023). Value chain analysis provides critical support to decision makers in making strategic decisions, such as identifying which operations should be developed or outsourced in order to gain competitive advantage and assessing the position of economically significant industries in the face of global competition (Eraslan et al., 2008). In addition, value chain analysis helps formulate business strategies that adapt to technological changes and the intense competition that results from these changes (Billings et al., 2004).

In agriculture, the value chain is formed as a result of the value created when agricultural products pass through certain stages during the harvesting of agricultural products from the field or during their delivery to consumers through a process (Özalp and Ören, 2016). It is well known that in developing or developed countries, farmers have the smallest share of the value created in the agricultural value chain. Since value chain analysis can clearly show the actors' share of value, it can be a guide for agricultural policies (Alemdar, 2008). It is extremely important that the links become stronger to ensure that producers, consumers, intermediaries and other actors are economically affected by these links in close proximity to each other. Increasing the number of value chain studies in agriculture is particularly important for the development of producers living in rural areas. Rural development refers to the process of improving the quality of life of people living in rural areas (Armagan et al., 2012). If the agricultural products produced by people living in rural areas can be transported to the right marketing channels through the agricultural value chain, then the development of producers can be achieved.

There have been numerous value chain analysis studies conducted in the agricultural sector. However, many of these studies rely on qualitative analysis based on the value chain model developed by Porter and tend to focus on the structure of the sector, often lacking quantitative analysis. For example, the study by Chandra and Kumar (2021) examined the value chain of the medicinal and aromatic plants and herbal health products sector in Uttarakhand, along with the roles and contributions of stakeholders. Şirin (2020) highlighted the concept of value chain in agribusiness systems, emphasizing the great need for establishing agribusinesses in the sector and noting that the value chain serves as a fundamental tool to prevent problems in any part of the business. Bülbül (2011) examined the sectoral status of citrus fruits, which have a significant position in the fresh fruit trade in Turkey and globally, and investigated the sustainable competitiveness by following the value chain analysis methodology of the Turkish patented Finike orange. Özdoğan (2009) conducted a value chain analysis of the table olive sector in Turkey and examined the problems encountered in implementing the ISO 22000 food safety management system. There is a need for value chain analysis that incorporates quantitative methods to improve the current state of the agricultural sector in Turkey (Özalp and Ören, 2016). Therefore, this study aims to provide a quantitative analysis of the value chain of figs and chestnuts in Aydın based on interviews with producers, intermediaries, processors, and exporters of these products. In this respect, the study is original as it fills a gap in the literature.

Turkey ranks first in the world's dried fig production with a 58% share and 85,500 tons of dried fig production in 2020-2021 period (International Nut and Dried Fruit [INC], 2021). Aydın's share in Turkey's dried fig production in the 2019-2020 period is 81% (Anonymous, 2019). In chestnut production, Turkey ranks fourth in the world with a share of 3.02% and a production of 72,655 tons (Food and Agriculture Organization of the United Nations [FAO], 2022). Aydın ranks first in chestnut production in Turkey with a share of 39.33% (Turkish Statistical Institute [TÜİK], 2022). Dried figs and chestnuts are of great economic importance for Aydın province. Conducting value chain analyses of these economically important agricultural products, in order to identify at which stage of the chain they gain value, is of great importance for both producers and other stakeholders. In this study, figs and chestnuts, which are socio-culturally important for Aydın, are considered together. This is because figs and chestnuts are grown in similar locations and the altitudes where figs cannot be grown are suitable for chestnut cultivation. It is of great importance for both producers and other stakeholders to carry out value chain analysis of these economically important agricultural products and to show in which link of the chain these products gain value.

The main objective of this research is to reveal the economic contribution of each link of the value chain in dried fig and chestnut production. In this context, it aims to measure and analyze the economic contribution of these products to Aydın province by examining all actors of the value chain, including producers, intermediaries, processors and exporters.

The study is divided into four sections. Section 1 provides information about the value chain analysis and the main objective of the study. Section 2 explains the materials and methods of the study. Section 3 presents the findings related to dried figs and chestnuts. The conclusion summarizes the main findings of the study.

MATERIAL and METHODS

Material

The main material of this research consists of data for the year 2021 obtained from producers in villages where fig and chestnut are produced in Aydın, fig and chestnut intermediaries, processors and exporters in Aydın.

Surveys were conducted with fig producers in the villages of Bozdoğan, Buharkent, Germencik, Incirliova, Köşk, Kuyucak, Nazilli, Sultanhisar and Yenipazar districts of Aydın. Similarly, chestnut producers were surveyed in randomly selected villages in Nazilli, Sultanhisar, Bozdoğan, Köşk, Kuyucak and Efeler districts.

The farms belonging to the producers were accepted as the main mass, and the farms included in the sample were selected by the method described in the next section. The original data collected from these companies through questionnaires were analyzed. These data were collected between February and July 2022. The questionnaires used in this research were obtained from studies on the economy of figs, chestnuts and other agricultural products and value chain studies of agricultural products by reviewing the literature.

The activities of the four actors covered in the study are as follows:

Producers: Farmers responsible for the cultivation of figs and chestnuts.

Intermediaries-collectors: Individuals called "çengelci" in the villages who collect the products from one or more villages and deliver them to other channels, as well as "warehouse operators" who collect the products either from the çengelci or directly from the villages through their own personnel and facilitate their delivery to exporters, processors, or other channels.

Processors: Companies that transform raw figs and chestnuts into processed products (such as chocolate-covered figs, fig chips, chocolate-covered chestnuts, and candied chestnuts).

Exporters: Companies that export figs and chestnuts.

Methodology

Data collection method

The number of farms was obtained from the farmer registration system data of the Aydın Provincial Directorate of Agriculture and Forestry for 2021. Since an farm owner may have land in more than one neighborhood and district, the subtotals of these farms were subtotaled in the Microsoft Excel program and duplicate values were eliminated. As a result of this process, 12,633 farms producing dried figs and 3,612 farms producing chestnuts were accepted as the main population, and the samples were selected and calculated from these two main populations. In the sample

calculation for these two products, extreme values that distort the distribution were removed. After removing the outliers, the number of fig farms was taken as 10,080 and the number of chestnut farms as 3,160. In addition, farms with a size of less than 5 decares were not included in the sample because they do not contribute economically to the value chain. The farms were divided into three groups as 5-19.99 decares, 20-39.99 decares and over 40 decares, considering the previous researches and the size of the farms. The fig and chestnut farms were grouped according to the size of the land of fig and chestnut producers, without distinguishing between villages and districts. Then, within the farms of each group, random numbers were generated in MS Excel program and separate selections were made for fig and chestnut farms as much as the sample volume. If the assigned number of farms could not be reached, the farms one above or one below were interviewed. In the selection of the interviewed companies, the sample size was calculated by drawing simple random samples from each stratum according to the following formula, with a confidence level of 90% and a margin of error of 10% (Yamane, 1967);

$$n = \frac{N\sigma^2 z^2}{d^2(N-1)+\sigma^2 z^2} \quad (1)$$

In the formula; n= sample volume, N= number of farms in the population, σ^2 = population variance, z^2= confidence limit (90%), d= accepted margin of error (10%). As a result of the calculation, 90 fig growers and 81 chestnut growers were interviewed.

In the absence of official data on the number of intermediaries (traders), personal interviews were conducted with a total of 40 intermediaries, including 20 dried fig intermediaries and 20 chestnut intermediaries, in the villages and/or districts where farmers sell dried figs and chestnuts. The number of processors was determined using data from the Aydın Chamber of Industry, and semi-structured interviews were conducted with all four fig processors and four chestnut processors. The number of dried fig and chestnut exporters was obtained from the records of the Aydın Commodity Exchange. According to this, there are 30 active dried fig exporters and five chestnut exporters. A complete census of the exporters of these two products was planned and personal interviews were conducted with 20 accessible dried fig exporters and all three chestnut exporters.

Data analysis methods

This study uses the concepts of marketing margins, absolute marketing margins, and relative marketing margins to calculate price transitions between players. Marketing margins are calculated as absolute marketing margins and relative marketing margins (proportional marketing margins). The absolute marketing margin is calculated as the difference between the prices of actors in different marketing channels (producers, intermediaries, processors, exporters), and the proportional marketing margin is calculated as the ratio of the absolute marketing margin to the retail selling price (Kınıklı et al., 2019). Similar to the absolute marketing margin, the value created was calculated from the price difference between actors (Alemdar, 2008; Özalp, 2019). The proportional margin of value added was found as a result of the ratio of gross margin to sales price.

For producers, the gross margin (gross profit) calculation was found by subtracting variable costs from the gross production value (Açıl and Demirci, 1984; Örük et al., 2022), and this value was divided by the production quantity to calculate the gross margin per kg. For other actors, the gross margin calculation was obtained by subtracting the purchase price and variable costs from the selling price.

One-way ANOVA was used for data that followed a normal distribution, while the Kruskal-Wallis test was used for data that did not follow a normal distribution. In addition, descriptive statistics (percentages, standard deviation, etc.) were used to evaluate the data.

FINDINGS

Findings related to dried figs

Analyzing the socio-demographic characteristics of the fig producers, it was found that all of them were male, their average age was 56.33 years, their average education was 6.33 years, their average experience in dried fig production was 35.24 years, and the transfer of fig production gardens was 45.6% from grandfather, 31.1% from father and 14.4% from great-grandfather. In addition, 8.9% of them had established their own fig gardens.

The analysis of the 20 dried fig agents interviewed shows that their average age is 45 years, with an average education of 10 years, indicating that most of them are high school graduates. Of these intermediaries, 55% are domestic marketers, while 45% are both producers and domestic marketers. In terms of legal status, 75% are sole

proprietorships or family businesses, 20% are limited liability companies, and 5% are sole partnerships. On average, these intermediaries have been in operation for 20 years. Furthermore, 80% of the companies are independent, 10% are subcontractors and 10% are both independent and subcontractors. The average number of administrative staff is two, with five permanent staff and eight temporary staff. An analysis of their facilities shows that 10% have packaging equipment, 20% have a transport vehicle (such as a forklift), 20% have a warehouse, and 5% have air-conditioned rooms.

Among the 20 dried fig exporters interviewed, 85% were male and 15% were female, with an average of 13.5 years of education, typically equivalent to a high school diploma, and an average age of 41.38 years. Of these exporters, 15% were both producers and exporters, 10% were involved in production, export, and domestic marketing, 50% were exclusively exporters, and 25% combined exporting with domestic marketing. In terms of legal structure, 20% operated as sole proprietorships, 25% as joint stock companies, and 55% as limited liability companies. On average, the companies had been in operation for 14.18 years, with 40% based in Aydın province. Additionally, 35% of the companies operated independently, while 65% functioned both independently and as subcontractors.

The average number of administrative staff was 11, with two technical staff and one agricultural engineer. Companies employed an average of 75 permanent staff and 165 temporary workers. Regarding managerial education, 30% of managers had completed primary school, 10% were high school graduates, 50% held university degrees, and 10% had completed postgraduate studies.

The study provides the following general data on the four fig processing facilities included in the analysis: the mean age of the operators was 52.25 years; their average educational attainment was 11.75 years of schooling. The facilities had been in operation for an average of 9.5 years. On average, each facility employed three administrative staff members, one food engineer, eight permanent staff members, and two temporary staff members. Regarding managerial qualifications, 25% of the managers held a middle school diploma, 50% had a high school diploma, and 25% were university graduates. In terms of legal status, 50% of the companies were classified as sole proprietorship-family businesses, while the remaining 50% were registered as limited liability companies.

When the agricultural incomes of fig producers were analysed from a socio-economic perspective, it was found that 45.6% of the farms had an income between 100,000 TL and 150,000 TL, 37.8% had an income of more than 150,000 TL, 15.6% had an income between 50,000 TL and 100,000 TL and 1.1% had an income of less than 50,000 TL. When the distribution of the costs of dried fig farms in obtaining one kg of dried figs was examined according to the cost items, the highest cost item was harvesting labour with 40.22%, ploughing fields cost with 8.43%, hoeing cost with 7.93%, pruning cost with 7.46%, and caprification cost with 6.11% (Table 1). Small-scale farms have higher costs for fertilization, fertilization labor, and transportation compared to other business groups, while their caprification and caprification labor costs are lower than those of other groups.

Table 1. *Proportional distribution of dried fig costs per kg of dried figs (%)*

	Group 1 (n=39)	**2nd Group (n=11)**	**3rd Group (n=40)**	**General (n=90)**	**Kruskal Wallis χ2(2)**	**Significance**
Seedling planting costs	4.68 (5.07)	10.08 (11.32)	5.41 (6.03)	5.66 (6.65)	1,31	0,52
Ploughing fields costs	7.48 (3.36)	8.87 (4.23)	9.24 (4.13)	8.43 (3.88)	3,24	0,20
Hoeing costs	8.49 (4.02)	8.71 (6.46)	7.16 (3.47)	7.93 (4.16)	1,59	0,45
Pruning costs	6.92 (2.78)	8.38 (3.69)	7.72 (3.73)	7.46 (3.35)	1,22	0,54
Fertiliser amount	5.12 (5.82)	2.38 (3.51)	2.58 (2.72)	3.65 (4.56)	9,52	0,01***
Fertiliser labour costs	2.16 (1,47)	1.32 (1,68)	1.06 (1.29)	1.57 (1.50)	12,10	0,00***
Amount of agricultural pesticides	0.26 (0.69)	0.98 (1.39)	0.29 (0.97)	0.36 (0.94)	4,18	0,12

Significance level; *p < 0.10; **p < 0.05; ***p < 0.01 (The numbers in brackets indicate standard deviations.)

The average selling price per kg is 26.11 TL, variable cost is 11.21 TL and gross margin is 14.90 TL. There is a statistically significant difference in sales price, variable cost and gross margin by farms groups (Table 2). Small farms have higher selling prices and variable costs but lower gross margins compared to other farm groups.

Table 2. *Sales price per kg, variable costs, gross margin of farms*

	Group 1 (n=39)	2nd Group (n=11)	3rd Group (n=40)	General (n=90)	F (2,87)	Significance
Sale price (TL/kg)	26.73 (2.03)	25.25 (1.66)	25.74 (1.68)	26.11 (1.90)	4.26	0.02**
Variable cost (TL/kg)	12.67 (2.96)	10.26 (2.76)	10.05 (1.85)	11.21 (2.78)	11.74	0.00***
Gross margin (TL/kg)	14.06 (2.86)	14.99 (2.97)	15.69 (2.47)	14.90 (2.79)	3.53	0.03**

Significance level; *p < 0.10; **p < 0.05; ***p < 0.01 (The numbers in brackets indicate standard deviations.)

Table 3. *Number of producers from whom dried figs are purchased*

	N	Minimum	Maximum	Mean	Std. Deviation
Number of producers purchased	18	3.00	287.00	43.56	67.08
Number of producers with continuous purchases	19	0.00	250.00	33.11	56.30

The most common expenses of the intermediaries are fuel, followed by distribution, material costs (sacks, crates, baskets, ropes, etc.) and warehouse rent. The cost per kg of the loss of value that occurs while the dried figs are waiting in the warehouse is 0.32 TL and constitutes the highest cost item of the intermediaries (Table 4).

Table 4. *Costs of dried fig intermediaries.*

	N	Minimum	Maximum	Mean	Std. Deviation
Grading (TL/kg)	20	0.00	0.72	0.07	0.16
Packaging (TL/kg)	3	0.00	1.10	0.07	0.25
Wrapping (TL/kg)	3	0.00	0.45	0.02	0.10
Quality control (TL/kg)	20	0.00	0.03	0.00	0.01
Distribution (TL/kg)	20	0.00	0.81	0.11	0.19
Material (TL/kg)	20	0.00	0.75	0.07	0.18
Warehouse rent (TL/kg)	20	0.00	0.20	0.04	0.06
Fuel Oil (TL/kg)	20	0.00	0.35	0.13	0.12
Monetary loss in total quantity (TL/kg)	20	0.00	1.00	0.32	0.31
Total variable costs (TL/kg)	20	0.02	3.32	0.83	0.95

The sales amounts and sales prices of dried fig intermediaries per farm are presented in Table 5. According to this, the average amount of dried figs sold directly to consumers in Turkey by the intermediaries is 3,000 kg and the average sales price is 78.33 TL. The amount sold to exporters is 975,899 kg and the average sales price is 27.64 TL.

Table 5. *Sales prices and sales quantities of dried fig intermediaries*

	N	Minimum	Maximum	Mean	Std. Deviation
Quantity sold to exporter (kg)	20	1,980.00	5,000,000.00	975,899.00	1,561,896.33
Sale price to exporter (TL/kg)	20	23.50	41.50	27.64	2.08
Sales quantity to consumers (kg)	3	1,000.00	7,000.00	3,000.00	3,464.10
Consumer selling price (TL/kg)	3	65.00	100.00	78.33	18.93
Total quantity (kg)	20	1,980.00	5,000,000.00	976,349.00	1,561,719.39
Sale price (TL/kg)	20	33.50	41.83	27.88	2.27

The average purchase price, selling price and gross margin of one kg of dried figs are shown in Table 6. Accordingly, the average purchase price of dried figs is 24.53 TL/kg, the average cost is 25.36 TL/kg, the average selling price is 27.93 TL/kg and the average gross margin is 2.57 TL/kg. Cost is the sum of purchase price and variable costs.

Table 6. *Average price, cost and gross margin information of dried fig intermediaries (TL/kg)*

	Average	Std. Deviation
Purchase price	24.53	1.83
Total variable costs (TL/kg)	0.83	0.95
Fig cost	25.36	2.38
Sale price	27.93	2.18
Gross margin	2.57	1.83

Dried fig exporters purchased an average of 1,252 tonnes of dried figs from intermediaries at an average price of 25.66 TL per kilogram, whereas the average quantity procured from producers was 455.82 tonnes, with an average

purchase price of 21.28 TL per kilogram (Table 7). The average payment period for dried figs purchased on credit is 25.54 days.

***Table** 7. Purchase quantities and prices of dried figs by dried fig exporters*

	N	Minimum	Maximum	Mean	Std. Deviation
Quantity purchased from intermediaries (tonnes)	20	80.00	3,600.00	1,252.00	1,214.83
Intermediary purchase price (TL/kg)	20	22.50	31.00	25.66	2.07
Amount received from producers (tonnes)	16	175.00	1,200.00	455.82	360.48
Producer buying price (TL/kg)	16	22.25	36.25	21.28	15.15
Total amount received (kg)	20	80.00	3,781.00	1,679.44	1,381.64
Average price (TL/kg)	20	23.13	31.53	26.71	2.68

The costs of dried fig exporters are shown in Table 8. According to the table, labor costs averaging 1.50 TL/kg and box and packaging costs averaging 1.16 TL/kg are the largest expenses for exporters. Total variable costs were calculated as 3.31 TL per kg.

***Table 8.** Costs of dried fig exporters (TL/kg)*

	N	Minimum	Maximum	Mean	Std. Deviation
Material costs	20	0.01	0.19	0.03	0.05
Box and packaging costs	20	0.64	1.89	1.16	0.30
Electricity costs	20	0.02	0.27	0.08	0.08
Cost of water	20	0.00	0.03	0.01	0.01
Cost of salt	20	0.01	0.07	0.02	0.02
Fumigation costs	20	0.05	0.30	0.11	0.08
Transport costs	20	0.01	0.18	0.04	0.04
Machine maintenance and repair costs	20	0.01	0.30	0.06	0.08
Fuel costs	20	0.02	0.20	0.04	0.05
Laboratory costs	20	0.00	0.08	0.01	0.02
Insurance costs	20	0.01	0.25	0.07	0.06
Other expenses	20	0.01	0.18	0.03	0.05
Labour cost	20	1.30	1.84	1.50	0.16
Monetary loss (kg)	20	0.05	0.70	0.16	0.26
Total cost (kg)	20	2.66	3.96	3.31	0.47

The sales prices and sales quantities of dried fig exporters per farm are presented in Table 9. Accordingly, the amount of dried figs sold by exporters directly to consumers in Turkey is 289.50 kg on average and the average sales price is 26.97 TL/kg. The average amount of dried figs sold abroad is 1,462 kg and the average selling price is 38.32 TL/kg. Payments in foreign sales transactions are made with an average maturity of 51 days.

***Table 9.** Sales prices and sales quantities of dried fig exporters*

	N	Minimum	Maximum	Mean	Std. Deviation
Amount sold domestically (kg)	15.00	50.00	600.00	289.50	163.63
Domestic sales price (TL/kg)	15.00	25.00	42.50	26.97	16.70
Quantity sold abroad (kg)	20.00	30.00	3,600.00	1,462.31	1,391.36
Foreign sales price (TL/kg)	20.00	30.00	51.58	38.32	6.73
Total quantity (kg)	20.00	80.00	3,781.00	1,679.44	1,381.64
Average selling price (TL/kg)	20.00	30.50	48.00	37.40	4.96

The average purchase price, sales price and gross margin of one kg of dried figs of dried fig exporters are shown in Table 10. According to this, the average purchase price of dried figs is 26.71 TL/kg, the average cost is 30.12 TL/kg, the average selling price is 37.40 TL/kg and the average gross profit is 3.30 TL/kg.

***Table 10.** Fig cost and gross margin of dried fig exporters (TL/kg)*

	N	Minimum	Maximum	Mean	Std. Deviation
Purchase price (TL/kg)	20	23.13	31.53	26.71	2.68
Variable cost (TL/kg)	20	2.66	3.96	3.31	0.47
Fig cost (TL/kg)	20	25.94	35.21	30.13	2.93
Sale price (TL/kg)	20	30.50	48.00	37.40	4.96
Gross margin (TL/kg)	20	3.15	15.70	7.27	3.30

The amount of dried figs purchased by the dried fig processors and the number of products belonging to their farms are given in Table 11. Processors generally process figs as chocolate figs, fig Turkish delight and fig chips. In addition, according to the information obtained from the farms, it was determined that the purchase price of dried figs

was determined jointly, the purchase price was made in cash, and the districts or villages where intensive purchases were made were Germencik, İsafakılar and Çarıklar.

Table 11. *Dried fig processors' purchase quantities (tons) and product information*

	Amount of figs purchased (tonnes)	Number of various products processed (number)	Product handled 1	Product handled 2
1. Farm	100	3	Chocolate figs	Fig Turkish delight
2. Farm	85	4	Fig chips	Fig Turkish delight
3. Farm	10	3	Chocolate figs	Fig chips
4. Farm	5	3	Chocolate figs	

Among the processed products, the most processed and sold product offered to the market by the farms is chocolate fig with 181 tonnes. The average sales amount, sales price, product cost and gross margin of the products of the farms are given in Table 12. Accordingly, the gross margin of fig chips was calculated as 55 TL/kg, the gross margin of chocolate figs as 31.82 TL/kg and the gross margin of fig delight as 31.56 TL/kg. The electricity cost used in the processing of figs into chips is higher than the cost of other processed products.

Table 12. *Sales quantity, sales price and gross margin information of processed fig products*

	Chocolate figs	Fig Turkish delight	Fig chips
Sales quantity (tonnes)	181	9	10
Sale price (TL/kg)	92.98	66.67	137.50
Product cost (TL/kg)	61.17	35.11	82.50
Gross margin (TL/kg)	31.82	31.56	55

When the value chain of dried figs is analysed, figs are delivered to different actors through different channels after leaving the producer's hands. When we look at the proportional distribution of the amount of dried figs according to the actors, 73.4% of dried figs are transferred from the producer to small intermediary and large traders (warehousers), or intermediary collectors as they are called in the study. From the raw state, 3.74% of dried figs are delivered to processors, 14.84% to exporters, 6.06% to other actors (dried fig shops, TARIS, etc.) and 2.12% directly to consumers. Intermediaries transfer 0.81% of the dried figs to processors, 99.07% to exporters and 0.12% to consumers. Processors deliver 99% of dried figs to domestic consumers and 1% to retailers abroad, while exporters distribute 86.61% of dried figs to wholesalers abroad and 13.39% to domestic wholesalers (Figure 1).

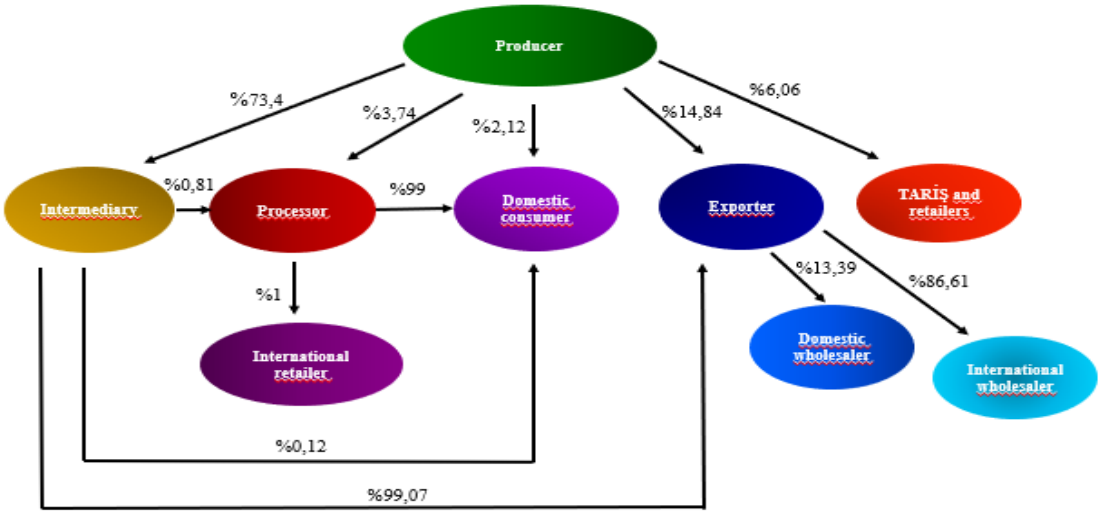

Figure 1. *Distribution channels of dried figs (%)*

Table 13 shows the marketing margins of dried fig actors and the proportional margin of the value created. Accordingly, absolute marketing margins were 26.11 TL/kg for producers, 1.82 TL/kg for intermediaries, 9.47 TL/kg for exporters and 66.09 TL/kg for processors. The actor with the highest absolute marketing margin is processors with 66.09 TL/kg and the actor with the highest relative marketing margin is processors with 134%. While calculating the

relative marketing margin, the retail price of dried figs in 2021 was taken as 49.11 TL. The reason why the relative marketing margin is higher in processors is that the value created by processed figs is higher than unprocessed figs. The actor with the highest proportional margin of the value created is producers with 57.07% and the lowest actor is intermediaries with 9.20%. This can be expressed as the gross margin of intermediaries is less than the gross margin of other actors.

***Table 13**. Absolute marketing margin of dried fig actors and proportional margin of value created*

	Producer	Intermediary	Exporter	Processor
Sale price (TL/kg)	26.11	27.93	37.40	94.02
Absolute marketing margin (TL/kg)	26.11	1.82	9.47	66.09
Relative marketing margin (%)	53.17	3.71	19.28	134.58
Proportional margin of value created (%)	57.07	9.20	19.47	35.06

Findings related to chestnut

It was determined that all of the chestnut producers were male, their average age was 51.20 years, their average education was 6.16 years, their average experience in chestnut cultivation was 31.47 years, and 53.1% of the chestnut production gardens were inherited from their fathers, 25.9% from their grandfathers, 17.3% from their own gardens and 3.7% from their great-grandfathers.

The data on the 20 chestnut intermediaries interviewed reveals that their average age is 43 years. They have an average educational background of eight years, which is equivalent to a middle school level. Professionally, 60% of the intermediaries are engaged as domestic marketers, while 40% are involved as both producers and domestic marketers. In terms of legal structure, 95% of these intermediaries operate as individual-family firms, with the remaining 5% functioning as individual partnerships. The average duration of their operations is 20 years. Furthermore, 85% of the firms are independent entities, whereas 15% operate both independently and under contract arrangements. On average, each firm employs two administrative staff members, with one firm additionally employing an agricultural engineer. The average number of permanent employees per firm is two, and the average number of temporary employees is four.

The three chestnut exporters interviewed are all male, with an average educational attainment equivalent to secondary school graduation and an average of eight years of education. The average age of the exporters is 40 years. All the farms are engaged in activities as producers, exporters, and domestic marketers. In terms of legal status, 33% of the farms operate as sole proprietorships, while 67% are classified as limited liability companies. These farms have been in operation for an average of 14 years and are located in the province of Aydın. The data indicates that the average number of administrative staff per farm is seven, the average number of technical staff is one, and only one farm employs an agricultural engineer. The average number of permanent staff members is 16, and the average number of temporary staff members is 23. Among the managers, 67% hold a primary school diploma, while 33% have completed undergraduate studies.

General information was collected on three chestnut processing firms included in the study. The average age of the firms is 45 years, and the average educational attainment of the managers is 11 years. These firms have been operational for an average of nine years. Each firm employs an average of two administrative staff members, one food engineer, 17 permanent employees, and 28 temporary employees. In terms of managerial education, 33% of the managers have completed primary school education, while 75% hold university degrees. Additionally, all firms (100%) are classified as sole proprietorships or family businesses. When the socio-economic status of chestnut producers was analysed, it was found that 56.8% of the farms obtained 100,000 TL-150,000 TL income from agricultural income, 21% obtained 50,000 TL-100,000 TL income, 17.3% obtained more than 150,000 TL income and 4.9% obtained less than 50,000 TL income. When the distribution of the costs of chestnut farms in obtaining one kg of chestnut is examined according to the cost items, the highest cost item is harvest labour with 60.79%, pruning costs with 8.56%, ploughing fields costs with 6.42%, hoeing costs with 4.02%, sapling costs with 2.59%, and seedling planting costs with 1.99% (Table 14). There is a statistically significant difference between the groups in ploughing, soil analysis, fertiliser, pile, pile labour, material, garden cleaning, fuel and transport expenses.

Table 14. *Proportional distribution of chestnut costs per kg of chestnuts (%).*

	Group 1 (n=40)	2nd Group (n=11)	3rd Group (n=30)	General (n=81)	Kruskal Wallis χ2(2)	Significance
Sapling costs	2.78 (3.99)	3.35 (4.34)	2.06 (2.18)	2.59 (3.47)	0,72	0,70
Seedling planting costs	2.10 (3.14)	1.77 (1.52)	1.92 (2.66)	1.99 (2.77)	1,27	0,53
Ploughing fields costs	5.42 (3.20)	8.98 (3.56)	6.81 (4.07)	6.42 (3.74)	7,64	0,02**
Hoeing costs	4.09 (5.70)	4.54 (2.79)	3.75 (4.48)	4.02 (4.91)	2,03	0,36
Pruning costs	7.95 (5.99)	7.71 (4.36)	9.68 (7.68)	8.56 (6.48)	1,04	0,60
Soil analysis costs	0.00 (0.00)	0.04 (0.09)	0.02 (0.06)	0.01 (0.05)	6,29	0,04**
Fertiliser costs	2.18 (2.30)	3.61 (2.46)	1.82 (3.44)	2.24 (2.82)	7,84	0,02**
Fertiliser labour costs	1.06 (0.91)	0.81 (1.04)	0.69 (0.72)	0.89 (0.87)	3,09	0,21
Amount of agricultural pesticides	1.12 (1.59)	1.50 (1.98)	0.88 (1.43)	1.08 (1.58)	0,32	0,85
Agricultural pesticide labour costs	0.64 (0.95)	1.19 (1.49)	0.60 (0.85)	0.70 (1.01)	0,98	0,61
Harvest labour costs	60.86 (15.63)	53.46 (14.45)	63.38 (14.86)	60.79 (15.33)	4,50	0,11
Machine costs for removing chestnuts from the pile	2.99 (1.69)	4.73 (2.81)	3.64 (1.81)	3.47 (1.97)	6,63	0,04**
Labour costs for removing chestnuts from the pile	2.06 (1.09)	2.06 (1.22)	1.25 (0.91)	1.76 (1.10)	15,01	0,00***
Material costs	0.86 (0.64)	1.00 (0.60)	0.49 (0.28)	0.74 (0.56)	15,23	0,00***
Garden cleaning costs	2.16 (2.74)	2.21 (2.39)	1.05 (1.38)	1.75 (2.32)	11,45	0,00***
Fuel costs	2.71 (2.44)	2.39 (2.34)	1.44 (1.17)	2.20 (2.10)	8,24	0,02**
Transport costs	1.01 (0.58)	0.66 (0.46)	0.50 (0.45)	0.77 (0.57)	22,69	0,00***
Insurance costs	0.00 (0.00)	0.00 (0.00)	0.04 (0.24)	0.02 (0.15)	1,70	0,43

Significance level; *p < 0.10; **p < 0.05; ***p < 0.01 (The numbers in brackets indicate standard deviations.)

Analyzing the companies' sales prices per kilogram of chestnuts, it can be seen that the sales price of under-sieved chestnuts is 16.22 TL/kg and the sales price of over-sieved chestnuts is 36.18 TL/kg (Table 15). Chestnuts are classified as over-sieved if they contain 55 to 85 pieces per kilogram and as under-sieved if there are 86 pieces or more per kilogram.

Table 15. *Sales prices of chestnut calibers (TL/kg)*

	Group 1 (n=40)	2nd Group (n=11)	3rd Group (n=30)	General (n=81)	F(2, 78)	Significance
Under the sieve	16.06 (2.78)	16.90 (1.66)	16.00 (1.73)	16.22 (2.55)	0.434	0.650
Above the sieve	36.46 (2.55)	35.09 (1.76)	36.33 (1.53)	36.18 (2.40)	1.440	0.246

Significance level; *p < 0.10; **p < 0.05; ***p < 0.01 (Numbers in brackets indicate standard deviations.)

The general average sales price per kg of chestnut farms is 33.05 TL, variable cost is 14.80 TL and gross margin is 18.25 TL. There is a statistically significant difference in sales price, variable costs and gross margin by farm groups (Table 16). Small farms have higher variable costs and lower gross margins than other farm groups.

Table 16. *Sales price per kg, variable costs, gross margin of farms.*

	Group 1 (n=40)	2nd Group (n=11)	3rd Group (n=30)	General (n=81)	F (2,87)	Significance
Sale price (TL/kg)	32.26 (3.37)	31.47 (2.55)	34.67 (2.00)	33.05 (3.07)	8.14	0.01**
Variable cost (TL/kg)	18.59 (6.45)	9.40 (2.71)	11.73 (7.31)	14.80 (7.44)	14.15	0.00**
Gross margin (TL/kg)	13.68 (6.66)	22.07 (3.83)	22.94 (7.26)	18.25 (7.95)	18.98	0.00**

Significance level; *p < 0.10; **p < 0.05; ***p < 0.01 (Numbers in brackets indicate standard deviations.)

The intermediaries purchase chestnuts from an average of 10.80 different producers, and they have continuous purchases from an average of 16.10 producers (Table 17).

Table 17. *Number of producers from whom chestnuts are purchased*

	N	Minimum	Maximum	Mean	Std. Deviation
Number of producers purchased	20	3	45	10.80	10.30
Number of producers with continuous purchases	20	0	35	16.10	13.80

The expenses incurred by intermediaries are detailed in Table 18. The most significant expense for intermediaries is quality control, followed by distribution and fuel costs. The cost per kilogram due to the loss of value while chestnuts are stored in the warehouse is 0.24 TL, with the highest expense being the value loss during storage. Table 19 presents the sales prices and quantities for chestnut intermediaries per farm. The average quantity of chestnuts sold directly to consumers in Turkey by intermediaries is 141,250 kg, with an average sales price of 34.25 TL/kg. The average quantity sold to exporters is 143,157 kg, with an average sales price of 37.61 TL/kg. In sales transactions, 70% of the payments are made on credit, while 30% are made in cash. The average credit period for deferred payments is 106 days.

Table 18. *Costs of chestnut intermediaries*

	Mean	Std. Deviation
Grading (TL/kg)	0.10	0.12
Packaging (TL/kg)	0.00	0.01
Wrapping (TL/kg)	0.02	0.05
Quality control (TL/kg)	0.16	0.16
Distribution (TL/kg)	0.13	0.21
Material (TL/kg)	0.01	0.01
Warehouse rental cost (TL/kg)	0.04	0.07
Fuel (TL/kg)	0.12	0.09
Monetary loss in total quantity (TL/kg)	0.24	0.20
Total variable cost (TL/kg)	0.85	0.37

Table 19. *Sales prices and sales quantities of chestnut intermediaries*

	N	Minimum	Maximum	Mean	Std. Deviation
Quantity sold to the exporter (kg)	19	20,000.00	850,000.00	143,157.89	177,413.60
Exporter selling price (TL/kg)	19	35.00	41.25	37.61	1.99
Quantity sold to the consumer (kg)	8	20,000.00	650,000.00	141,250.00	213,152.36
Consumer selling price (TL/kg)	8	20.00	46.00	34.25	11.72
Total quantity (kg)	20	20,000.00	1,500,000.00	192,500.00	318,497.71
Average price (TL/kg)	20	33.04	42.98	37.31	2.91

The average purchase price, selling price, and gross margin per kilogram of chestnuts for intermediaries are presented in Table 20. Accordingly, the average purchase price of chestnuts is 33.77 TL/kg, the average cost is 34.62 TL/kg, the average selling price is 36.91 TL/kg, and the average gross margin is 2.30 TL/kg.

Table 20. *Average price, cost and gross margin information of chestnut intermediaries (TL/kg)*

	Mean	Std. Deviation
Purchase price	33.77	0.74
Total variable cost	0.85	0.37
Chestnut cost	34.62	0.90
Selling price	36.91	2.21
Gross margin	2.30	1.97

An investigation into the purchasing channels and prices of chestnut exporters revealed that the average purchase price for 3,222 tonnes of chestnuts from intermediaries is 33.94 TL/kg, the average purchase price for 1,398 tonnes of chestnuts from farmers is 33.70 TL/kg, and the overall average purchase price for 4,620 tonnes of chestnuts is 33.87 TL/kg (Table 21).

Table 21. *Purchase quantities (tonnes) and prices (TL/kg) of chestnuts by chestnut exporters*

	Quantity of Chestnuts Purchased (tonnes)	Purchase Price (TL/kg)
Intermediaries	3,222	33.94
Producers	1,398	33.70
Total	4,620	33.87

Farms incur an average cost of 1.53 TL/kg for each kilogram of chestnuts. The combined costs of grading, materials, and transportation (labor) amount to approximately 0.77 TL/kg (Table 22). One of the most significant cost factors is the weight loss due to wastage, which accounts for 0.30 TL/kg. When the monetary value of the quantity loss incurred while chestnuts are stored in the warehouse is calculated, it constitutes a significant expense item.

Table 22. *Cost items of chestnut exporters (TL/kg)*

Expense Item	Expense Amount (TL/kg)
Monetary loss	0.30
Grading	0.33
Material cost	0.28
Quality control cost	0.01
Distribution cost	0.09
Warehouse rental cost	0.12
Transportation cost	0.16
Fuel cost	0.11
Electricity cost	0.05
Laboratory cost	0.01
Machinery maintenance and repair cost	0.02
Insurance cost	0.03
Other costs	0.02
Total cost	1.53

When examining the marketing channels of exporters, it was found that 1,390 tonnes of chestnuts were distributed domestically at 45.60 TL/kg, 3,230 tonnes were exported abroad at 56.18 TL/kg, resulting in a total sale of 4,620 tonnes of chestnuts at an average price of 53 TL/kg (Table 23). Analysis of the proportional distribution of sales reveals that 30% were allocated to the domestic market and 70% to foreign markets. Exporters explore new markets by participating in international trade fairs. However, the majority of firms indicated that they can easily discover new foreign markets without attending fairs through brokers.

Table 23. *Sales prices and sales quantities of chestnut exporters*

	Quantity (tonnes)	Quantity (%)	Price (TL/kg)
Domestic	1,390	30.09	45.60
Foreign	3,230	69.91	56.18
Total	4,620	100.00	53.00

The average purchase price, selling price, and gross margin per kilogram of chestnuts for chestnut exporters are shown in Table 24. Accordingly, the average purchase price of chestnuts is 26.71 TL/kg, the average cost is 28.24 TL/kg, the average selling price is 53 TL/kg, and the average gross margin is 24.76 TL/kg.

Table 24. *Average price, cost and gross margin of chestnut exporters (TL/kg)*

Chestnut purchase price (TL/kg)	26.71
Chestnut variable cost (TL/kg)	1.53
Chestnut cost (TL/kg)	28.24
Chestnut selling price (TL/kg)	53.00
Chestnut gross margin (TL/kg)	24.76

The quantity of chestnuts purchased by processors, the number of products owned by their businesses, and the average selling prices of these products are provided in Table 25. Processors indicated that the chestnut purchase price is collectively determined, and the payment is made with a 30-day credit term. They acquire 60% of the 800 tons of chestnuts from intermediaries and 40% from producers.

Table 25. *Chestnut processors' purchase quantities and product information*

	Quantity of chestnuts purchased (tonnes)	Number of various processed products (number)	Products considered
1. Farm	100	1	Chocolate-covered chestnut
2. Farm	400	1	Chestnut Candy
3. Farm	300	1	Chestnut Candy

The total sales amount, average sales prices, average product costs, and average gross margins of chestnut processors are presented in Table 26. In Aydın, 100 tonnes of chocolate-covered chestnuts and 700 tonnes of candied chestnuts are processed and sold domestically.

Table 26. *Sales quantity, sales price and gross margin information of processed chestnut products.*

	Chocolate-covered chestnut	Chestnut Candy
Sales quantity (tonnes)	100	700
Selling price (TL/kg)	50	112.57
Product cost (TL/kg)	39.87	87.86
Gross margin (TL/kg)	10.13	24.71

When the chestnut value chain is examined, chestnuts are distributed to different actors through various channels after leaving the hands of the producer. In Figure 2, the distribution of chestnuts among actors reveals that processors hold the largest share at 50.05%. Of the processed chestnuts, 58.33% are consumed domestically. Due to chestnut producers being located in mountain villages, reaching export firms is more challenging and costly, resulting in 65.23% of chestnuts being delivered to exporters through intermediaries. The proportion of chestnuts transferred from producers to intermediaries is 42.34%.

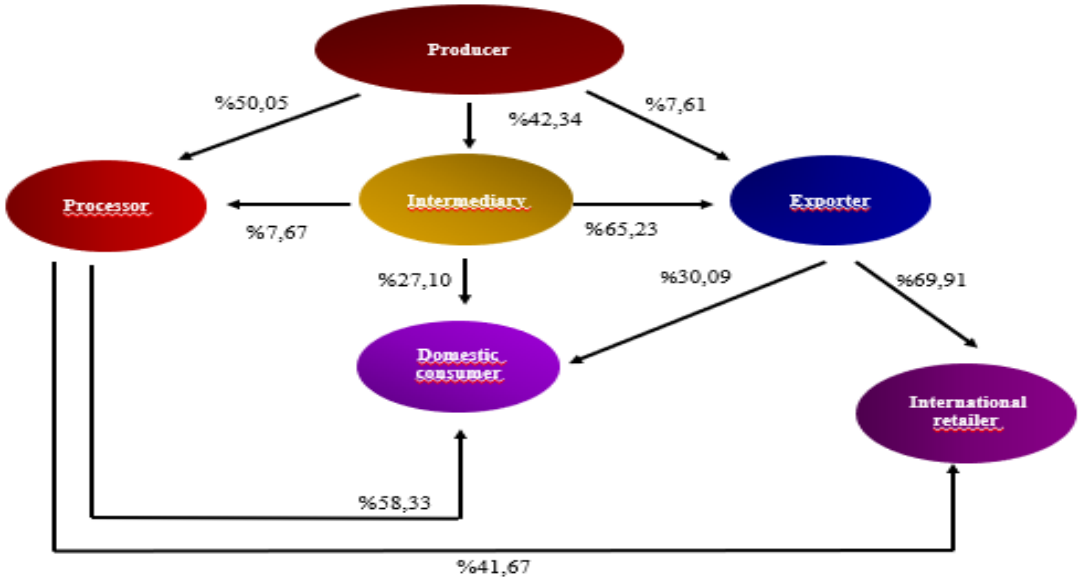

Figure 2. *Distribution channels of chestnut (%)*

The marketing margins of chestnut actors and the proportional margin of created value are indicated in Table 27. Accordingly, the absolute marketing margins are 33.05 TL/kg for producers, 3.86 TL/kg for agents, 16.09 TL/kg for exporters, and 74.78 TL/kg for processors. The actor with the highest absolute marketing margin is processors at 74.78 TL/kg, and the actor with the highest proportional marketing margin is processors at 136.66%. When calculating the proportional marketing margin, the 2021 retail price of chestnuts is taken as 54.72 TL. The reason for the high proportional marketing margin in processors is that the processed chestnuts create more value compared to raw chestnuts. The actor with the highest proportional margin of created value is producers at 57.43%. In the chestnut value chain, producers receive a higher share compared to other actors. Exporters have a higher proportional margin of created value than processors. Chestnut exporters in Aydın obtain more value than chestnut processors, indicating that chestnut processing is not sufficiently developed in Aydın.

Table 27*. Chestnut actors' absolute marketing margin and proportional margin of value created*

	Producer	Intermediary	Exporter	Processor
Sale price (TL/kg)	33.05	36.91	53.00	111.69
Absolute marketing margin (TL/kg)	33.05	3.86	16.09	74.78
Relative marketing margin (%)	60.40	7.05	29.40	136.66
Proportional margin of value created (%)	57.43	6.23	46.72	21.94

CONCLUSION and DISCUSSION

The fig has an important socio-cultural value for Aydın. The origins of both the "fig drying houses" and the camels still found in the region can be traced back to fig cultivation practices established in the early Republican period, coinciding with the construction of the first railways. Despite their extensive experience in fig cultivation, dried fig producers face challenges in conducting soil analyses and renewing their orchards with suitable seedlings. In addition, they do not use appropriate seedlings, modern pruning techniques, or precise harvesting practices. The primary cost of production for dried fig producers is the labor required for harvesting and drying, which accounts for 40.22% of the total cost. Since the harvest period is the same for all fig producers, it is difficult for producers to find enough labor. Harvesting costs are followed by the cost of plowing and pulling power with 8.43%, hoeing costs with 7.93%, pruning costs with 7.46% and caprification costs with 6.11%. Similarly, Çobanoğlu et al. (2005) found that harvesting costs accounted for the largest share (34.60%) of total costs in fig farms, followed by tillage costs (28.31%) and caprification costs (11.84%). For the producers, the gross margins of the farms increase as the size of the farm increases. Therefore, in order to increase the producer's contribution to the value chain, the size of the farm should be increased. Dried fig producers deliver only a small part of their products directly to consumers. The dried fig market operates as an oligopsony, with a limited number of exporters purchasing dried figs directly from producers. Although Aydın accounts for about 48% of the world's dried fig production, the prices farmers receive are lower than international market prices. Selling figs in their raw, unpackaged form adds significantly less value than selling processed figs. To increase value addition, it is essential to expand the market by introducing new processed fig products. The distribution of dried figs mainly involves intermediaries in the transition from producers to processors and exporters. The marketing channel structure described by Özdemir (2001), which includes "producer-trader-exporter-importer", is still valid today.

Intermediaries purchase dried figs based on prices and quantities set by exporters. In years of high production, the price of dried figs may decrease if exporters slow or stop their purchases. Most middlemen do not engage in retail sales, and their marketing channels are very limited. The number of companies producing differentiated products by processing dried figs in Aydın is very limited. According to the processors interviewed, the risk of selling the product through processing is higher than that of exporting. Therefore, there is no entrepreneurship in this field. Although the actor with the highest absolute and relative profit margin is the dried fig processor, the amount of figs processed is less than 1% of the amount of figs exported. Similarly, Çelik et al. (2023) calculated that the marketing margin obtained by intermediaries in cherry production is higher than the marketing margin obtained by farmers. Özalp (2019) also conducted an economic analysis of the peanut value chain and calculated that the highest share of absolute profit is received by retailers, followed by wholesalers, processors, and producers, respectively. In the case of tomatoes, Bozdemir et al. (2021) determined that the market actor with the highest price mobility and marketing margin is the market. In the case of chestnuts, similar to dried figs, the actors with the highest absolute and relative profit margins are the processors. However, the amount of processed chestnuts is significantly small compared to the total production of chestnuts. The biggest problem for chestnut producers is the canker disease. Because of the disease, no resistant or tolerant varieties are selected to replace the dried trees. Ertan and Kılıç (2005) stated that the radical solution to chestnut blight is the cultivation and dissemination of disease-resistant species and hybrids. Similar to fig producers, the highest expenditure of chestnut producers is in harvesting (60.79%). The marketing channel of chestnuts is largely provided by intermediaries. The reason for this is that chestnut producers can receive their payments quickly from intermediaries and producers can cover their production costs quickly. Due to the problems in the storage conditions of the intermediaries, there are monetary losses in product quality and product. In order to reduce these losses, it is necessary to increase the intermediaries' access to cold storage facilities. The main cost item for chestnut exporters is the weight loss that occurs while the product is waiting in the warehouse. For this reason, storage conditions and minimizing the losses that occur in the warehouse will ensure that the lost value is recovered. Therefore, increasing the number of cold storage warehouses in the region, increasing the use of this service and increasing and using the products within the scope of licensed warehousing should be encouraged. Soylu (2004) pointed out that the most ideal

method for minimizing changes in the color and gloss of chestnut shells, as well as other quality losses and losses due to various fungal diseases, is to store the fruit in cold storage facilities. Chestnut processors want chestnut varieties that are easy to peel and do not fall apart during processing. However, the lack of awareness of farmers in the selection of seedlings makes it difficult for them to find the chestnuts desired by processors. In terms of the value chain, it is necessary to create globally recognized brands and to increase the use of geographical indications. However, the majority of exporting companies are engaged in subcontracted production for both figs and chestnuts. Dokuzlu (2020) stated that the factors that create value are organic products and geographically marked products. The most important point of the value chain is to increase the value created, that is, the high value of the final product. Increasing product diversity shows the importance of research and development (R&D) and product development (P&D) in the value chain. By ensuring effective communication between research institutes, universities, product processors and farmers, various extension activities should be provided to each actor starting from farmers.

Researchers' Contribution Statement Summary

The authors declare that they have contributed equally to the article and have not plagiarised.

Conflict of Interest Statement

The authors declare that there is no conflict of interest between them.

Ethic Declaration

This research was approved by the Social and Human Sciences Research Ethics Committee of the Rectorate of T.C. Aydın Adnan Menderes University with the document number 31906847/050.04.04.04-08-18 dated 31/12/2021.

Additional Information

This study is based on the first author's PhD thesis.

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