

Value Chain Equity for Tomato and Onion Crops in Fayoum

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Abstract: Growers of horticultural crops including tomato and onion are the weak actors of the value chain and other actors are more powerful. The aim of this paper is to estimate the share of each value chain actor in unit cost, retail price, and profit of tomato and onion crops in Fayoum Governorate. Survey has been designed and interviews with effective actors of both value chain have been conducted. Data obtained were analyzed to have clear vision on the current situation. Improved situation has been assumed based on the SWOT analysis and challenges clarified by interviewees. Based on the analysis; growers seem to be the weak actor of both value chains. They usually pay big portion of the unit cost and receive low profits comparing to other actors. The improved situation suggested according to the results can reduce the share of growers in unit cost by 9% for both crops respectively. Accordingly, the share of growers in retail price increases by 18% in tomato and 16% in onion and their share in profit significantly increases by 65% in tomato and 46% in onion.

Keywords: tomato, onion, value chain, unit cost, retail price, price distortions

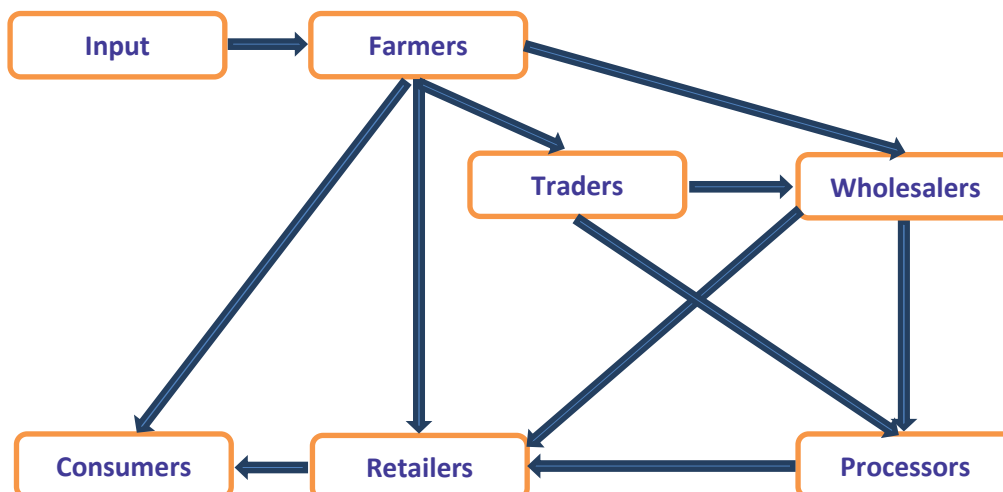
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I. Introduction

Although the value chain concept is relatively new, however it's widely used to enhance the agribusiness sector. It plays an important role in transforming agricultural commodities from raw material to endproducts demanded by the consumers [1]. To transfer these products along their value chains; there should be several stakeholders involved and receiving parts of value chain gains. among the stakeholders along the chain is oftendebated and analyzed. Farmers, traders, wholesalers, retailers, and consumers are major actors in the value chain [2]. The first step to understand a value chain is to draw the value chain map. A value chain maps provide a way to understand the processes and pathways to production and sale, by illustrating in a simple form, the complexities of the value chain of an industry sector or product [3]. The value chain map for vegetables (including tomato and onion) in Egypt can be illustrated as shown in figure 1.

Figure 1: Value chain map for vegetables in Egypt



Source: compiled from interviews with value chain actors

As soon as the value chain map is developed; the next step is to analyze it. Value chain analysis identifies which activities add value to the product, evaluates the preparedness of a chain to create, realize and distribute value effectively and efficiently, and assesses the scope and/or potential interventions to help a chain better understand customers and consumers, create more value, reduce waste and build stronger partnerships

[4]. Key aspects of the value chain best practices are; double specialized intermediaries, contracts to increase knowledge and stability of prices, minimum price arrangements to provide predictability of pricing and ensure coverage of the variable costs, information and knowledge management, and most important equity arrangements including shared ownership business structures and price sharing arrangements [5]. Equity in the value chain is essential for all actors to continue to perform their functions in the value chain. As per [6]; a main conclusion can be drawn from the analysis of costs and benefits sharing among value chain stakeholders that the sharing of benefits is drastically uneven to the detriment of weak planters which leads to a poor competitiveness of farmers with respect to value appropriation in the value chain. Value chain research can be of great benefit to solve value chain challenges. The particular focus of value chain research on and analysis of relationships helps to identify bottlenecks that are preventing a sector from achieving certain economic and social targets as well as market players' incentives to engage in transactions [7]. The reasons might vary from lack of knowledge and information provided by input supply companies and their local retailers, to lack of market information. It's essential after all to analyze the value chain to find out the modes of strategic relationship among value chain partners [8].

II. Statement of Research Problem

Growers of tomato and onion crops especially in Fayoum Governorate like most other governorates are facing several challenges along the value chains. Volatility of farm gate and wholesale prices reflects a bad effect on the growers' stability of income and raise issue of value chain equity for both crops. Intermediaries are receiving big portion of the retail price and, accordingly, huge profits for doing less efforts than the growers do.

III. Objectives of the Study

The study aims at investigating the situation of both tomato and onion value chain in Fayoum Governorate, estimating the dividends of costs and profits that each value chain actor receives, and provide suggestions for improved scenario for each value chain.

IV. Data Sources

In order to give a clear overview about the tomato and onion value chains at both national level and Fayoum Governorate level; secondary data has been collected from the Central Agency for Public Mobilization and Statistics CAPMAS. In addition; questionnaires have been designed to collect primary data and information for the value chain model. Interviews with 100 farmers, 8 local traders, 12 commissioners (from Fayoum Wholesale Markets), 7 wholesalers, and 15 retailers (supermarkets and land market sellers) have been conducted. Data tabulated and analyzed to provide concrete estimates.

V. Research Methodology

The approach in analyzing the value chain of the selected crops is investigating the value chain linkages between the different actors starting from input suppliers, farmers, traders, local marketers to the end consumers. A set of questionnaires were designed to collect data from the value chains' actors through interviews. Quantitative and qualitative data and/ or information about constraints, challenges, cost of practices, and revenues were collected in order to analyze the distribution of costs and revenues between the actors.

VI. Situation of Tomato and Onion Value Chains

Area cultivated and production

Vegetables are major crops in Egypt agriculture sector where 2.782 million feddans were cultivated in 2015 with vegetables. Out of the total area; 468.5 and 197 thousand feddans were cultivated with tomato and onion respectively representing 16.84% and 7.08% of the total vegetable area respectively. The production of both crops is 7.74 million ton and 3.04 million tons respectively representing 24.08% and 9.46% of the total vegetables' production amounted at 32.13 million tons in 2015 [9].

Referring to table 1; the area cultivated of tomato and onion in Fayoum represent 5.01% and 4.26% of the total area of both crops nationwide and the total production of both crops represent 4.55% and 3.96% of the total production of both crops nationwide.

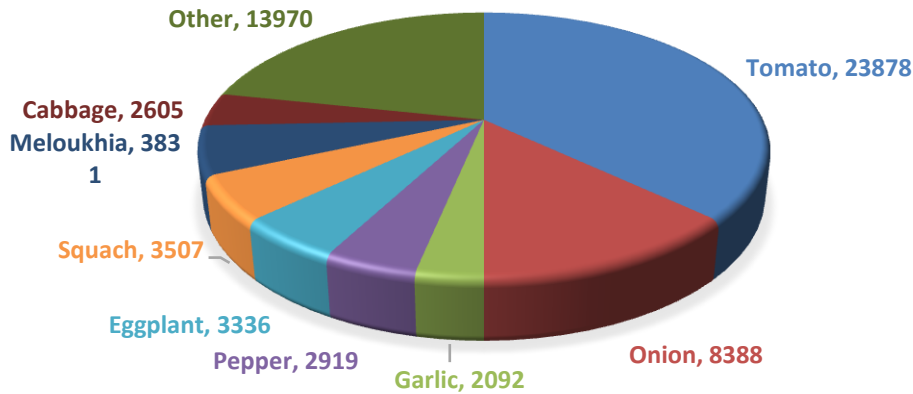
Table 1: area cultivated and production of tomato and onion in Fayoum

Crop	Area cultivated		Production	
	Feddans	% of Egypt	Tons	% of Egypt
Tomato	23878	5.01	352219	4.55
Onion	8388	4.26	120426	3.96

Source: compiled from CAPMAS statistics, 2017

In Fayoum; vegetables represent good portion of cultivated area. In total 64,526 feddans¹ are cultivated with vegetables producing 652 thousand tons as per the 2015 CAPMAS statistics. The area cultivated with both tomato and onion represent 50% of the total vegetable area where tomato's area cultivated represent 37% of this area (23,878 feddans) and onion represents 13% (8388 feddans). Figure two shows the area cultivated with major vegetable crops in Fayoum in 2015[9].

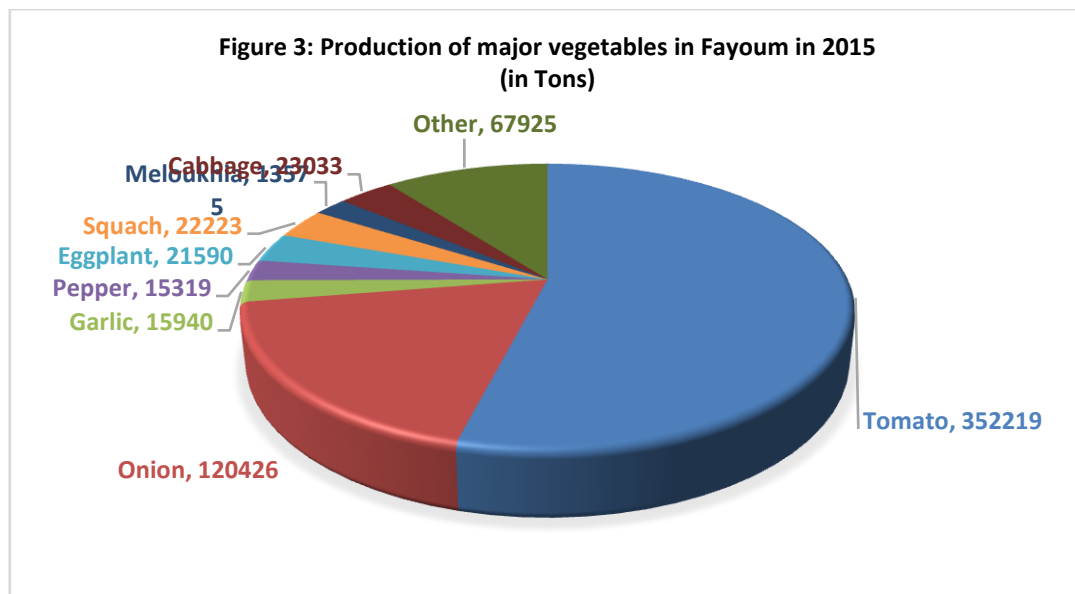
Figure 2: Area cultivated of major vegetables in Fayoum in 2015 (in feddans)



Source: compiled from CAPMAS statistics, 2017

As for production; vegetables' production in Fayoum amounted at 652 thousand tons in 2015 and represent 2% of the total vegetables' production in Egypt amounted at 32,127 thousand tons. The production of both tomato and onion represent 33.56% of the total vegetables' production where tomato's production represents 24.1% of this quantity (7.74 million tons) and onion represents 9.5% (3.04 million tons). Figure three shows the production of major vegetable crops in Fayoum in 2015 [9].

Figure 3: Production of major vegetables in Fayoum in 2015 (in Tons)



Source: compiled from CAPMAS statistics, 2017

Prices

The distribution of the retail price for both tomato and onion shows unequal distribution of the retail price. Table two shows the farmgate, wholesale, and retail prices for tomato and onion in Fayoum from 2011/2012 to 2014/2015 [10].

¹ Feddan is the measurement of area cultivated in Egypt and equal to 4200 square meters.

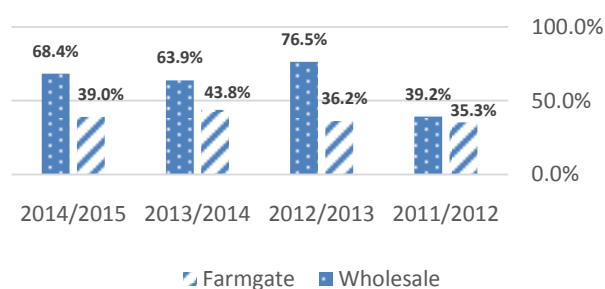
Table 2: Distribution of retail prices of tomato and onion in Fayoum

	Year	Farmgate	Wholesale	Retail
Tomato	2011/2012	1487	1650	4210
	2012/2013	1493	3150	4120
	2013/2014	1492	2180	3410
	2014/2015	1540	2700	3950
	Average	1503	2420	3923
Onion	2011/2012	872	2900	2550
	2012/2013	887	2820	4080
	2013/2014	961	3130	4029
	2014/2015	1042	4120	5460
	Average	940	3242	4030

Source: CAPMAS Annual Bulletin for Prices of Food Products and Services

Figure 4 shows the percentage of farmgate and wholesale prices of tomato in relation to the retail price. The farmgate price of tomato was as low as 35% in 2012 and 39% in 2015 and maximum was 44% in 2014 where the wholesale price represents big portion of the retail price.

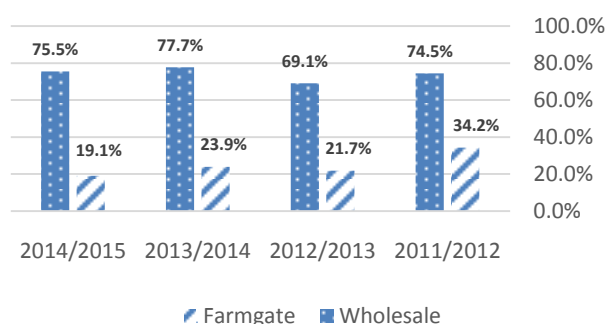
Figure 4: Tomato distribution of retail price



Source: CAPMAS Annual Bulletin for Prices of Food Products and Services

Figure 5 shows the percentage of farmgate and wholesale prices of onion in relation to the retail price. The farmgate price of onion was as low as 34% in 2012 and went down dramatically in 2015 to 19% where the wholesale price represents big portion of the retail price ranging from 69% to 78%.

Figure 5: Onion distribution of retail price



Source: CAPMAS Annual Bulletin for Prices of Food Products and Services

VII. Findings

Sample characteristics

Value chain overview

Several gaps have been identified through interviews with value chain actors. Lack of information about market demand and market prices is the first obstacle for tomato and onion growers to take marketing decisions starting from the area cultivated to the markets in which the production should be sold. It's also been identified that in most of the vegetable crops most of the small-holders select inappropriate varieties and cannot differentiate between the vegetable varieties that are consumed fresh and the varieties for processing. The misuse of pesticides is also one of the big challenges for tomato and onion growers. As for the farming stage; farmers lack the knowledge of good agricultural practices and postharvest practices. The following section states the challenges identified in each phase.

Inputs: the following challenges have been identified;

- Fertilizers are over-priced in local market and the subsidized quantities through the agricultural cooperatives are insufficient.
- Pesticides are over-priced in local market and are either low quality or ineffective due to unknown sources.
- In many cases; seedlings available through the market are not well-trusted and low quality.
- Poor function of agricultural cooperatives especially in the area of inputs supply.
- Shortage of skilled labor especially those required for postharvest handling.
- High wages comparing to the skills acquired.
- High costs affiliated with mechanization and its maintenance.

Production:the following challenges have been identified;

- Irregular water availability and use of polluted water canals & drains.
- Irrigation cost is very high due to the use of water pumps where fuel costs a lot.
- Diseases' infections cause big losses to growers. Certain infections are repeatable and unbeatable like TutaAbsoluta, Root Rot and White Drosophila.
- Low lands quality and salinity especially in new lands.
- Lower productivity in old lands due to inefficient production in smallholdings.
- Improper timing for planting crops.
- Failure to control weeds cause lower productivity.

Postharvest: the following challenges have been identified;

- Improper harvesting packs.
- Use of traditional transportation means rather than cooling trucks and long distances to wholesale markets result in high costs.
- Higher percentages of losses due to improper postharvest treatments.

Marketing: the following challenges have been identified;

- Monopolistic behavior by traders.
- Irregular production quantities over the seasons result in big fluctuation in prices.
- Delayed payments by traders.
- Lack of market information.

SWOT analysis

Based on the interviews with the farmers and other value chain actors and investigation of current agricultural economics situation, the following SWOT analysis has been conducted.

Strengths	Weaknesses
<ul style="list-style-type: none"> ✓ Willingness of farmers to increase crop production area ✓ Suitable agro-ecological climate for production during EU off-season periods. ✓ Possibility of setting up production contract-farming schemes using inclusive business model. ✓ Relatively good farming and business management experience with larger commercial growers. 	<ul style="list-style-type: none"> ✓ Poor farmer access to quality production inputs and services. ✓ Poor market information disseminated to value-chain actors. ✓ Low usage of appropriate farm mechanization. ✓ Low levels of agricultural technical knowledge and good agricultural practices used by small-scale farmers ✓ Poor access of small-scale producers to post-harvest packing, storage, and cold chain services and facilities. ✓ Lack of cold chain facilities
Opportunities	Threats
<ul style="list-style-type: none"> ✓ Abundantmarket for quality, certified horticultural seed and plant material. ✓ Growing market for fresh quality produce. ✓ Existence of commodity and supermarket markets, especially in large urban areas. 	<ul style="list-style-type: none"> ✓ Weak local and national economy. ✓ Low farm gate and market price. ✓ Pests and diseases ✓ Climate change and water needs and availability.

Suggestion for improvements

The following are suggestions to improve tomato and onion production in Fayoum;

Inputs

- Support the role of agricultural cooperative in supplying trusted inputs to growers.
- Advocate the use of organic fertilizers that help improve production quality and increase productivity.
- Monitoring of pesticides shops to control quality of the pesticides sold.
- Support the production of quality seedlings.
- Introduce proper mechanization to fit into the Egyptian conditions.

Production

- Introduce fertilization and pest control systems that are more efficient.
- Improve irrigation and drainage systems.
- Apply suitable crop rotations.
- Applying good agricultural practices.

Marketing

- Provide market information to growers.
- Introduce contract farming in a better way to guarantee commitment of parties.
- Improve postharvest treatments.
- Support exportation of high-quality products.
- Introduce the collective marketing approach to farmers.

Value Chain Analysis

The study has identified and interviewed four value chain actors including; farmers, local traders, commissioners (wholesale market traders), wholesalers, and retailers for the four investigated crops; tomatoes, onions, green beans, and garlic within the local market. The total gross margin has been broken into partial margins including; cost margin, profit margin, and marketing margin. For each type of margins; it was broken down between the different value chain actors. Based on the challenges and SWOT analysis retrieved from the interviews with the different actors; an improved situation for each value chain has been developed depending on the difference between actual inputs (seeds, fertilizers, pesticides...etc.) and official recommendations. The comparison mainly changes the margins dedicated to farmers and, accordingly, changes other value chain actors' margins.

Tomato Value Chain Margins

According to table 2, the tomato growers pay as big as 86.5% of the unit cost which means 86.5 EGP for each 100 EGP of costs incurred. The local traders pay 2.6% of the unit cost while the commissioners only pay 1.7%. The wholesalers and retailers pay 3.4% and 5.8% respectively. As for the total profit; the tomato farmers receive only 20.5% of the total profit which means 20.5 EGP out of each 100 EGP profits generated along the value chain. The local traders and commissioners receive 23.3% and 23.7% of the total profits respectively while wholesalers and retailers only receive 17.4% and 15.1% respectively. As for the retail price; tomato growers receive farm gate price equal to 34.4% of the retail price. The rest of the price is divided between the different actors as follows; 16.6% for local traders, 17.4% for commissioners, 12.2% for wholesalers, and 19.4% for retailers.

Table2: Tomato Value Chain Margins

	Actual Margins %			Improved Margins %		
	Unit Cost	Total Profit	Retail Price	Unit Cost	Total Profit	Retail Price
Farmer	86.5	20.5	34.4	78.7	33.8	40.5
Local Trader	2.6	23.3	16.6	4.4	18.1	14.5
Commissioner	1.7	23.7	17.4	4.3	19.3	15.5
Wholesaler	3.4	17.4	12.2	5.9	14.5	11.3
Retailer	5.8	15.1	19.4	6.7	14.3	18.2

Source: Calculated from survey results

As tomato growers tend to use enormous quantities of input supplies especially fertilizers and pesticides, production cost goes high and, accordingly, the unit cost also gets high. Referring to the Good Agricultural Practices, the fertilizers and pesticides can be reduced to 10% - 15% without affecting the productivity of the tomatoes. As margins have been recalculated based on the previous statement, table 2 shows the improved margins. The unit cost for growers has been reduced to 78.7% comparing to 86.5% in the actual scenario which means for each 100 EGP of unit costs, the growers pay 78.7 EGP. Margins for other actors were redistributed as follows; 4.4% for local traders, 4.3% for commissioners, 5.9% for wholesalers, and 6.7% for retailers. As for the total profit; tomato growers' share of profit has increased from 20.5% to 33.8% while other actors' shares were reduced to 18.1% for local traders, 19.3% for commissioners, 14.5% for wholesalers, and 14.3% for retailers. The distribution of retail price between the value chain actors has also changed. The major change was the increase of growers' margin to 40.5% instead of 34.4% in the actual scenario. Other actors' margins were also affected where local traders got 14.5%, commissioners got 15.5%, wholesalers got 11.3%, and retailers got 18.2%.

Bulb Onion Value Chain Margins

According to table 3, the onion growers pay as big as 87.2% of the unit cost which means 87.2 EGP for each 100 EGP of costs incurred. The local traders and commissioners pay as little as 1.2% of the unit cost while the wholesalers and retailers pay 3.3% and 8.1% respectively. As for the total profit; the onion farmers receive only 22.3% of the total profit which means 20.5 EGP out of each 100 EGP profits generated along the value chain. The local traders and commissioners receive 11.8% and 19.3% of the total profits respectively while wholesalers and retailers only receive 20.3% and 26.3% respectively. As for the retail price; onion growers receive farm gate price equal to 49.5% of the retail price. The rest of the price is divided between the different actors as follows; 12.9% for local traders, 11.7% for commissioners, 10.6% for wholesalers, and 15.3% for retailers.

Table 3: Bulb Onion Value Chain Margins

	Actual Margins %			Improved Margins %		
	Unit Cost	Total Profit	Retail Price	Unit Cost	Total Profit	Retail Price
Farmer	86.2	22.3	49.5	79.2	32.5	57.2
Local Trader	1.2	11.8	12.9	1.7	12.1	10.8
Commissioner	1.2	19.3	11.7	4.4	16.1	10.5
Wholesaler	3.3	20.3	10.6	5.2	18.5	9.4
Retailer	8.1	26.3	15.3	9.5	20.8	12.1

Source: Calculated from survey results

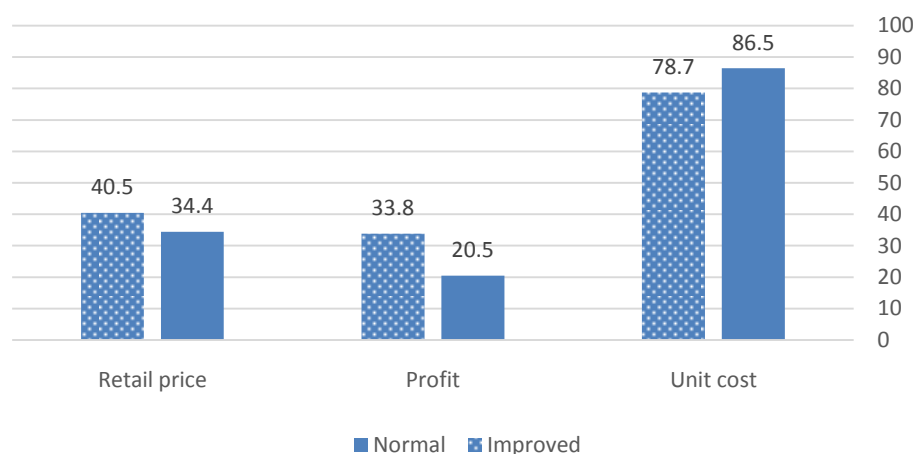
As onion growers encounter big losses during harvest and postharvest processes, the unit cost gets high. Referring to the Good Agricultural Practices, up to 15% of the losses can be reduced with no extra costs. The margin, accordingly, will be changed. Table 3 shows these improved margins for onion. The unit cost for growers has been reduced to 79.2% comparing to 86.2% in the actual scenario which means for each 100 EGP of unit costs, the growers pay 78.7 EGP. Margins for other actors were redistributed as follows; 1.7% for local traders, 4.4% for commissioners, 5.2% for wholesalers, and 9.5% for retailers. As for the total profit; onion growers' share of profit has increased from 22.3% to 32.5% while other actors' shares were reduced to 12.1% for local traders, 16.1% for commissioners, 18.5% for wholesalers, and 20.8% for retailers. The distribution of retail price between the value chain actors has also changed. The major change was the increase of growers' margin to 57.2% instead of 49.5% in the actual scenario. Other actors' margins were also affected where local traders got 10.8%, commissioners got 10.5%, wholesalers got 9.4%, and retailers got 12.1%.

VIII. Discussions

Growers of tomato and onion pay the big portion (86.5% and 87.2% respectively) of the unit cost for both crops. However, they receive as low as 34.4% and 49.5% of the retail price. The rest of the retail price goes to other value chain actors who pay only 13.5% and 12.8% of the unit cost. The total profit is unequally distributed between the different actors, growers of tomato and onion receive as low as 20.5% and 22.3% respectively of the total value chain profits and the rest is distributed between other actors. This means that the actors who don't produce the product or own it pay less costs and receive more profits.

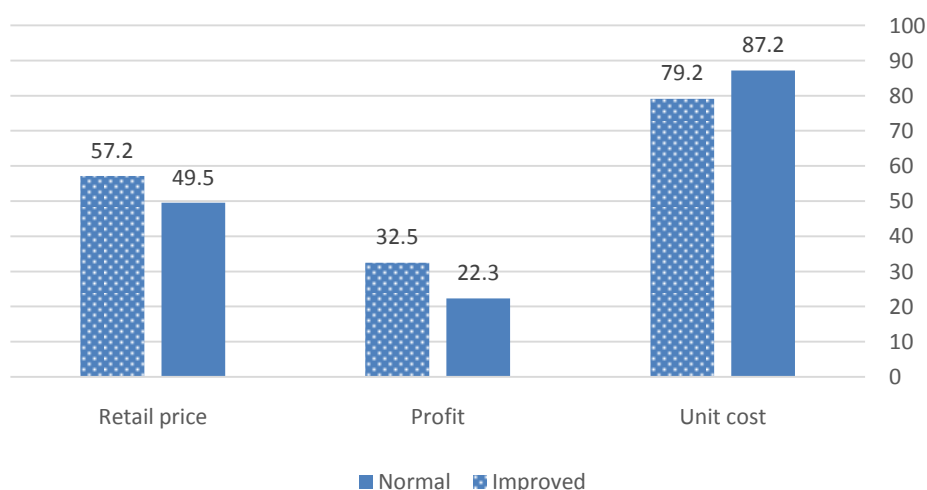
Although the situation is not working for the growers, there are possibilities to improve it. As the growers are not following the good agricultural practices and the proper marketing; the possibility to improve the distribution of margins mainly result from improving agricultural and marketing practices. Based on the improvement assumptions; growers share of unit cost can be reduced to 78.7% and 79.2% and their share of retail price can be increased to 40.5% and 57.2% respectively. The growers share of total profit can be increased to 33.8% and 32.5% respectively. Figure 6 and figure 7 show the changes in the distribution of the factors assessed in actual and improved situation for tomato and onion respectively.

Figure 6: Share of tomato growers in actual and improved situations



Source: compiled from research results

Figure 7: Share of onion growers in actual and improved situations



Source: compiled from research results

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