FOOD SCIENCE & TECHNOLOGY | REVIEW ARTICLE

A seminar review on red pepper (Capsicum) production and marketing in Ethiopia

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Abstract: In Ethiopia, red pepper is cultivated in many parts of the country and it is an important source of income for smallholder producers. Since the larger proportion of the pepper produced is for the market, it takes a significant share of the national income from commodity export. Even though the country cultivates pepper but its share in the world was insignificant. The pepper sub-sector can be characterized as underdeveloped, unorganized, small scale, and inefficient. Furthermore, farmers output was faced constraints such as lack of improved seeds to satisfy producers demand, lack of advice and technical assistance, non-timely distribution of fertilizer, which leads to delay in sowing and harvesting, traditional way of cultivating, lack of training for experts and shortage of manuals, publications and guidelines for spice production largely hinder the red pepper production. The red pepper value chain suffers from low production, low quality, less value addition and irregularity of supply. The actors were input supplier, producer, merchant agent, processors, wholesaler, retailer, and consumer. These problems of low quality and quantity not only influence the international competitiveness of Ethiopian exporters but also the domestic market as well. The decline of red pepper production is also attributed to poor varieties, poor cultural practices, and diseases. Despite the fact that the significance of pepper in Ethiopian economy and current income-generating capacity of pepper as compared to others

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PUBLIC INTEREST STATEMENT

The sub-sector of spice has been immensely important for the country’s economic development and poverty reduction by creating an enormous job opportunity, income generation, and food security as well as fostering foreign exchange earnings. However, Ethiopia had a long year’s history in spice marketing due to the existence of conducive agro-ecology for production, the contribution of spice production and marketing is limited as well as low in the country. Among the spices, red pepper is considered as one of the flavoring materials, an essential source of oils, an essential source of colors, and an essential flavoring ingredient for stews and more importantly a cash crop for many smallholder producers in the country. Despite its significance, a seminar review was identified a range of red pepper channels in Ethiopia so as to enhance the production as well as its market development. Hence, a seminar review was undertaken on Red Pepper (Capsicum) production and Marketing in Ethiopia.
has not been given due attention. By 2050 the world’s population expected to be reached 9 billion and demand for food goes to 70% and 100%.

Subjects: Agriculture & Environmental Sciences; Environment & Gender; Ecology - Environment Studies; Social Work; Social Work and Social Policy

Keywords: Red pepper; production; marketing; marketing channel; value chain

1. Introduction

1.1. Background

There are many names for pepper in different countries in Asia. Chilli peppers are called “ema” in Bhutan, “la-jiao” in China “cabe” in Indonesia, “prik” in Thailand, and “chilli” in India. The early Aztecs of Mexico also called them “chilli”, and this term is the most commonly used today around the world, with some variant spellings: chile, chili, chilly, etc. (Berke, 2002). According to American Spice Trade Association (ASTA), “red pepper” is the preferred name for all hot red pepper (EEPA, 2003). Pepper is produced in all the continents except Antarctica. In Antarctica, there are stories about pepper being kept in flower pots to spice up their food (Boseland & Votava, 2000). It is believed to have originated in Central and South America. Peru and Mexico might have been the second centers of origin, after which it spread into the New World Tropics before its subsequent introduction into Asia and Africa in 1493 (Boseland & Votava, 2000).

As others Ethiopia also cultivates pepper but its share in the world is insignificant as compared to India that produced 4 million metric tons from 891,800 ha in 1992, Ethiopia’s production in 2001/02 was only 77,962.4 metric tons harvested on 55,381 ha (CSA, 2003). Productivity is also incomparable with others, where China 15 metric tons per hectare in 2001/02, whose production was about 1.4 metric tons per hectare. In addition, the history of pepper in Ethiopia is perhaps the most ancient than the history of any other vegetable products (EEPA (Ethiopian Export Promotion Agency), 2003). Ethiopians have a strong attachment to dark red pepper, which has high value principally for its high pungency. The fine-powdered pungent product is an indispensable flavoring and coloring ingredient in the common traditional sauce “stew or Wot” whereas; the green pod is consumed as a vegetable with other food items. There is a general belief among Ethiopians that a person who frequently consumes hot pepper has resistance to various diseases. It is in the daily diet of most Ethiopians. The average daily consumption of red pepper by Ethiopian adult is estimated 15 g, which is higher than tomatoes and most other vegetables (MARC, 2004).

Moreover, red pepper is the world’s second important vegetable ranking after tomatoes and it is the most produced type of spice flavoring and color to food while providing essential vitamins and minerals. The nutritional value of red pepper merits special attention. It is a rich source of vitamin A and E. Both hot and sweet peppers contain more vitamin C to prevent flu colds than any other vegetable crop (Boseland & Votava, 2000). The color and flavor extracts from pepper are used in both the food and feed industries, e.g., ginger beer, hot sauces, and poultry feed. In some countries, the shoot tips are cooked as herb or as vegetable (Rubatzky & Yamguchi, 1997). Furthermore, in many households, pepper provides the only needed flavor to enhance the intake of otherwise bland diets. The range of food products that contain pepper or its chemical constituent is broad, and it includes ethnic foods, meat, salad dressings, mayonnaise, dairy products, and candies, packed foods, slack foods, salsa, and hot sauces. Pointed out in addition to their uses as food uses for cosmetic production, condiment and medicine, and ornamentals in the garden. (Rubatzky & Yamguchi, 1997)

Mostly pepper is the common ingredient of the daily dish of almost all Ethiopians. People consume pepper for intake enhancement as well as to supplement dietary household needs. Red pepper is a major spice or condiment and the vegetable crop produced by the majority of smallholder producers in the south, Oromia, and Amhara regions. Despite the fact that the significance of red pepper in Ethiopian economy and current income-generating capacity of red
pepper as compared to its magnificent potential in the country had not been given due attention (EEPA, 2003). Therefore, this study was initiated to review the production and marketing of red pepper in Ethiopia.

1.2. Objective
The general objective of the seminar review was to understand the red pepper production and marketing in Ethiopia with the following specific objectives:

1. To review the major red pepper marketing actors and their role
2. To identify the major marketing channels of red pepper
3. To discuss the factors affecting the growth and yield of red pepper

2. Literature review

2.1. Theoretical concepts
The term spice refers to any dried plant product used primarily for seasoning, be it the seed, leaves, bark/peel, or flowers. Spices are essential oils that give foods and beverages flavor, aroma, and sometimes color. They can be marketed whole, ground to a powder or in the form of essential oils and oleoresins. Many spices are also used for other purposes. Plants such as turmeric (Curcuma longa) are increasingly in demand for natural therapies, while others such as peppers (Capsicum spp.) serve as substitutes for chemical dyes or pesticides (Masresha Yimer, 2010). Another definition indicates: spice is a dried seed, fruit, root, bark, or vegetative substance used in nutritionally insignificant quantities as a food additive for the purpose of flavoring, and sometimes as a preservative by killing or preventing the growth of harmful bacteria. Many of these substances are also used for other purposes such as medicine, religious rituals, cosmetics, perfumery, appetite, or eating as vegetables. For example, turmeric is also used as a preservative; licorice as a medicine; garlic as a vegetable and nutmeg as a recreational drug (Masresha Yimer, 2010).

2.1.1. Marketing
Marketing is the process of bringing sellers and buyers together for the purpose of exchanging title to goods and services (Kilingo and Kariuki, 2001). According to Kotler (2003) marketing is defined as a social and a managerial process whereby individuals and groups obtain what they need and want through creating and exchanging products and value with others. The American Marketing Association representing marketing professionals in the US and Canada states that marketing is the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organizational objectives (Eric and Kerin, 2000).

According to Raphael Kaplinsky and Mike Morris (2000) value chain describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use. A value chain is an alliance of enterprises collaborating vertically to achieve a more rewarding position in the market (Nisku, 2014).

3. Red pepper production
Red pepper is an annual crop which grows at an altitude ranging from 1400 up to 2100 m.a.s.l. Growing pepper requires soil that is well drained and rich in organic matter, as well as 600–650 mm rainfall. It grows well on well-prepared soil that is free from perennial weed. Red pepper is propagated by raising seedlings in a nursery. Depending on the area, harvesting starts 5 to 6 months from transplanting. Planting is carried out in the beginning of the main rain season (Alemnew Abay, 2010). The red pepper is harvested when it is fully red and starts to dry. After harvesting, pepper is dried. Shade drying is recommended for high-quality oleoresin. Red pepper and chill are the leading
vegetable and spices grown in the country. The central Eastern and Southern Shoa, Western, Northwestern Wollega, Fogera, Dera and Libokemkern (South Gondar), Jabitehnan and Burie (West Gojjam), Alefa and Denbya (North Gondar), Gangway (Awi) and Kobo (North Wollo) and the Southern part of the country are the potential red pepper producing areas (Alemnew Abay, 2010).

The Ethiopian Institute of Agricultural Research (EIAR) has released five pepper varieties, namely, Marakofana, Bakolocale, Melkazala, Melkadema, and Eshete. Among these species, Marakofana and Bakolocale are widely used by farmers. Marakofana is about 19 cm height, it has a thick cover and irritating nature. This variety is highly demanded by spice factories like Ethiopian Spice Factory. Bakolocale variety has also red color and thin cover it is highly irritating and it has a total height of about 13 cm (Alemnew Abay, 2010). Red pepper is an important cash crop in the Amhara region for many smallholder producers. On average 68% of red pepper production is for the market in Amhara National Regional State (CSA, 2009). It is a crop of high value in both domestic and export markets. Since it is a commercial and industrial crop, it generates employment to urban and rural workers. The main-processed product, oleoresin, is exported to different countries and the spiced ground is supplied to the local market. Oleoresin that is used for food coloring is extracted from red pepper for export purpose. The deep-red colored cultivars have a very high processing demand in the country.

The total production of red pepper in the country for the year 2005/06 Ethiopian main cropping season (Meher) was estimated at 1,790,283 quintals. Rain-fed pepper production in 2005/06 production season was 777,602 quintals in South Nations Nationalities and People Regional State (SNNPRS). This accounted for 43% of the country’s production (CSA, 2006). In Ethiopia, the production of red pepper is constrained by variable seasonal conditions. The 2005/06 yield of pepper was very high, around 22qt/ha in the country, which was greater than the previous years’ yield (13qntual per hectare). The Ethiopian Export Promotion Agency (EEPA (Ethiopian Export Promotion Agency), 2003) also carried out a spice potential market study in Amhara, Oromia, and SNNPRS, and identified that the land coverage for pepper in the three regions. According to the study results, pepper production accounts for 34% of the total spices production in the three regions. Despite the fact that the red pepper production system for green and dry pod has stayed as low input and low output with a national average yield of 7.6 ton/ha for green pod whereas it was 1.6 ton/ha for the dry pod, respectively (Central Statistical Agency, 2006). The decline of red pepper production is also attributed to poor varieties, poor cultural practices, the prevalence of fungal or blights and bacterial as well as viral diseases (Fekadu & Dandena, 2006).

3.1. Opportunities for producers and traders
The existence of Agricultural Development Led Industrialization Policy of the country (ADLI) creates a good opportunity for producers through input and output supply and extension services provided by the Development Associations and woreda expertises. The favorable agro-ecology of the area to produce red pepper is also a good opportunity to boost production and increase demand in the area particularly and generally in the country. Even though cooperatives involvement in red pepper marketing was low at present cooperatives could benefit producers by decreasing the transportation cost and purchase the product at a fair price (Alemnew Abay, 2010). Other opportunities are the expansion of infrastructures such as road, telecommunication, electric power, the availability of cheap labors force, the existence of demand both domestically and international market and the expansion of research centers, i.e., improved technology was deemed.

4. Marketing channel of red pepper in Ethiopia
A marketing channel is a business structure of interdependent organizations that reach from the point of product origin to the consumer with the purpose of moving products to their final consumption destination (Kotler and Armstrong, 2003). Abbot (1958) also defined marketing channel as the sequence of intermediaries through which goods pass from producer to consumer. This channel may be short or long depending on the kind and quality of the product marketed,
available marketing services, and prevailing social and physical environment. The channel system creates time, place, possession, and form utilities. However, the benefits of the channel system cannot be enjoyed without an element of cost.

A product may take many routes on its journey from a producer to buyers and marketers search for the most efficient route from the many alternatives available is the actors’ choice. The channel may be direct or indirect. In the direct channel a producer and ultimate consumer deal directly with each other. In the indirect channel, intermediaries are involved between the producers and final consumers and perform numerous channel functions. To choose appropriate channel environmental factors, consumer characteristics, product type, and the firm financial, human and technological capabilities determine (Eric and Kerin, 2000). There are basically four types of marketing channels explained as follows and essentially, a channel might be a retail store, a website, a mail-order catalog, or direct personal communications by a letter, email or text message. Here is a bit of information about each one.

4.1. Direct selling
Direct Selling is the marketing and selling of products directly to consumers away from a fixed retail location. Peddler (vender) is the oldest form of direct selling. Modern direct selling includes sales made through the party plan, one-on-one demonstrations, and personal contact arrangements as well as internet sales. Direct selling is different from direct marketing in that it is about individual sales agents reaching and dealing directly with clients while direct marketing is about business organizations seeking a relationship with their customers without going through an agent/consultant or retail outlet. Direct selling often, but not always, uses multi-level marketing (a salesperson is paid for selling and for sales made by people he recruits or sponsors) rather than single-level marketing (salesperson is paid only for the sales he makes himself).

4.2. Selling through intermediaries
A marketing channel where intermediaries such as wholesalers and retailers are utilized to make a product available to the customer is called an indirect channel. The most indirect channel you can use (Producer/manufacturer —> agent middlemen (commission agent, broker) —> wholesaler —> retailer —> consumer) is used when there are many small manufacturers and many small retailers and an agent is used to help coordinate a large supply of the product.

4.3. Dual distribution
Describes a wide variety of marketing arrangements by which the manufacturer or wholesalers use more than one channel simultaneously to reach the end user. They may sell directly to the end users as well as sell to other companies for resale. Using two or more channels to attract the same target market can sometimes lead to channel conflict. An example of dual distribution is business format franchising, where the franchisors license the operation of some of its units to franchisees while simultaneously owning and operating some units themselves.

4.4. Reverse channels
If you have read about the other three channels, you would have noticed that they have one thing in common – the flow. Each one flows from producer to intermediary (if there is one) to consumer. Technology, however, has made another flow possible. This one goes in the reverse direction and may go – from consumer to intermediary to beneficiary. Think of making money from the resale of a product or recycling. In reverse flow, you will not find a producer. You will only find a User or a Beneficiary. Figure 1 shows that the red pepper product flows and the different marketing participants. Hence, the product flow was clearly depicted in Figure 1.

4.4.1. Demand of red pepper
The product is demanded locally, nationally, and internationally. Ethiopia export as well as import grounded pepper in the year 1993–2003 (Abay, 2010) hence if we increase production there will be the opportunity to export after meeting domestic demand. The major world pepper buyers are US
Figure 1. Marketing channel of red pepper in Ethiopia.

Source: Adapted from Sileshi (2011)

Table 1. Ethiopia’s total spices exported by commodity in the year 2009/10

| Types of spices | Volume | FOB Value | Share of volume % | Share of value | Top ranking |
|-----------------|--------|-----------|-------------------|----------------|-------------|
| Ginger          | 10,270 | 11,999    | 66.22             | 64.93          | 1           |
| Turmeric        | 2932   | 2840      | 18.91             | 15.37          | 2           |
| Cumin seed      | 801    | 1555      | 5.16              | 8.41           | 3           |
| Cardamom        | 116    | 567       | 0.75              | 3.07           | 4           |
| Fenu Greek      | 588    | 508       | 3.79              | 2.75           | 5           |
| Pepper          | 133    | 486       | 0.86              | 2.63           | 6           |
| Others          | 667    | 526       | 4                 | 3              |             |
| **Total**       | 15,507 | 18,481    |                   |                |             |

Sources: Adapted from Masresha Yimer (2010)

America, Netherlands, Singapore, Germany, India, France, Japan, Canada, Spain, Britain, Ukraine, and others (Abay, 2010 quoting EEPA, 2003). According to Table 1 mentioned, however, even if pepper is exporting to abroad in different destinations, it is still ranked in the least as compared to other spices. Table 1 below shows that the contribution of pepper was not only ranked the least but also its share to the country’s development also low. Therefore, as its important is immense and multidimensional, the responsible bodies should give strong attention for the development of red paper market as well as production improvement.

4.4.2. Supply of red pepper

Most of the time producers are supplying their product to the market during the harvest time. The reason is that while store for more time they fear the weight will be reduced and the price also decreased even most of the time they sold to a local collector at the farm gate level after dried the product. In addition, the producers’ important cash crop that generate income better than other growing crops in the country as well.
5. Marketing constraints and opportunities of red pepper

5.1. Constraints
Existence of unlicensed traders that do not pay tax charge for the respective bodies as competitive price and discourage on the licensed traders. Some licensed traders were forced to return their license due to unfair and prohibited trade practices by the unlicensed traders that purchase relatively at a higher price and sell at a lower price than licensed traders because they do not pay tax for the concerned body. Shortage of capital was also a critical problem for traders. So, the imperfect pricing system of traders was a major problem for producers. Traders charge low price at peak supply periods which is not based on the real demand and supply interaction but they use the information gap of producers. Traders also influence producers in setting the price and do not pay a reasonable price either by decreasing the price or by reducing the amount during the exchange (Abay, 2010). On the other hand, producers influence traders through deliberate adulteration by adding water and other foreign matters to increase the weight of the red pepper prior to 1-day to bring the market. The price of red pepper was also highly fluctuating and unstable that creates uncertainty among producers to produce more. Hence, producers were not confident to produce red pepper constantly due to the fear of the decrease in price and constrained with the lack of roads to transport outputs to the market (Abay, 2010). According to Mussema (2006), the informal survey results show that there were about 200 different unlicensed traders in each market. Shortly, the Ethiopian red pepper was constrained as Lack of access to information about the price and quality of the produce, Minimal involvement of cooperatives because cooperatives focus on non-perishable products like maize, teff, wheat, soybean and others, low credit access, collateral problem to borrow from other financial institutions, the storage capacity and quality of stores were also very poor and price fluctuation of the produce was also a serious problem for trader.

Opportunities of red pepper in Ethiopia were the expansion of infrastructure, access to foreign markets, the expansion of technology like telecommunication, the competitiveness of the products, policy issue, i.e., government provides attention for the product and the availability of demand for red pepper from locally to internationally are considered as ample to produce it.

6. Red pepper marketing actors and their role

6.1. Input suppliers
At this stage of the marketing channel, there are actors who are involved directly or indirectly in agricultural input supply like improved seed varieties, fertilizers, herbicides, pesticides, and farm implements which are essential inputs at the production stage. These include cooperatives, Bureau of agriculture, NGOs (Woldesenbet, 2013).

6.2. Growers/producers
According to CEDA (2004), the growers of red pepper whose capacity ranges from small family plots to large hectares targeted towards processors and producers of hot pepper products. Some form associations and have strong lobbying rights according to the region or country they are from, for example, in Mexico who is the second-largest world suppliers of red peppers.

6.3. Collectors/assemblers
These are traders in assembly markets who collect the product from producers in village markets and from farm gates for the purpose of reselling it to wholesalers and retailers. They use their financial resources and their local knowledge to bulk red pepper from the surrounding area. They play an important role and they do know areas of the surplus well (Woldesenbet, 2013).

6.4. Brokers
Brokers play an important role in linking producers to market and other stakeholders of the commodity chain while the ability of market accession of producers is limited and market demand requires an improvement in quantity amount as well as the diversity of products type.
They are not given any physical control over the product. They ordinarily follow directions from their principals. Usually, have little power over terms of sale or revenue collection. Their major role is bringing seller and potential buyers together. Hence, the primary role of the brokers was bringing buyers and sellers but not take the title of the product themselves.

6.5. Processors
These are producers of industrial products for all the industries for which red pepper industrial by-products are used. In other words, they supply the producers of final consuming products. These processors range from large laboratories, factories supplying multinational producers and restaurant chains, to small processors supplying restaurants, hotels, and small blenders in their local markets and regions. Products: hot pepper mash and pulp, hot pepper slices, hot pepper powder, hot pepper flakes, hot pepper oil, hot pepper oleoresins (CEDA, 2004).

6.6. Wholesalers
These are sellers of the final consumer goods to retailers and consumers alike (CEDA, 2004). They were also sold to the retails of the marketing agents. They have purchased the products in bulk quantities as compared to the other red pepper traders.

6.7. Retailers
These are sellers of hot peppers and its products by giant retail chains to small neighborhood stores and marketplaces to the consumers (CEDA, 2004). Most of the time they were selling the finished or semi-finished or processed products to the final consumers or end users.

6.8. Consumers
These are the consumers of hot pepper and its products. They are usually lovers of hot and spicy foods and range from ethnic food buyers to mainstream market buyers (CEDA, 2004). They were considered as the final; stage in the marketing channels.

6.9. Value chain
Describes the “full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use” (Kaplinsky and Morris, 2000a). United Nation Industrial Development Organization or UNIDO (2011) described value chain as a mechanism that allows producers, processors, and traders separated by time and space to gradually add value to products and services as they pass from one link in the chain to the next until reaching the final consumer domestic or global. According to the first popularized concept, Porter (1985) defined the value chain as a representation of a firm’s value-adding activities, based on its pricing strategy and cost structure. In a particular industry, the value chain is about from input supply to production, processing, wholesale, retail and finally, consumption. Further, Porter explained in his book of competitive advantage that value chain consists of two main components: primary activities and secondary activities. These activities according to porter are the direct, value creating activities of the firm (the producer) and each of these primary activities is linked to support activities which help to improve their effectiveness or efficiency whereas supportive activities...
normally consist of activities that do not directly produce goods or services. Agricultural value chain is usually defined as all firms and their activities engaged in input supply, production, transport, processing, and marketing (or distribution) of the product or products (Anandajayasekeram & Gebremedhin, 2009).

6.10. Value chain analysis
Is the process of breaking a chain into its constituent parts in order to better understand its structure and functioning. The analysis consists of identifying chain actors at each stage and discerning their functions and relationships; determining the chain governance, or leadership, to facilitate chain formation and strengthening; and identifying value-adding activities in the chain and assigning costs and added value to each of those activities. Figure 2 clearly put the value chain actors as well as the product flow directions. According to Figure 2, the value chain activity is a two-way communication and the arrow shows in this figure is the product and the information flow of red pepper value chain. Therefore, according to the Figure 2 of generic red pepper value chain, the upward line and to the right from core actors show product flow as well as the downward line & to the left from core actors show information flow.

Value addition: refers, the act of adding value(s) to a product to create form, place, and time utility which increase the customer value offered by a product or service. It is an innovation that enhances or improves an existing product or introduces new products or new product uses (Fleming, 2005). Value-addition: is the process of changing or transforming a product from its original state to a more valuable state. Many raw commodities have intrinsic value in their original state. Value added is created at different stages and by different actors throughout the value chain like flour-red pepper with ingredients packed of accompanying the information. Value added may be related to quality, costs, delivery times, delivery flexibility, innovativeness, etc. The size of value added is decided by the end-customer’s willingness to pay. Opportunities for a company to add value depend on a number of factors, such as market characteristics (size and diversity of markets) and technological capabilities of the actors. Moreover, market information on product and process requirements is the key to being able to produce the right value for the right market. In this respect, finding value-adding opportunities is not only related to the relaxation of market access constraints in existing markets but also to finding opportunities in new markets and in setting up new market channels to address these markets.

6.11. Factors affecting the yield and growth of red pepper in ethiopia

6.11.1. Planting methods
Capsicum in the field is established either by direct seeding or transplanting depending upon the environmental condition of an area. Both types of planting have their own distinctive advantage or disadvantage over the other (Carter, 1994). According to the research results from different parts of Ethiopia, using a standard Bako Local variety, direct sown plots were seen more vigorous than transplanted ones, but the stand percent of direct sown plots were seriously affected by erosion (Sam-Aggrey & Bereke_TsehaiTuku, 1985). According to the authors, direct sown plots were affected by lodging due to bearing of more fruits than transplanted ones. Similarly, direct sown plants were reported to have a strong taproot than transplants, which form extensive lateral roots because of the early shock after being uplifted from the bed. Considering all these factors, therefore, it was concluded that direct sowing of hot pepper should be better than transplanting.

Transplanting is used for more precise control of plant population and spacing, thinning, cost avoided, and with efficient use of seed (0.8 to 0.9 kg seeds/ha) than direct planting (6.25 kg seeds/ha) (Sam-Aggrey, 1985: Leskkovar & Cantliffe, 1993). Transplanting also affords late planting opportunities for seedling raised in greenhouses, least amount of water during seedling establishment. In some cases, transplanted plants tend to be shorter and have more nodes and have lower total root growth than direct-seeded pepper plants (Aliyu, 2000). In general, transplanting could be applicable in areas receiving long, predictable and ample rainfall. But in areas with erratic rain and...
short rainy season, the use of direct sowing method is important even though, direct sowing is with its own limitations, like that of washing away of seeds, plant lodging and requirement for frequent weeding (Sam-Aggrey & Bereke_TsehaiTuku, 1985).

6.11.2. Water requirement of red pepper
The water deficit during the period between flowering and fruit development reduced final fruit production (Della Costa & Gianquinto, 2002) reported that continuous water stress significantly reduced total fresh weight of fruit, and the highest marketable yield was found at irrigation of 120% and the lowest at 40% evapotranspiration (ET). This indicates that total pepper yield was less at lower levels of irrigation. Throughout the world, since the available water for agriculture is generally limited, the knowledge of the relationship between yield and quality of the product and irrigation regimes is an important factor to maximize the benefit of the available water supply.

Effective irrigation is essential to obtain the best yields of the fruit of the right size. The soil must be kept moist to a minimum depth of 45 cm. During the first 2 weeks after transplanting, the plants should be irrigated twice or three times per week for the transplants to become established, thereafter, once or twice per week depending on climatic conditions and soil type is advisable (Berke et al., 2005).

6.11.3. Fertilizer requirement
The amount of fertilizer to be applied depends on soil fertility, fertilizer recovery rate, and organic matter, soil mineralization of nitrogen (N), and soil leaching of N (Berke et al., 2005). Study by Hedge (1997) showed that nutrient uptake and dry matter production (fruit yield) of hot pepper are closely related. It is believed that phosphorus results in a better yield and more red colored fruit (Carter, 1994). Fertilizer requirements vary with soil type and previous crop history. And thus, a balanced nutrient level is required for maximum production. In Ethiopia, the recommended fertilizer rate for the red or hot pepper is, 200 kg/ha DAP and 100 kg/ha for UREA (EARO, 2004).

6.11.4. Farmyard manure
Animal manures, particularly cattle dung, were the main source of nutrients for the maintenance of soil fertility in settled agriculture until the advent of mineral fertilizers (Ofori & Santana, 1990). Farmyard manures are responsible to nutrient availability for the crop in demand, improve soil physical properties (aggregation) and hence improve water retention capacity, particularly organic in nature, infiltration rate and biological activity of soil (Aliyu, 2000.). The advantage of farmyard manure application, however, greatly depends, among others, on proper application methods, which increase the value, reduce cost, and effectiveness (Teklu Eshetu & Tabor, 2004).

6.11.5. Integrated use of farmyard manure and inorganic fertilizer
An integrated approach for the maintenance of soil fertility as well as crop productivity, with the complementary use of both mineral and organic fertilizers offers a good opportunity to the smallholder farmer to maintain yields at reasonable and sustainable levels (Ofori & Santana, 1990). Various research reports showed that integrated use of organic as well as inorganic fertilizer improves the soil fertility and productivity of the potato in terms of both quantity and quality (Teklu Eshetu & Tabor, 2004).

6.11.6. Diseases incidence
The main diseases that directly cause the low yield on red pepper are virus complex like Pepper Mottle Virus, Fungal diseases including; damping off (Rhizoctonia solani, Pythium spp., and Fusarium spp), powdery mildew, blight (Phytophthora capsici) and fruit rot (Vermicularia capsici), Bacterial Soft Rot (Erwinia carotovora), Bacterial wilt (Pseudomonas solanacearum), anthracnose or Ripe Rot (Collectotrichum capsici) (MoARD, 2009). The diseases cause rotting of the roots and the underground portion of the stem and in severe conditions causes death. Some of them cause small, yellow, slightly raised spots appear on young as well as on older leaves, and some attack the crop at the seedling stage, as a result, followed by yield loss. Therefore, the control
measures include, the use of cultural practices, resistant varieties, rotation of crops, in the severe case of chemical action is relevant (EARO. (Ethiopian Agricultural Research Organization), 2004).

6.11.7. Variety
Each variety has its own significant effect on yield and yield components, and each variety has its own traits that are part and parcel as quality parameters of the crop (shape, size, color, taste, and pungency). The most important traits among others include number of branches per plant (count), plant height, number of fruits per plant, days to maturity (count from days of transplanting), dry fruit yield per plant, fruit length, and single fruit weight (Lemma et al., 2008).

According to Abay (2010), the major production characteristics of red pepper are low input utilization, poor product quality, poor post-harvest handling, and lack access to services (credit, extension services, road and transport, market information). The Ethiopian Institute of Agricultural Research (EIAR) has released five pepper varieties, namely, Marakofana, Bakolocale, Melkazala, Melkadema, and Eshete. Among these species, Marakofana and Bakolocale are widely used by smallholder producers in Ethiopia (Abay, 2010). In this case, seed variety has a significant effect on the production as well as productivity of red pepper in the country depending on its agro-ecology.

6.11.8. Harvesting period
Red pepper is non climacteric horticultural crop. The harvesting period is after full ripening on the shrub. Early or late harvesting is deteriorating both the quality (loss of color, content, nutrient) and quantity (shriveling, wilt) of the product. Therefore, to minimize this negative consequence of red pepper seed should be obtained from a trusted source to ensure that, it is clean and free from pathogens, such as bacterial leaf spot, that can be spread via seed. The red pepper should be harvested when it is fully red and starts to dry. After harvesting, red pepper is fully dried (preferable down to 11 – 13% moisture content) and it is recommended to use shade drying for high-quality pepper (Aliyu, 2000).

6.11.9. Drought
Frequent drought also another factor that affects the growth and yield of red pepper in the quality and quantity of the product. Hence, if the smallholder producers are unable to get other supplementary inputs, i.e., irrigation, the production and productivity are obviously at risk as well.

6.11.10. Gap analysis
Value addition of red pepper assessment research analysis is a paramount important like innovation of canned green pepper use as fresh, preparing flour red pepper in added spices packed with accompanying information. The quality of the product, i.e., adulteration such that mixing sand, soil, water in red pepper, the supplier informal transaction (some of the suppliers sold informally their product to the local collector in advance but yet not received the money), why the producers are sold their product during the harvested period the like. Hence, a need for further study in the red pepper value chain as well as using a model of multi-variety choice is a paramount important issue for the red pepper market development in the country.

6.11.11. Implication
From the identified problems, appropriate interventions are required to alleviate the problems and increasing production and productivity with irrespective of its quality. Well-integrated actors at each stage of the value chain with mutual benefit and the involvement of cooperatives in red pepper marketing are the better way of capitalizing the existing opportunities as well as minimizing the challenges that hinder the red pepper development in the country.
7. Conclusion and recommendation

7.1. Conclusion
Red pepper is the world’s second important vegetable crops ranking in after tomatoes and it is the most produced type of spice flavoring and color to food while providing essential vitamins and minerals as well as industrial factories. Even though it is ranked in the second, there are different factors that affect the production as well as the marketing development of red pepper. The major red pepper value chain actor involved was input suppliers, producers, collectors/assemblers, brokers, processors (mostly), wholesalers, retailers, and final users or consumers. Even though these are the different participants in the value chain, the distribution of benefit is not fairly as the principle of the value chain and the chain also not well integrated rather one benefit on the expense of the other such as unlicensed traders over licensed traders.

The major marketing factors that affect the red pepper are the existence of unlicensed traders buy the product with equally with licensed traders and they sell at lower than the licensed one because they did not pay tax, information gap especially producers did not have adequate information about the quality and quantity of the produce, this is due to infrastructural barriers, lack of using communication, different adulterations such as soil, gravel, water is added with the red pepper product during selling for the sake of increasing weight, lack of credit access even if the financial institution wants to provide credit the borrower should have to provide collaterals otherwise difficult to get it.

The production factors that affect red pepper are prevalence of diseases, method of planting, water requirement, fertilizer requirement, seed varieties, farmyard manure, harvesting period, and drought. These factors are affecting both the quantity as well as the quality of the red pepper product, and in addition, producers did not confidence to produce red pepper product continuously due to the fluctuation of price.

7.2. Recommendation
Based on the discussion the following recommendations were forwarded:

- The government should take appropriate measure regarding those unlicensed traders which affect the normal demand and supply of the red pepper market in the study area in particular and in the country in general.
- The cooperative agency should involve just like other crop products in order to encourage more producers to produce as well as benefit all actors at each stage of the marketing channels.
- Any respective bodies should create awareness about the mutual benefit of all actors at each stage of the value chain and fulfill the necessary infrastructural facilities that lead to red pepper production as well as market development.
- The respective bodies should provide training for the importance of value addition for those actors to benefit all in each stage along the value chain.
- The development agent would assist those producers during the production as well as before and after harvesting of the red pepper products in order to alleviate growth and yield related problems.
- The government should create a mechanism to control the different adulterations added on the red pepper product that was created at the expense of the users and create equal playfield.

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