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Rose value chain in the Kingdom of Saudi Arabia

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*Strengthening MoEWA's Capacity to implement its Sustainable Rural Agricultural Development
Programme (2019-2025) (UTF/SAU/051/SAU)*

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Executive Summary

Under its Saudi Vision 2030, government of Saudi Arabia and FAO jointly formulated a program for developing the agriculture sector of the kingdom with particular emphasis on certain identified commodities through a value chain approach. The agricultural development through value chain approach has been witnessed across the world and FAO's prominent successes by adopting the same approach for developing rural communities, Sustainable Rural Development Programme (SRAD) focuses on rural development through an integrated approach of value chain.

Rose is one of the target value chains under this SRAD program having concentration in Makkah region with a long history of cultivation in Taif governorate. The rose value chain in SRAD predominantly for rose oil extraction and some other byproducts; the ornamental rose is mostly imported. Rose value chain, having actors at production, aggregation, processing and distribution levels, provides ample opportunity for efficiency improvement at both primary functions as well as support functions' arenas.

The production system is antiquated and marred by the unavailability of quality planting material as well as poor agronomic practices. Harvesting problems due to the exacting harvest requirements, aggregation and transportation in open lorries, processing in fossil fuel heated hydrodistillation methods and limited diversification, all provide room for improvement. Opportunities to improve rose value chain governance also exists. The linkages, both vertical and horizontal, are at mid level of efficiency and needs improvement.

Saudi rose oil finds a good place in the end markets due to its quality attributes and this placement can be further improved through having geographic indications for Taif rose oil. The national markets are primarily in Makkah, Jeddah, Medina and Riyadh with high influx of Hajjis during Hajj season. Globally, the Saudi Rose oil is in competition with Bulgarian and Turkish industry as both utilize the same rose for rose oil extraction.

The Rose value chain development strategy calls for a holistic approach for improving input supplies, production, aggregation, transportation, processing and marketing besides the governance of the value chain which at the moment seems to be dominated by the processors.

Background

Kingdom of Saudi Arabia has a geographical area of about 200 million hectares of which 24.4% is arable land, 2.6 % forest and rainfed grassland, 2.3 % covered by roads and other construction while 70% is semi desert grassland. The agriculture sector contribution to GDP is very meager. The kingdom's populace having high disposable income and mostly dwelling in urban areas demand for high quality fresh and processed food. Since the production and processing of most of these foods is not 100% in the country, the reliance for meeting quality food demands shifts to imports. To bridge this gap private companies, SMEs and microenterprises are trying hard to transform kingdom from a net food importer to an exporter. However, small producers and youth, due to limited agribusiness opportunities, weak community managed institutions, and lack of information about technological upgradations, find it difficult to keep dwelling in the rural areas which leads to rural urban migration.

The value chain approach is one of several market systems approaches to development on sustainable grounds. There are several approaches towards development through value chain with the common fundamental belief that for small rural farmers' economic opportunities are affected by the dynamic systems in which they participate. Positively influencing functions of these systems has the potential to improve employment and income opportunities for the agricultural SMEs. The important aspects for the value chain approach applicable to private sector development include a thorough understanding of end-market dynamics as well as consideration of a business enabling environment. Small holders in the Kingdom face with several constraints associated to agro climatic conditions and traditional non-specialized farming system besides existence of inefficiencies all along the value chain which appreciably reduces the profit margins. Traditional agriculture producers constitute around 88% of the Kingdom's total producers. The development of rural sector thus is dependent on holistic consideration from the efficient management of production resources, processes and systems, technologies, value chain and supporting institutions.

Prime beneficiaries of the FAO SRAD project are small scale rural farmers. Throughout the world it is an established fact that these rural agricultural SMEs are not only about farming; its an all inclusive system based upon a value chain approach. These act as a shock absorber in case of any food supply chain fluctuations as well as keeping the prices at an equilibrium. These rural agriculture SMEs provide a major source of income and employment at rural level; particularly for youth and women. These rural SMEs are part of a larger supply chain including large scale farmers, aggregators, retailers, traders, importers/exporters, processors, government entities, markets, R&D organizations and agricultural cooperatives.

The inefficiencies along the value chain mars their competitiveness at local level which then contributes negatively to the national competitiveness. The inefficiencies, broadly speaking, include reliance on antiquated inputs and production systems, low access to technologies appropriate for small scale farming, lack of innovation, poor infrastructure and service delivery, poor marketing systems, low digitization, scarce skilled human resources. Performance of the agriculture sector, on the whole, through MEWA and its various initiatives is not exclusive of other stake holders including sister government agencies.

Methodology:

The value chain report was compiled mostly based on the secondary data available while the primary data was collected through interaction with primary producers, processors and traders. The existing reports, project document, and various other reports were utilized for gathering the information required. Discussions were held with the FAO Rose component lead to understand the dynamics of rose value chain in the kingdom. A brief visit to Taif was also conducted to witness the producers and processors. Sale points in Taif and Riyadh were visited to assess the sale mechanism and discussions with the ministry of environment, water and agriculture colleagues made to understand the governance.

Existing status of global and KSA markets for rose oil, market opportunities, value chain map, current structure of the value chain and its dynamics with linkages, role of each actor along with the constraints faced at production, aggregation, processing, and distributions tiers as well as inputs and services are included. The enabling environment including both social and environmental environments are narrated. The governance of the rose value chain with power echelons and the sustainability analysis is also presented.

Finally, the value chain development strategy with recommendations based upon the gap analysis and derived from the global best practices is drafted with the objective to overcome the existing constraints, ensure sustainability at various tiers of the value chain for different actors.

Brief history and overview:

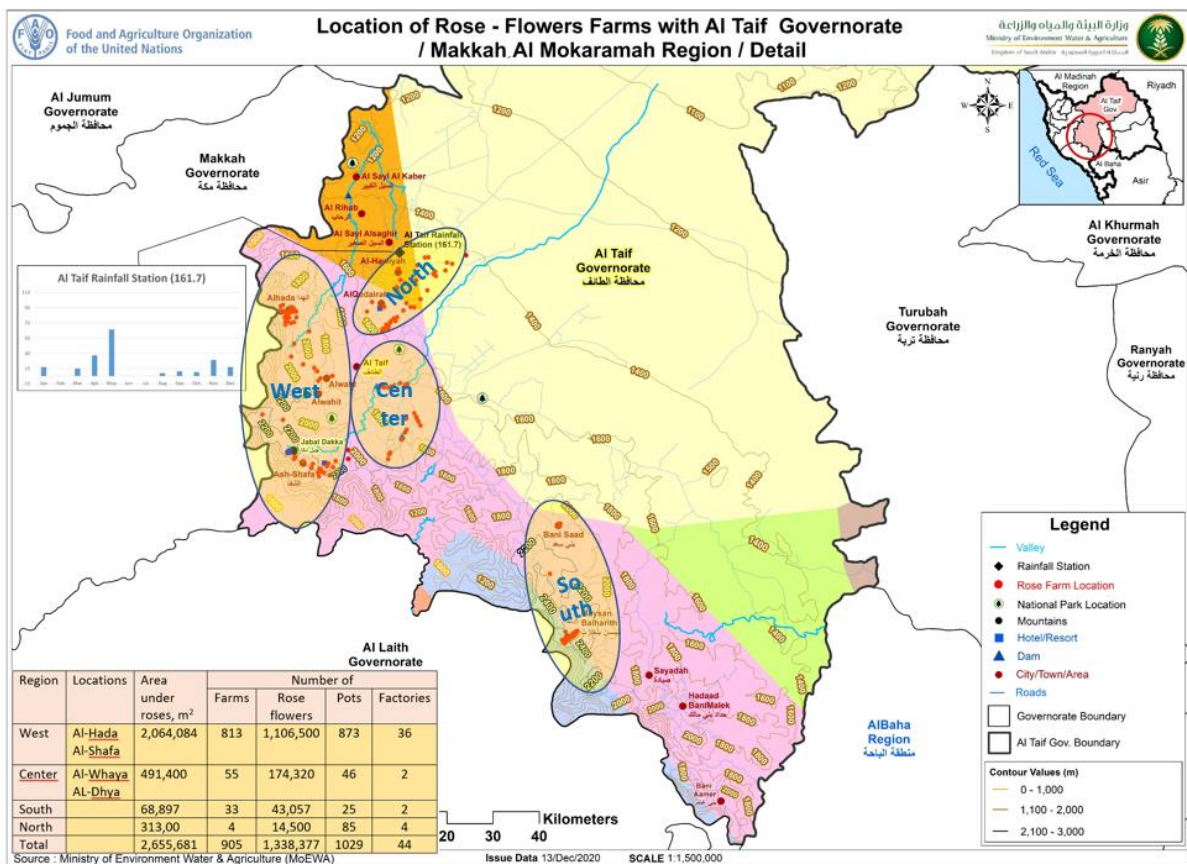
Rose is one of the target value chains in the commodity value chains of FAO SRAD projects. Garden cultivation of roses began some 5,000 years ago, probably in China (gardnery.com). Rose, a woody perennial flowering plant of the genus *Rosa*, falls in the family Rosaceae with over three hundred species and tens of thousands of cultivars.

Globally, rose is cultivated for varying purposes but its aromatic characteristic is most significant. The global rose oil production is traditionally dominated by two countries, Bulgaria and Turkey which also utilize Damascus rose for rose oil extraction. The size of global rose oil market was 4 - 4.5 tons valued at 279 Million USD in 2018 with the annual growth of 6-8% and 297.6 million USD in 2019.

Cultivation of roses in KSA is a centuries old practice, largely pursued in the Taif governorate of Makkah region and is traditionally recognized for making rose oil and perfumery products. Taif, which is a highland has favourable agroclimatic conditions for cultivation of "Arabia's Rose," For three centuries, the oil-rich, 30-petal damask rose (*Rosa x Damascena trigintipetala*) has been cultivated here and processed into precious attar of roses and its popular—and even older—counterpart, rose water

The rose farming has distinct features, and its specialized cultivation is undertaken in the variable altitudes of the mountains (>1200 meters above sea level) in the North, West and South of Taif city, concentrated within a diameter of 50-60 km. Rose farms are concentrated in high lands and some valleys between an altitude of 2500-1400 meters above sea level (mASL), and the areas planted with Taif rose are more than 2.5 million square meters and contain approximately 1.3 million shrubs planted in 905 farms. The regional distribution of rose farming and its processing is illustrated in map below:

The main areas of rose cultivation in Taif governorate.



The rose cultivation in Taif is integrated to its processing for rose oil and related by products such as rose water (archive.aramcoworld.com). Thus rose sector needs to be identified from the cultivation alongwith 72 local processing factories. The word attar, which is today a synonym for rose oil, comes from the Arabic 'itr, meaning "perfume" or "essence." The first description of the distillation of rose petals was written by the ninth-century philosopher al-Kindi, and more sophisticated equipment was described in the 10th century by al-Razi. Later, in the 13th century, rose water was produced widely in Syria, and the name of the oil-bearing rose genus *Damascena* may trace its origins to the city of Damascus. But true attar—rose oil as we know it today—was not produced until the late 16th century, when the double-distillation technique was developed. The primary product is rose oil which is almost entirely used in the domestic market for perfumery industry. This apparently small sector in terms of area cultivated has relatively high potential of employment, and it is estimated that more than 8,000 people are employed in all the supply and value chains of the rose sector.

Some distinctive features of rose sector are:

- 🌸 Rose cultivation is in plantations and has a very small season of flowering March to May every year.
- 🌸 The harvest in rose farming currently has no food function and the producers must rely on other crops or market to meet their consumption needs.
- 🌸 Volatility of the rose oil contained in the flowers making harvesting procedure only manual during short period of time in the morning
- 🌸 It is quality sensitive crop and high losses due to inappropriate picking and during transportation when exposed to high temperature.

- High value of the product with substantial addition at each value chain tier and corresponding price spread from farm to finished product.

Functional Analysis

End markets: Consumption of rose oil around the world reaches up to 4.5 tons per year. The strongest demand comes from the big cosmetic and perfumery companies in Europe and the U.S., while some Middle Eastern countries (Bahrain, Kuwait, Dubai) also purchase large quantities of essential oil. In recent years, a significant growth has been observed in the East Asian market, too.

Rose oil market

Global market

Increasing per capita spending on perfumes and personal care products in developing and emerging economies has led to an increase in demand for aromatic essential oils with added functionality, which is anticipated to drive the global rose oil market in the near future. Europe and Asia Pacific dominate the Rose Oil market followed by North America; in Europe, Bulgaria is the major producer of rose oil and exports around 30% of its total exports to France, which is then followed by United States, Japan, Ireland, and others. While in Asia Pacific, Turkey is the key player operating in the same markets. Traditionally, Bulgaria and Turkey have dominated the world rose oil market. These two countries are followed by France, India and China. Global rose oil market was sized at 4 – 4.5 tons with a value of 279 million USD in 2018, having an annual growth rate of around 6%. (Source: <https://grandviewresearch.com/industry-analysis/rose-oil-market>).

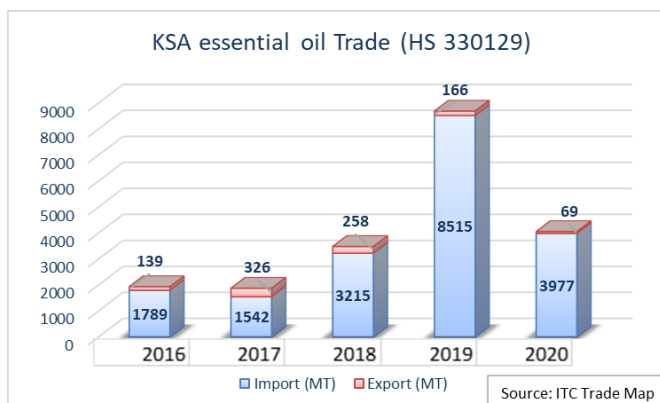
The global rose oil market is primarily segmented into two streams: organic and conventional. Organic fetches the premium owing to the increasing awareness about health on part of the end consumers. Another important segmentation is on the basis of source of rose oil; *Rosa damascene* or *Rosa centifolia*; the former seems to dominate the high-end markets due to its superior strong and long-lasting aroma as well as for its healing properties. Yet another segmentation is based upon the basis of extraction method which is segmented into steam distillation, solvent extraction, and supercritical CO₂ extraction. The old steam distillation dominates the market so far with solvent-solvent and supercritical extraction methods gradually making their way.

KSA market

Taif governorate in Makkah region is the major hub of rose oil production in the Kingdom followed by Madinah and Albaha regions. The entire rose oil comes from *Rosa damascene* which is acclaimed for its better quality and fetches higher prices. Around 400 kg of rose oil is produced annually with an estimated revenue of 54 million SAR (about 15 million USD). The major national market for rose oil is Makkah (Taif being part of Makkah), followed by Madinah. Maximum sale is done at the time of Hajj (Pilgrimage) when millions of pilgrims visit holy cities of Makkah and Madinah. Interestingly, international buyers also come to these two cities to buy rose oil. Being the most important product of Saudi rose and owing to its traditional distillation method, rose oil often fetches prices reaching that of gold. Being a highly precious commodity, rose oil is sold in the market based on grams (locally in

tolas), where a tola¹ generally fetches 1800 to 2500 SARs. The rose oil is available for sale at the local large distilleries' outlets, branded outlets, and high-end markets.

The specific data pertaining to imports and exports of rose oil is not available. However, the essential oils data under HS code 330129 reveals that KSA imports large quantities of essential oils including rose oil. The data eludes that the essential oils imports were gradually increasing till 2019 and then experienced a dip due to COVID19 pandemic. At the same time the documented exports of essential oils almost remained stagnant except during COVID19



when these dropped appreciably. Most of the Saudi Rose Oil gets exported through nontraditional channels particularly during the Hajj (Pilgrimage) when most of the pilgrims buy rose oil and take it back to their countries as gift².

The domestic and international consumers for Saudi Rose Oil are aware of its quality attributes and are willing to pay the premium. The competition, however, exists with the Turkish and Bulgarian oil that finds its way into the Saudi markets but are sold at comparably less price. Some inferior quality rose oil brought into the kingdom from other countries is also mixed with the local rose oil and sold at higher prices in local packaging.

Global and KSA markets for other rose-based products:

Besides rose oil and rose water, there are a number of other products derived from rose in different countries (revenue data not available). Some of these products include:

- 🌸 **Dried flowers:** The dried buds and petals of rose are sold in groceries as flavor and laxative agents. In many countries dried flowers are used as laxative agent and flavoring in foods.
- 🌸 **Rose hips:** Rose hips are the berry like fruits under the petals of flower. They are rich in vitamins, minerals and fatty acids, polyphenols, carotenoids and tannins. The vitamin C content of rose hips juice is higher than citrus fruits.
- 🌸 **Rose concrete:** Rose concrete, a red orange Vaseline mass is extracted by non-polar solvent extraction and is the main material for production of rose absolute.
- 🌸 **Rose absolute:** Rose absolute or the ethanol extract of rose concrete has an orange red liquid with rose aroma.
- 🌸 **Gulkand:** Gulkand is a sweet product made of rose petals and sugar. Rose petals and sugar are placed in layers in a wide mouthed jar for 3-4 weeks with stirring on alternate days. Gulkand is also used as a tonic for reduction of eye inflammation, treatment of acidity, improves appetite and digestions and many other health benefits.
- 🌸 **Jams:** Rose petals macerated and mixed with sugar and/or other products gives an excellent aromatic jam liked by many for consumption.
- 🌸 **Cosmetics and personal care:** Many products like rose soap, rose lotion, rose powder etc are made with better prices.

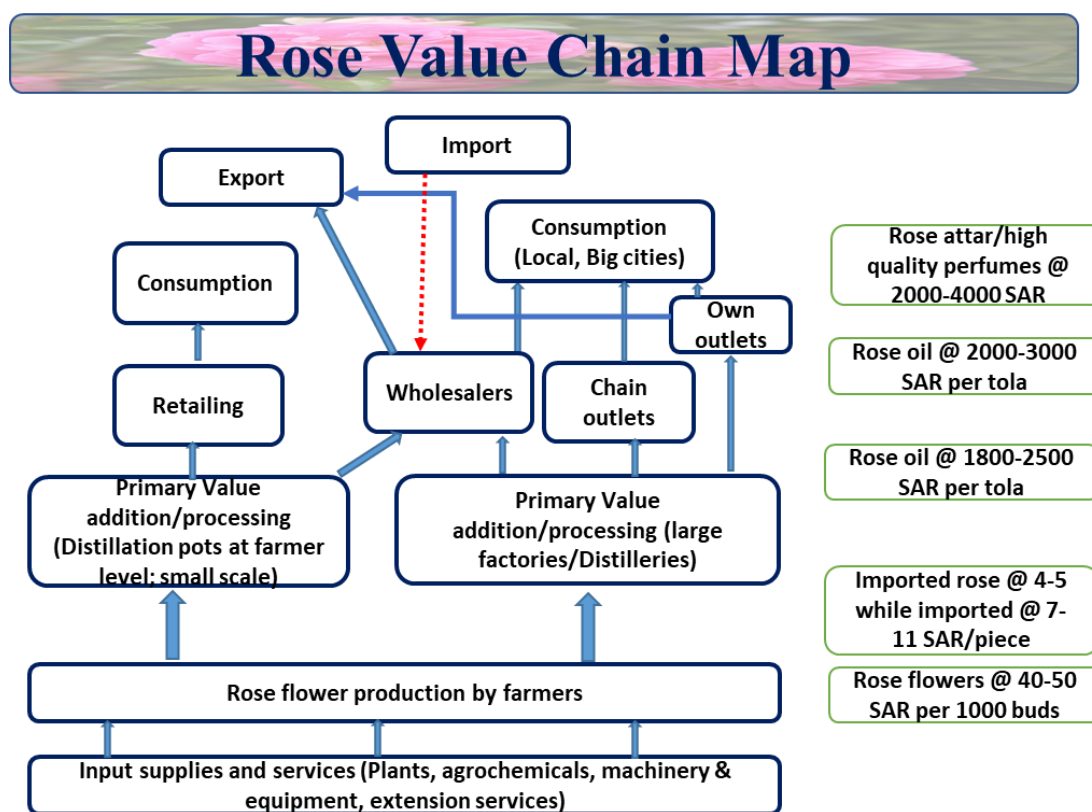
¹ Tola is a local measure of weight; one tola is equivalent to 11.7 grams.

² Data not available specifically for rose oil import and export.

In the kingdom, only a few large processing units are involved in making rose value-added products and that too primarily in the cosmetics and personal care segment. Rest of the options in rose value addition including its use in foods is almost nonexistent. This provides an almost empty room to fill and offers a number of opportunities to processors as well as primary producers to generate additional income and reduce wastage. Another excellent opportunity exists for utilization of rose waste after oil extraction. This waste contains a good quantity of unextracted aromatic compounds and can be utilized as an excellent compost material for indoor ornamentals. Regarding the rose oil itself, the increased buying capacity of Saudi buyers, exposure to international trade and higher living standards as well as growing awareness about quality of the produce, the general trend towards use of rose oil as attar or in perfumes locally is on the rise thus providing ample opportunity for expansion in production, processing and marketing. The production of rose oil, interestingly, remained steady in the last five years (around 400 liters)³ which hardly satisfies the local requirements.

Rose value chain mapping

The rose value chain shows that for rose oil extraction, it starts at input sourcing that are responsible for provision of rose plants, fertilizers, tools, equipment and extension services. These are mostly



located in and near Taif for ease of access to their clients with the similar arrangement in other rose producing regions. The nurseries responsible for provision of quality, true to the type and disease-free stock are limited in number (only 5 such nurseries are officially recognized) and unable to cope with the demand. This results in continued utilization of the same bush (plant) in the field, even beyond its productive life. The agrochemicals are provided by the private sector while on majority of small farms,

³ Discussions with the rose national expert.

the irrigation facilities are provided by the government through ministry of environment, water and agriculture through its subsidies program. The extension services are entirely in the primary production arena and are entirely provided by the extension staff of the ministry. The next segment of the value chain is the primary production. There are two channels at this tier. The farmers producing fresh flowers collect the flowers through labour in the early hours and supply these flowers to the processors @ SAR 40-50 per 1000 buds or farmers having their own distillation pots utilize the harvest for distillation at their own. Aggregators or intermediaries were not observed as the product is sensitive and needs to reach processing immediately after harvest to avoid quality losses. Similarly, almost all of the processors having backward linkages with the rose farmers for supply of fresh rose flowers, also have their own plantations. Thus, making primary production and processing tiers intermingling with each other. The small distilleries with farmer producers have forward linkages with either retailers or with the wholesalers. While the large distilleries have wholesalers, chain outlets or their own branded outlets for rose oil. At the processor level, average sale price per tola of rose oil is around 1800 to 2500 SAR while at next tier of value chain it attains a further increase to 2000 to 3000 SAR. The final consumer from both the channels pays around 3000 to 4000 SAR per tola. The import channel is not well documented though but some of the processors hinted on it that inferior rose oil from some other countries is imported and repacked and sold in KSA as a Saudi product.

Core actors of Rose Value Chain

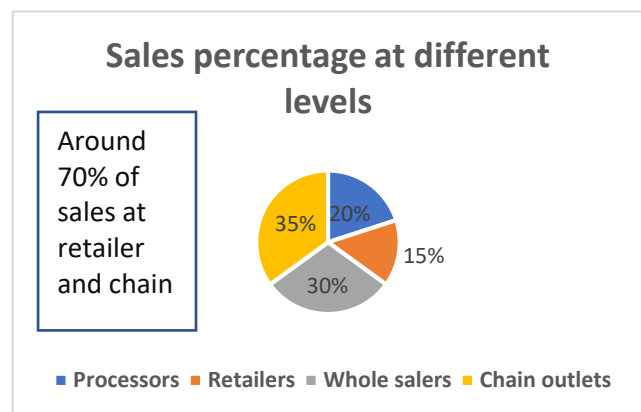
The core actors of the rose value chain include primary producers, processors, and distributors. Below is a brief account of various value chain actors and their functions, challenges they are facing within their functional areas:

a. Core value chain actors:

- i) Primary producers: These are the most important actors in the value chain and have the responsibility to produce rose flowers for rose oil extraction at processing level. There are 905 rose farms of varying size in the governorate with 602 farms (43.5%) of less than 5000 m² area, 148 farms between 5000 to 10,000 m² and 158 farms above 10,000 m² area. This clearly reflects that majority of farms are small in nature. One peculiar characteristic of primary producers in the rose value chain of Saudi Arabia is that quite a few primary producers are small processors as well. In this context, production and processing tiers of the value chain intermingles with each other. Value chain actors at this level have backward linkages with the input suppliers and forward linkages with the processors (if not processing themselves). The actors are confronted with limited supply of quality planting material that not only hampers horizontal expansion of their production business but also affects rejuvenation of their existing plantations. The primary producers also face difficulties in proper crop management particularly during the warm season at the time of flowering and harvesting. The scarcity of water compels the producers to buy water tanks to irrigate their plantations. This erodes their profitability. Very few farmers are using organic matter to improve soil water holding capacity, soil texture and sequestering ability. Proper disease diagnostics via ITC technology are not practices. Yet another important handicap at this level is the unavailability of required labor force at the time of harvest. Rose flower has exacting harvesting requirements and should be harvested before the day temperature rises. Higher temperatures result in loss of precious volatile aromatic compounds. Many a farmer are unable to harvest crop at optimum level of physiological

maturity due to unavailability of labor at required time. No labor pooling at the peak harvest period that lasts from 6-8 weeks is observed.

- ii. Aggregators/transporters: Primary producers are playing the role of aggregators and transporters. They are responsible for harvesting the crop and get it transported to the processing units using their own transport. This is usually done in jute bags sprinkled with water to keep the harvest moist but are transported in open lorries without any temperature control. This poses a loss to the quality of rose as aromatic compounds have low boiling point and are sensitive to higher temperatures. There is no common place for harvest aggregation and then its auction. Primary producers themselves are responsible for getting the produce transported to the processing sites. The concept of aggregation is non existing. No cold chain is maintained at this stage. This leads to erosion of bargaining capacity of farmers for this highly perishable commodity. The farmers have to take their produce by themselves to the factories and sell at the offered price. Of late, owing to Corona pandemic, some of the factory owners have refused to buy the produce resulting in losses to farmers.
- iii. Processors: The rose value chain in the Kingdom for rose oil extraction has 72 rose oil processing units (locally called rose factories) mostly concentrated in Taif. As is the case with the primary producers, almost all of the processors have their own primary production plantations besides backward linkages with the rose farmers for supply of rose flowers for processing. The rose processors usually have a verbal arrangement with their supplying farmers to buy their produce. Upon receiving the produce (which is transported by the primary producers), the processors check the produce for good quality. The processors at the front end are linked with chain outlets, big stores in the kingdom, and in case of large processors with the export markets. Most of the processors from mid to large size have their own outlets at the processing sites as well as in the nearby big cities. The processing, itself is done through antiquated but traditional hydrodistillation method which is prevalent throughout the industry. The method has many inefficiencies in terms of oil extraction, maintaining the quality, avoiding losses and is not environment friendly as it uses fossil fuel to generate heat for water boiling. Only a very few processors are making other value added products from rose like rose soap, lotion and personal care products. Although the quality standards for Taif rose oil were identified by University of Taif under its rose chair but these standards need to be registered with and vetted by Saudi Arabian Standards Organization (SASO) to thwart away the danger of adulteration.
- iv. Distributors: The rose oil distribution in the country is mostly done either by the processors themselves through their own outlet at processing sites or in big cities or through retailers spread across the country. The export distribution is two pronged; mostly the pilgrims take rose oil with them to their countries in smaller quantities or the overseas importers place order suppliers or large traders. Large traders have their linkages with processors (both small and large) at back end and with the export destinations at forward end. Some of the issues faced by the actors in this tier include storage issues, fluctuation in prices and interruptions in supplies. Recent covid19 pandemic badly affected these



distributors particularly the traders. An undocumented channel for import of rose oil from other countries to KSA and its distribution in the name of KSA rose oil also poses problem.

b. Enabling environment actors:

- i. Institutions: Amongst the institutions, MoEWA directorates related to agricultural production, protection, research and extension services holds the most important function of regulating rose sector through policies, interventions like subsidies and services to the producers and other players of production and processing chain. Other government offices like Munsha'at (Saudi Small and Medium Enterprises General Authority), Saudi Food and Drug Authority (SFDA), Agricultural Development Fund, Ministry of Commerce, etc are there to provide the policy guidelines and enabling environment.
- ii. Producer associations and cooperatives are potential stakeholders in providing forward and backward linkage to rose farming as well as in supply of market, input and other support services. Only a few such societies exist in rose sector.
- iii. Academic centers and research institutions: The public sector university in Taif is the main hub for conducting research on roses with other research institutions like King Abdullah University Riyadh, Ummul Qura University Makkah and the MoEWA wing of research are the major actors.

Extended Value Chain

The extended value chain of rose in KSA includes input supplies, extension services and financial services.

- i. Input suppliers: The input suppliers reside at the start of this value chain with the function to provide necessary inputs for the primary producers. They are mostly located in and around the major production areas, mostly in major cities. The major hub for rose production is Taif where only 05 nurseries are recognized by the ministry for provision of quality planting material to the farmers. This poses a major challenge at their forward linkage as the farmers can not have enough quality plants in time to expand and renew their plantations for continued commercial production. Other inputs like fertilizers and pesticides as well as farm implements are also provided by these input suppliers. The drip irrigation systems are provided by the government under its subsidies program to the small producers for increasing water use efficiency and improve judicious use of water in agriculture sector.
- ii. Extension service providers: Extension services are provided by the government sector through its ministry of environment, water and agriculture to the primary producers under its agricultural extension wing and are essentially free of cost. A major challenge for the government extension service providers is that their training and focus remains entirely focused on primary production related matters without getting into the domain of agribusiness, marketing, processing or developing linkages. Some large factories and cooperatives have recently started providing extension services to their back-end farmers on a limited scale.
- iii. Financial service providers: The government of KSA under its vision 2030 program is providing huge subsidies to the tune of 92 billion SAR to the agriculture sector. Besides this subsidies program, a number of institutions exist to support farmers in expanding and/or establishing their agribusiness activities. These institutions include Agriculture Development Fund (ADF), being a part of MoEWA is entrusted with the responsibility to provide easy loans to the farmers as per their crop requirements. These loans are interest free with an upper limit of around three hundred thousand SAR. To get a loan, an agripreneur needs to submit a bankable business plan clearly

mentioning business model, activities, resources required/existing, financial projections. The ADF, however, does not have access to majority of rural small farmers. Another supporting agency is the Saudi Arabian Agricultural Bank (SAAB), which disburses subsidies and grants interest-free loans through bankable proposals. Yet another organization with the name of Munshaa't (Small and Medium Enterprises Development Authority) is supporting SMEs in establishing and expanding their businesses including agribusinesses. Munshaa't is mostly focused on capacity building and feasibility development for agribusiness activities. The latest development during February 16, 2021 came when the establishment of SME bank was granted by his royal majesty to support SMEs. The SMEs Bank brings together all financing solutions under one umbrella to enable the small and medium enterprises sector to access appropriate financing and achieve stability and growth. However, all these kind of fund services can't serve 80% of the farmers because of the documentation required for getting the fund. Munshaa't is supporting farmers to prepare these feasibilities and required documentations for getting loans from these financial institutions.

- iv. Business Development Services: In most of the instances, the rural agricultural landscape relies on traditional knowledge and experience in crop husbandry, input sourcing, marketing etc. The rose sector provides a clear example as the cultivation of roses is being carried out in the same manner for centuries. Similarly, the rose oil extraction by water distillation is also an old technique. The business flow and other progress dynamics, though have quite a bigger room to improve, still relies on the traditional practices. Farm management for larger farms is done by expat labour. The extension wing of MoEWA, though, provides basic extension services. But that too is limited to the primary production tier and does not go beyond to post harvest management, processing and marketing. Some, large factories and cooperatives have recently started providing extension services to the farmers at a limited scale. Reliance on traditional practices, antiquated processing techniques etc are some of the limiting factors in the rose value chain.

Business Enabling Environment

Enabling Business Environments are defined as sets of policies, institutions, support services and other conditions that collectively improve or create a general business setting where enterprises and business activities can start, develop and thrive. A positive enabling environment for agricultural growth is interpreted to comprise a multifaceted setting for the agricultural sector and economy through non-distorting and stable policies, adequate provision of public goods, good governance through laws and regulations that are conducive to private-sector economic activity while addressing market failures, and strong and effective institutions through which government measures and actions are operationalized for maximizing the output.

Business enabling environment is broadly categorized into two sub segments:

- a. Social Enabling Environment:

- i. Government support: The government of the kingdom is keen to develop its agriculture sector through a number of measures. Under its vision 2030 program, one of the important objectives is to diversify its non oil economy including agriculture. Besides providing all other extension services, the government announced a huge agriculture subsidies program to the tune of 92 billion SARs through MoEWA to achieve its 16 strategic goals in line with the vision 2030. At policy level, government has shown its will and interest to boost agriculture sector through innovation, technological developments, digitization and technical assistance to the farmers. Rose sector can benefit through this program. At the

moment farmers get a subsidy of 7 SARs for producing 1000 rose flowers and 9 SARs for planting (and making it to maturity) every new rose bush.

- ii. Quality standards: The quality standards for Taif rose oil were identified by University of Taif but these need to be registered and certified by the relevant government organization which is Saudi Arabian Standards Organization (SASO). This will pave way for international certification by International Standards Organization. This will further help in brand recognition through a number of ways including geographical identification to get better returns and also control adulteration.
- iii. Taxes and Tax management: The government of the kingdom has not levied any direct taxes on the farmers. However, during the last decade value added tax was levied on the inputs and other resources used in the farming.
- iv. Infrastructure: Almost all of the processors are using the antiquated and traditional rose oil extraction system of hydro distillation where both oil extraction quantity and at times quality also is not 100 percent. Other methods of extraction including supercritical extraction or microwave aided extraction has proven more efficient. At the same time, quality of extracted rose oil gets maintained only for 02 years if it is kept in dark, dry and airtight conditions.
- v. Market access: At both tiers of production and processing, there exist well established channels for marketing of the produce. For example, farmers either directly sell their produce to aggregators or large suppliers, or sell it to distilleries. Local direct selling to the consumer is very rare. The processors at the same time, either sell their processed produce to the large factories or to chain outlets or other perfumeries. The large factories and suppliers in turn have links with export markets as well as branded outlets. For export purpose, the import laws of the destination countries have to be followed.
- vi. Research and Development: At the moment some of the universities are conducting R&D activities in the rose sector. These include Taif University that has a dedicated rose chair for the purpose. The other organizations are Umul Qura University Makkah, King Saud University Riyadh and King Abdul Aziz University Riyadh. Some of the private entities like Abdul Samad Al Qurashi are also conducting R&D activities at their own level.
- vii. Human Resource Development: The farmers and processors are utilizing their own indigenous knowledge for production of roses and their processing respectively. Unfortunately, very meager activities exist for capacity building of farmers at the processing and marketing level. Of late, MoEWA in collaboration with FAO has initiated activities to bring capacities of various stake holders at various tiers of the target value chains including rose.
- viii. Gender roles: Rose farms that are situated away from the residential areas, have very limited or no women access primarily emanating out of cultural sensitivities. However, a very few rose farms that are located near to houses have limited involvement of women at the primary production level activities. The rose farms are managed by men with hired labour. Similarly, at the processing level, trading level or further value addition level, role of women remains invisible. However, at the consumer level of value chain, the role of women is dominating and easily observed at the retail stores or mega malls. The preceding years have witnessed several laws that are encouraging women to participate (and in some cases, surpass) in the economic activities in many new arenas.
World Economic Forum carries out analysis of its member countries to ascertain gender gaps since year 2006. The gender gap is the difference between women and men as reflected in social, political, intellectual, cultural, or economic attainments or attitudes. The Global Gender Gap Index is an index designed to measure gender equality, while measuring this gap in four key areas:

- Economic participation and opportunity – outcomes on salaries, participation levels and access to high-skilled employment.
- Educational attainment – outcomes on access to basic and higher level education
- Political empowerment – outcomes on representation in decision-making structures
- Health and survival – outcomes on life expectancy and sex ratio.

The Global Gender Gap Report was first published in 2006 by the World Economic Forum. The 2020 report (published in 2019) covers 153 member countries. The report has placed KSA at 146th position with a gender gap index of 0.5990.

Table-10: Saudi Arabia – Global Gender Gap Index		
<small>(Source: https://countryeconomy.com/demography/global-gender-gap-index/saudi-arabia)</small>		
Year	Global Gender Gap Ranking	Global Gender Gap Index
2020	146	0.5990
2018	141	0.5900
2017	138	0.5840
2016	141	0.5829
2015	134	0.605

Table-11: Global Gender Gap Index Score						
Country	2015	2016	2017	2018	2020	Rank 2020
Iceland	0.881	0.874	0.878	0.858	0.877	1
Norway	0.85	0.842	0.83	0.835	0.842	2
Finland	0.85	0.845	0.823	0.821	0.832	3
Sweden	0.823	0.815	0.816	0.822	0.82	4
Nicaragua	0.776	0.78	0.814	0.809	0.804	5
UAE	0.646	0.639	0.649	0.642	0.655	120
Kuwait	0.646	0.624	0.679	0.63	0.65	122
Saudi Arabia	0.605	0.583	0.584	0.59	0.599	146

Source: Global Gender Gap Report, 2020. World Economic Forum







- ix. Organization and Cooperation: Saudi General Authority for Statistics in its 2018 report mentioned that the agriculture sector in the Kingdom contributes 5.2% to the Gross Domestic Product (GDP), with a total of 52 billion Saudi Riyals. As such, under vision 2030, the Kingdom attaches great importance to its agriculture and its share towards food security. Encouraging small rural farmers to act collectively to overcome problems accrued due to small scale is seen as one of the most viable strategies for addressing constraints. Global learnings indicate that co-operatives are among the institutional arrangements that can help small farmers improve productivity as well as enhance options for marketing their produce. Cooperatives have the ability to help small farmers to survive

when the markets are highly competitive and fluctuating. They assist farmers when the transaction costs are high. They also facilitate the farmers fetching the highest prices by selling their produce collectively while meeting the high demands.

As per Saudi Gazette notification 544098, a total of 233 cooperative societies affiliated to the Ministry of Labor and Social Development are operating in various parts of the Kingdom, in seven categories: agricultural, multipurpose, consumer, vocational, marketing, services and fishermen. The agricultural cooperative provides the citizens with agricultural products, reclaim land, dig wells, establishes poultry farms, distributes agricultural machinery and markets the produce of farmers. (Source: <https://saudigazette.com.sa/article/544098>).

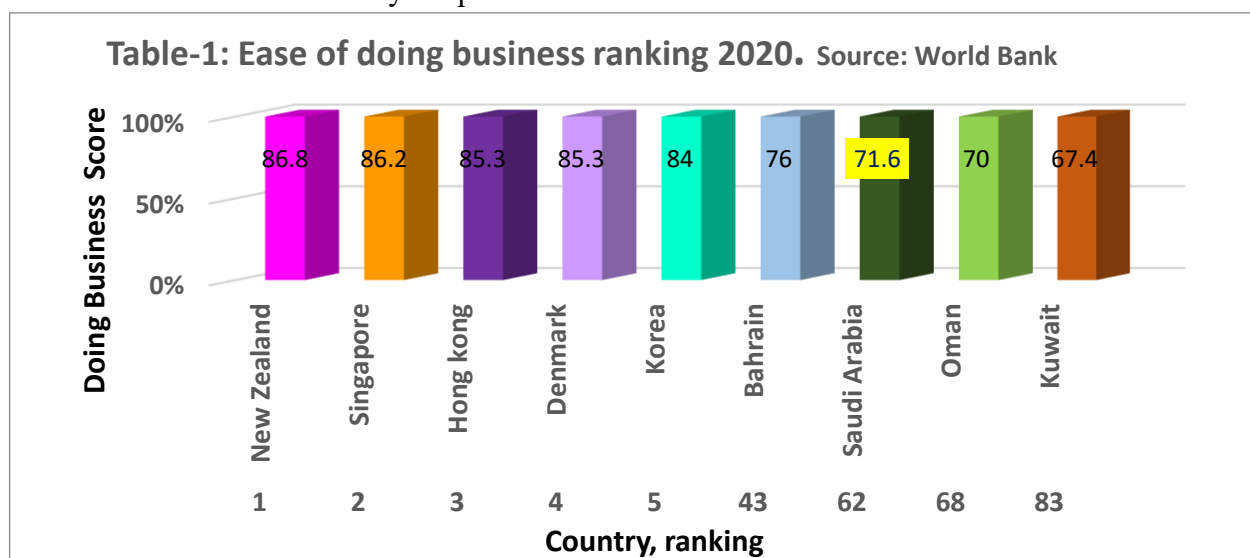
In the rose sector, two cooperatives exist in the Taif area, namely Taif Rose Cooperatives Society, and Taif Agricultural Cooperative Society; both registered with the country Cooperatives Societies Council which itself was established on 17th March, 2008 and got its full affiliation with International Cooperative Alliance on 28th January, 2016. The associations are in the nascent stage and requires formalization and maturity to support primary producing farmers. The most important role of these cooperatives is seen as provision of quality inputs at lower prices as well as resolve the issue of labour shortage during peak harvest periods of rose. The big processing units does not seem to have any interest in these cooperatives. However; one of the cooperatives is planning to establish its own rose oil extraction factory with the help of government.

In a nutshell, cooperatives in the rose sector can play a critical role in improving the entire sector and particularly benefitting small farmers including but not limited to the following:

-  Horizontal and vertical expansion of rose production
-  Increase crop productivity through supporting members in their capacity building in crop husbandry
-  Improve marketing by accessing different markets and reducing marketing costs
-  Support implementation of quality standards of Taif Rose
-  Support the sector in attaining geographical indications
-  Support product diversification from a few products to many products and include other aromatic plants in the chain (Jasmine and lavender are good candidates)

- x. Ease of Doing Business: The strength of the business environment scored on the basis of an economy's performance in each of the 10 areas included in the ease of doing business ranking. The ease of doing business score serves as the basis for ranking economies on their business environment: the ranking is obtained by sorting the economies by their scores. The ease of doing business score shows an economy's absolute position relative to the best regulatory performance, whereas the ease of doing business ranking is an

indication of an economy's position relative to that of other economies.



Under Saudi Vision 2030, Saudi Arabia reached to the top of the 10 economies that improved the most on the front of Ease of Doing Business after implementing regulatory reforms. These economies implemented a total of 59 regulatory reforms in 2018/19 accounting for one-fifth of all the reforms recorded worldwide. The efforts for improving Ease of Doing Business by Saudi Arabia focused primarily on the areas of starting a business, dealing with construction permits, getting electricity, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts and resolving insolvency.

Table-2: Top 10 world economies improving the most across three or more areas measured by Doing Business in 2018-19

Economy	Rank	Change in Doing Business Score	Reforms that made it easy to do business									
			Starting a business	Dealing with construction permits	Getting electricity	Registering property	Getting credit	Protecting minority investors	Paying taxes	Trading across borders	Enforcing contracts	Resolving insolvency
Saudi Arabia	62	7.7	✓	✓	✓	x	✓	✓	✓	✓	✓	✓
Jordan	75	7.6	x	x	x	x	✓	x	✓	x	x	✓
Togo	97	7.0	✓	✓	✓	✓	✓	x	x	x	x	x
Bahrain	43	5.9	✓	x	✓	✓	✓	✓	✓	✓	✓	✓
Tajikistan	106	5.7	✓	x	x	x	✓	x	x	✓	x	x
Pakistan	108	5.6	✓	✓	✓	✓	x	x	✓	✓	x	x
Kuwait	83	4.7	✓	✓	✓	✓	✓	✓	x	✓	x	x
China	31	4.0	✓	✓	✓	x	x	✓	✓	✓	✓	✓
India	63	3.5	✓	✓	x	x	x	x	x	✓	x	✓
Nigeria	131	3.4	✓	✓	✓	✓	x	x	x	✓	✓	x

Source: Doing Business 2020, World Bank.

Saudi Arabia improved further by two positions on world competitiveness ranking 2020, reaching 24th, globally. Saudi Arabia is trying to diversify its economy: the non-oil sector is expected to expand further in the years to come, and further public and private investments outside the mineral sector will be deployed over the next few years. The determination of Saudi Arabia to initiate a process towards structural transformation of its economy is mostly visible in terms of ICT adoption. Underpinning this result is the rapid deployment of broadband technology (subscriptions to broadband internet have increased from 90 to 111 per 100 people) and a significant increase in internet users (+18.4%). At the same time, innovation capability is gradually improving (+3.2). In the recently-released World Competitiveness Yearbook 2020 published by the International

Institute for Management Development (IMD), the Kingdom is ranked as the 24th most competitive economy among the 63 countries covered by the report, up two positions from a year earlier. The major parameters for assessing this competitiveness included Government Efficiency, Business Efficiency and infrastructure. This year, the Kingdom is the only improving country in the GCC and in the Middle East region. It is also the 8th most competitive G20 economy, ahead of peers, such as Russia, France, Japan, Italy, India, Argentina, Indonesia, Mexico, Brazil, and Turkey. The Kingdom has moved up the ranking on 3 out of 4 factors covered by the benchmark: from 30th to 20th position in economic performance; from 25th to 19th in business efficiency; and from 38th to 36th in infrastructure.

Table-3: IMD World Competitiveness ranking 2020; One-year change
Source: World Competitiveness Year Book 2020, International Institute for Management Development

2020 Rank	Country	2019 Rank	Change	+ive or -ive	2020 Rank	Country	2019 Rank	Change	+ive or -ive
1	Singapore	1	0	Negative	14	Qatar	10	-4	Negative
2	Denmark	8	6	Positive	15	Luxemberg	12	-3	Negative
3	Switzerland	4	1	Positive	16	Austria	19	3	Positive
4	Netherlands	6	2	Positive	17	Germany	17	0	Negative
5	Hong Kong	2	-3	Negative	18	Australia	18	0	Negative
6	Sweden	9	3	Positive	19	U.K.	23	4	Positive
7	Norway	11	4	Positive	20	China (ML)	14	-6	Negative
8	Canada	13	5	Positive	21	Iceland	20	-1	Negative
9	UAE	5	-4	Negative	22	New Zealand	21	-1	Negative
10	USA	3	-7	Negative	23	Korea	28	5	Positive
11	China (T)	16	5	Positive	24	Saudi Arabia	26	2	Positive
12	Ireland	7	-5	Negative	25	Belgium	27	2	Positive
13	Finland	15	2						

b. Environmental Enabling Environment:

The rose cultivation for oil extraction is predominantly in the governorate of Taif in Makkah region. The governorate of Taif is characterized by a clear contrast in the terrain, as it is located on the heights of the Sarawat Mountains in the western and southern directions (1700 - 2500 meters above sea level) and extending in the direction of the Najd plateau to the east (1600-1400 meters above sea level) and some low valleys to the north (less than 1400 meters above the sea level) with a moderate climate for most of the year. The agroclimatic conditions are congenial for the growth and production of Rosa damascene. The harvest of rose is generally spread over 6-8 weeks period, generally starting in April and ending in May, depending on the elevation.

Generally, water is the most precious input for all crop commodities in the kingdom with rose included. Although the drip irrigation systems are installed but with the growing temperatures and owing to increased evapotranspiration in April and May, the water requirements for the plants get high. The available water is not enough, and the farmers are constrained to buy water tankers to avoid crop damage. In case of non-availability of water, the productivity gets adversely affected resulting in economic losses. Besides this, if the drought continues over

longer periods of time, the plants may also get damaged. This scarcity of water in general is eroding profitability of the primary producers. Many farmers who wish to expand their farm area are hesitant as the water scarcity poses a major threat to the new plantations.

Rose Value Chain Governance

As with other value chains, rose value chain in the KSA has varying roles of its actors at different tiers with varying degree of controls within the value chain with relevant responsibilities. The legislature is responsible for devising policies for sector development and improving competitiveness while MoEWA ensures compliance with the rules by all the value chain actors.

Looking at different tools employed for rose value chain governance, we find that:

- Verbal contractual agreements exist between producers and processors as well as processors and traders.
- The standards for products and processes, although identified still needs vetting by the regulatory authorities.
- The self-regulatory systems exists between primary producers and processors as well as processors and traders that defines quality of primary produce for utilization at the processing level as well as the final product with established (though not well documented) parameters.
- Government regulatory framework is placed, and compliance ensured by ministry.

Although proper geographical identity of the Taif rose, endorsed by the Intellectual Property Organization (IPO) is yet to be achieved, the Taif rose, itself has evolved as a brand having specific quality attributes.

The horizontal linkages exist at primary producers' tier as well as processors tier (albeit both are intermingling at times). The farmers, through cooperatives and other informal ways have devised their business linkages that often also engulf information exchange; same is the case with the processors.

For vertical linkages, (again intermingling at production and processing level), the linkages are well established as the processors have their dedicated farmers who would sell specific processors or have the first right of rejection. Similarly, processors also have well established forward linkages with the retailers, traders, whole sellers and other outlets.

Owing to the highly perishable nature of the primary produce and the extremely narrow window of primary production, the most powerful role is played by the processors. They are the ones to determine the prices for their suppliers at backward linkages. The primary producers have to sell their produce in good quality while avoiding deterioration at the price set by the processors. A halt in the harvest for even one week can cause detrimental losses to their income. This was witnessed during the COVID19 situation when the buying markets for rose oil shrank appreciably due to restriction on movements, the processors refused to buy bulk of the primary produce as the forward markets for the processors were not conducive. The farmers had to sell their produce at lot lower prices. The processors however, absorbed the shock by either reducing their production volumes and/or by purchasing the input (flowers) from the primary producers at a lot lower rate. The processors, owing to their multiple roles in production, processing and sales hold the key position in the rose value chain.

Economic and financial sustainability

This section of the report narrates the profitability of three major actors in the value chain i.e. farmers, processors and traders. For the sake of simplicity data pertaining to the average small farmer, average small processor and average trader are utilized.

Primary Production (Farmer):

Although there are huge variations in the land holding of rose farmers, an average farmer with a land holding of 6 dunums⁴ is considered here; below this landholding, the production is not feasible in any case. Even at this level, the farmers are using other sources of income to supplement their income from rose farming as the total profit comes out from 6 dunums of land having 600 plants per dunum and a production of around 350 flower per plant per year, to be merely 43,000 SAR which is around 3,583.33 SAR per month; quite below the subsistence level. This is despite the fact that the government extends heavy subsidies to farmers for planting (a subsidy of 11 SAR per plant to plant and raise it to maturity), flowers produced (3.5 SAR per kg of flower) as well as on the drip irrigation systems (50% subsidy over the total cost).

The primary producer has very low bargaining power as he has to sell the perishable produce to the processor as early as possible; otherwise, desiccation and loss of volatiles add to losses. Under the present scheme of business, the production does not seem to be viable over longer periods of times if the subsidies are withdrawn. However, increasing farm size and inclusion of other crops as intercrops and integration with agritourism may add to the financial sustainability of this segment. Another way of increasing income is to add the processing facilities alongwith the primary production. This system is in fact being practiced by many farmers who have enough produce of their own to enter the processing segment.

Below table gives a gist of the major costs associated with the primary production and the sales proceeds. It is observed that the major chunk of variable costs is incurred on the labour which is around 65% of the total variable costs.

Rose farm cost economics for 6 dunums having 600 plants per dunum						
Variable Costs						
Inputs	Price	Unit	Quantity		Total	
Plants ⁵	SAR 0.37	Nos	2400	=	SAR	880.00
Fertilizers	SAR 4,800.00	Lump sum	1	=	SAR	4,800.00
Water	SAR 8,000.00	Lump sum.	1	=	SAR	8,000.00
Pesticides	SAR 1,800.00	Lump sum	1	=	SAR	1,800.00
Farm machinery	SAR 500.00	Lump sum	1	=	SAR	500.00
Total input Costs						SAR 15,980.00
Labor activities	Price	Unit	Quantity		Total	
Regular labour ⁶	SAR 900.00	per year	36	=	SAR	32,400.00
Pruning	SAR 300.00	per season	6	=	SAR	1,800.00
Harvesting	SAR 200.00	per season	4	=	SAR	800.00
Total Labor Costs						SAR 35,000.00
Others	Price	Unit	Quantity		Total	
Electricity	SAR 50.00	per	12	=	SAR	600.00
Total production Costs						SAR 600.00
Marketing Costs	Price	Unit	Quantity		Total	
Bags for harvest	SAR 4.00	Nos	5	=	SAR	20.00
Transportation ⁷	SAR 50.00	Nos	40	=	SAR	2,000.00
Total marketing Costs						SAR 2,020.00
Total Variable Costs						SAR 53,600.00
Fixed Costs						
Items	Price	Unit	Lifespan		Total	
Land lease cost	SAR 2,500.00	1	1	=	SAR	2,500.00
Total Fixed Costs						SAR 2,500.00

⁴ One dunum is 1000 square meter; 10 dunums constitute one hectare.

⁵ 600 plants per dunum, life of plant is 30 years, subsidy per plant is 11 SAR; factored in here.

⁶ Permanent labour stays the whole year.

⁷ Daily harvesting and transportation for 40 days

Total of All Costs				SAR	56,100.00
Flowers' utilization⁸	Quantity	Unit	Weight		
Total produced	1260000	Nos	4200		
Buds wasted	31500	Nos	105		
Buds sold	1228500	Nos	4095		
Income	SalePrice	Quantity		Total	
Flowers	20.00	4095	=	SAR	81,900.00
Subsidy on Irrigation System	2,500.00	1		SAR	2,500.00
Subsidy on flowers produced	3.50	4200		SAR	14,700.00
Gross Income				SAR	99,100.00
Income over Variable Costs				SAR	45,500.00
Income over All Costs				Net Profit	SAR 43,000.00

Rose oil Processors:

Cost economics of average Rose Processor (10 pots facility)						
Variable Costs						
Inputs	Price (SAR)	Unit	Qty		Total (SAR)	
Flowers procured	20.00	Kgs	2401	=		48,020.00
Heating cost ⁹	16.00	Cylinders	705	=		11,280.00
Water	400.00	Tanker	10	=		4,000.00
Pots ¹⁰	300.00	Nos	10	=		3,000.00
Electricity cost	300.00	Lumpsum	12	=		3,600.00
Total input Costs						
Labor activities	Price (SAR)	Unit	Qty		Total (SAR)	
Skilled labour	1,500.00	per season	36	=		54,000.00
Semi skilled labour	1,200.00	per season	6	=		7,200.00
Total Labor Costs						
Others	Price (SAR)	Unit	Qty		Total(SAR)	
Water for cleaning	400.00	Tanker	10	=		4,000.00
Food cost for labour ¹¹	70.00	Day	282	=		9,740.00
Total production Costs						
Marketing Costs	Price (SAR)	Unit	Qty		Total (SAR)	
Packaging	10.00	No	480	=		4,800.00
Packing	900.00	No	12	=		10,800.00
Labeling	2.00	No	480	=		960.00
Transportation	600.00	Trips	5	=		3,000.00
Other promotions	10,000.00	Season	1	=		10,000.00
Total marketing Costs						29,560.00
Total Variable Costs						184,400.00
Fixed Cost Items	Price	Lifespan	Unit			
Land lease cost	600000	1	20	Year		30,000.00
Fixtures	60000	1	10	Year		6,000.00

⁸ Approximately 300 flowers weigh 01 kg.

⁹ 15 Gas cylinders per day for 47 days

¹⁰ Cost of one pot is 6000 SAR with a life span of 20 years; calculated per year here

¹¹ Includes 3 skilled, 2 semi skilled labour and 01 supervisor

Winchister	2000	1	5	Year	400.00
Total Fixed Costs					
Total of All Costs					
Rose Oil Production	Qty			Unit	
Total oil produced	480			Tolas	
Oil wasted	28.8			Tolas	
Oil sold	451.2			Tolas	
Income	Sales Price	Qty	Unit		
Rose oil sales	800.00	451.2	Year	360,960	
Rose water sales	15.00	1000	Year	15,000	
Gross Income					
Income over Variable Costs					191,560.00
Income over All Costs					Net Profit
					155,160

This is a kind of mix tier as at times primary producers are also acting as processors while the large processors also possess their own rose farms besides sourcing from the farmers. An average processor in KSA has around 10 pots for rose oil extraction (excluding a few big processors who has above 100 pots). Looking at the costs of production, the major chunk goes to input costs (37%) followed by labour costs (33%) of the total variable cost. The net profit per annum is around 155,160 SAR (12,930 SAR per month). This can be further increased by increasing production capacity as the labour chargers will remain almost the same for 20 pots facility). The processors have the major say in the rose value chain as they are the decision makers and power brokers. During the covi-19, processors refused to buy farmers produce resulting in losses and drop in the procurement price for fresh flowers.

Rose oil Traders:

Varying size of traders exist in the rose value chain, however, here, an average rose oil trader with trading of around 3000 ml of rose oil is considered for analysis. The overall profit of an average trader is calculated to be around 742,500 per annum (61,875 SAR per month). The traders are less prone to market fluctuations and get the biggest chunk of profits.

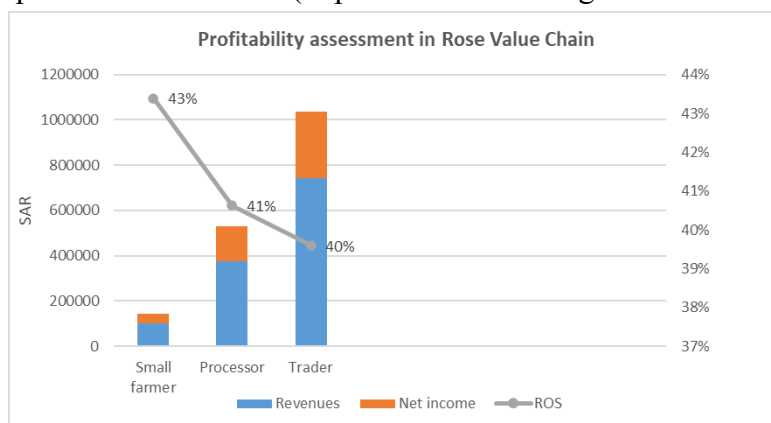
Economic analysis for average rose trader (trading 3000 ml per year)						
Variable Costs						
Inputs		Price (SAR)	Unit	Quantity	Unit	Total (SAR)
Rose oil procured		80.00	ml	3000	ml	240,000.00
Transportation ¹²		5,000.00	lump sum	1	--	5,000.00
Total inputs Costs						245,000.00
Labor activities		Price (SAR)	Unit	Quantity	Unit	Total (SAR)
Manager		2,500.00	Month	12	Month	30,000.00
Salesman		2,000.00	Month	12	Month	24,000.00
Distributor		1,500.00	Month	24	Month	36,000.00
Total Labor Costs						90,000.00
Total production Costs						335,000
Marketing Costs		Price (SAR)	Unit	Quantity	Unit	Total (SAR)
Repackaging		50.00	No.	300	Year	15,000.00
Branding		3,000.00	per	1	Year	3,000.00
Labeling		25.00	per	300	Year	7,500.00
Promotions		5,000.00	per	1	Year	5,000.00
Gift samples		5,000.00	per	1	Year	5,000.00
Total marketing Costs						35,500.00
Total Variable Costs						370,500.00
Fixed Costs						
Items	Price	Unit	Lifespan	Unit		
Office rental cost	5000	1	12	Year	60,000.00	
Fixtures	30000	1	5	Year	6,000.00	
Communications	12000	1	1	Year	12,000.00	
Total Fixed Costs						78,000.00
Total of All Costs						448,500.00
Rose oil trading		Quantity	Unit			
Total procured		300 ¹³	10 ml packing			

¹² Visit to multiple places to procure rose oil from processors

¹³ Rose oil is generally sold in 10 ml packing

Losses	3	%	10 ml bottle
Remaining for sale	297		
Income	Price	Unit	Quantity
Rose oil sales ¹⁴	2,500.00	year	x 297
Gross Income			Total
			742,500.00
Income over Variable Costs			372,000.00
Income over All Costs	Net profit		294,000.00

Overall it is ascertained that for the overall economic sustainability of the rose value chain, the distribution of margins needs to be rationalized. Under the present scheme, processors and traders get bulk of the profits owing to their margins and volume of sales. Traders have major profits with minimum associated risks. Increase in sale price of fresh flowers (or price fixation through rose farmers' cooperatives, supported by the government) might be helpful. Despite the fact that the returns on sales for the small holders seems higher, the farmers are unable to meet their livelihood requirements by solely depending on rose farming. That is the reason why majority of farmers (who are not in processing) are also having other sources of income like regular jobs in the private or public sector. Integration of primary production with other activities like agritourism may add to profits of these primary producers as well.



Upgrading Strategy

The rose value chain has diversified challenges and provides different development opportunities, and hence asks for commodity specific value chain development strategy focused at sustainability and the potential to increase income and employment opportunities. Coordinated efforts by all stake holders, including farmers, government, R&D institutions, financial institutions, private sector etc holds prime importance for this transformation. Agriculture and food production systems are largely driven by private sector enterprises be they small scale farmers, or SMEs or global companies.

SWOT Analysis

Based on preliminary review, following strengths, weaknesses, opportunities and threats of the sector in respect of KSA rose sector are identified, that will be helping in formulating a roadmap for its strategic development. There is general balance between these four pillars suggesting that sector development is realistic but needs to take into account several important factors.

Strengths	Weaknesses
<ul style="list-style-type: none"> Congenial agro-ecological and climatic conditions for rose cultivation 	<ul style="list-style-type: none"> Inadequate research and knowledge support Lack of adopted appropriate technologies along value chain

¹⁴ The prices are variable between 2000 to 3000 SAR

<ul style="list-style-type: none"> ❁ Tradition and customs established for rose cultivation and oil extraction ❁ Rose is relatively high-water use efficiency crop ❁ Local rose give high oil yield, has strong scent and relatively low production cost ❁ Potential for high returns ❁ Rose associations exists ❁ Cognizance about branding already exists ❁ High demand and use of rose products domestically, as perfume, rosewater, decoration, medicine, food and beverages ❁ Rose growers have traditional knowledge of rose production and processing 	<ul style="list-style-type: none"> ❁ Absence of specialized nurseries ❁ Poor extension and technical support services (farm to market) to rose producers ❁ Limited water availability and suboptimal irrigation management ❁ Poor production & post-production services ❁ Poor finance services for small-scale rose growers ❁ Inadequate storage and marketing infrastructure ❁ Constraints in market integration ❁ Limited production of rose oil secondary products and waste management ❁ Outdated rose processing equipment and technology ❁ Limited numbers of effective agricultural cooperatives for rose sector ❁ Lack of refrigerated transportation of fresh roses ❁ Absence of effective sales platform for Taif roses
Opportunities	Threats
<ul style="list-style-type: none"> ❁ Government will and interest to develop rose sector ❁ SRAD subsidies programme ❁ Increasing domestic demand as new uses emerge ❁ Increasing global demand for rose oil ❁ Application of Geographical Indications and other quality standards to promote the quality of Taif rose ❁ Sector diversification using other aromatic plants ❁ Development of strong Taif University rose research group 	<ul style="list-style-type: none"> ❁ Availability of skilled labour during harvesting seasons ❁ Lack of information about market requirements ❁ Arbitrary setting of the prices ❁ Adulteration of rose oil and lack of rose quality standards ❁ Strong competition with rose oil from foreign countries ❁ Rose oil Price volatility in the global markets ❁ No ISO standard of rose oil produced in KSA

Based upon the value chain analysis. SWOT analysis and considering the rooms for improvement at various tiers of the rose value chain, following actions are suggested for sectoral development:

Strategy action	Impact	Risk
<p>Primary Production: The most critical limiting factor at the primary production level is availability of true to the type, disease free quality rose plants for plantation of the rose farm establishments. Plant nurseries in the private sector with strong linkages with the ministry of environment, water and agriculture for technical guidance and quality control/certification of propagated material for further provision to farmers may be established in or near the prime rose production areas. This may further be augmented by establishing rose germplasm unit with the Agricultural Research wing of MoEWA having separate mother and multiplication blocks to look for better <i>rosa damacena</i> varieties that are suitable for expanding the</p>	High	Low

Strategy action	Impact	Risk
<p>production period, are good in essential oils recovery and are resilient to the agroclimatic conditions of the rose growing areas in the kingdom.</p> <p>To tackle the water scarcity issues, high efficiency drip irrigation systems are already in place in some of the areas and need to be expanded to all the rose farmers coupled with fertigation equipment.</p>		
<p>Crop Management: Water scarcity is adversely affecting rose crop productivity and quality. Farmers in the warm season are compelled to buy water tanks (@ 70 SAR/tank) which adversely impact profitability. Rose farmers may be encouraged and trained to utilize water conservation techniques including utilization of high efficiency drip irrigation systems, utilization of organic soil conditioners to improve soil water holding capacity as well as nutrient sequestering ability, rain water harvesting etc through a comprehensive capacity building program that may be implemented by MoEWA. Crop management techniques are generally antiquated and needs skill development of farmers in pest identification and control as well as nutrient management, pruning and harvesting of roses. The modern rose nurseries in private sector as well as rose sector cooperatives having technical support of MEWA can be a good source for provision of these crop management related capacity building programs. For disease diagnosis, pest identification and guidance on agronomic practices can be provided through development of mobile apps as well; once the producers get trained in the basic diagnostics.</p> <p>Subject to water availability, intercropping with members of family <i>fabacea</i> will help improve soil fertility besides providing farmer an additional source of income after the rose flower harvest. Very few farmers are using farmyard manure that can help improve water holding capacity of the soil besides acting as a natural nutrient sequestering agent.</p>		
<p>Harvest Management: Rose being a delicate product with exacting requirements for rose oil extraction requires harvesting to be carried out in the comparatively colder hours of the day i.e. early morning to avoid heat that may cause loss in quality, decrease shelf life and evaporation of some essential oils. The farmers are generally unable to harvest their produce leaving it to the next day or during the hotter time of the day that adversely impact product quality. The rose harvest is concentrated in two months with a peak in April. All the available labour (usually expats) gets engaged in rose harvesting causing shortage of trained manpower. This issue of labour shortage can potentially be resolved through labour pooling through rose growers' cooperatives.</p>	High	Low
<p>Post Harvest Management: Rose, for rose oil extraction requires immediate transportation to the processing sites while avoiding exposure to higher temperatures that result into evaporation of some essential oils. Currently roses, after harvest are put into jute or plastic bags and shifted to the processing sites in open vehicles. This on one side limits farmers'</p>	High	Low

Strategy action	Impact	Risk
<p>choice of selling as they can only sell to the processing sites within their vicinity, and on the other hand results in quality loss. Temperature controlled vans (or porta coolers) managed by either the rose processors or rose cooperatives can provide a good solution to this.</p>		
<p>Processing: Although very traditional and unique, but the current method of hydro-distillation of rose oil is not only antiquated but less efficient as the quantity of oil extracted is compromised as well as it is labour and energy intensive. Better extraction methods, e.g. solvent-solvent extraction or more sophisticated CO₂ super critical extraction not only reduces the time of extraction but also increase oil extraction efficiency. These modernized extraction units (solvent-solvent) can be introduced through the rose cooperatives alongwith necessary capacity building in operation and maintenance.</p> <p>Even the existing hydro-distillation methods has many areas of improvement e.g. use of food grade stainless steel (grade 304 or 316) instead of copper stills, leaving room for circulation in the still, sealing the pots and collection retorts to avoid escape of volatile substances can also appreciably improve quality.</p>	High	Medium
<p>Market Place, Marketing: Establishment of a temperature controlled central market with open auction, record keeping and ITC facilities will help balancing the negotiation power of primary producers. Electronic marketing platforms, introduction of <u>geographic indications</u> registered with SAIPO and IPO for branding and hence reaching out to better paying clients through aggressive marketing along with adulteration control and vetting of quality standard for Taif rose will help improve the situation.</p>	High	Low
<p>Product Diversification: Rose processors are reliant only on a very few products at the moment e.g. Rose oil or rose water while other products that can be used to add value are not getting good footage. Possibilities are enormous in cosmetics, health care and food sector, though some of the large processors have ventured it into this arena with their own brand. These value addition facilities established through cooperatives can increase both income and employment opportunities.</p> <p>Another arena of diversification is to include other aromatic plants in the processing line. Rose is available only for 2 months which does not make rose processing a high margin business as rest of the months are idle for the processor. One possibility can be addition of Jasmine in the processing for which the same extraction equipment can be utilized. Other aromatic plants like lavender can also be considered for inclusion. This will not only ensure expansion of operations but also this diversification will lead to further job creation and distribution of margins along the value chain besides opening-up new opportunities.</p>	High	Low

Strategy action	Impact	Risk
Cooperatives: Expansion and capacity building of rose sector cooperative societies is recommended in business management, information sharing, marketing as well as improving the business environment is recommended.	High	Low
Quality Controls and Traceability: Saudi Arabia Standards Organization (SASO) can help rose sector in defining and acknowledging the rose oil attributes which will further help in controlling adulteration; a <i>cine qua non</i> to stay competitive in international markets. Similarly end to end traceability by introducing ITC aided traceability mechanism may further augment efforts to gains in the international markets.	High	Low
Agro-tourism integration: Rose farms provide an excellent opportunity to attract visitors. Provision of facilities like sitting areas, traditional food, play area for children, self-cooking, engagement in rose harvesting, rose garlands sale at the well maintained clean rose farms have the potential to attract quite a good number of visitors. This integration of rose farming with the agro-tourism can add to the farm profitability.	High	Low
Digitalization: Opportunities for digitalization exist both at on-farm and off-farm levels. These opportunities include connectivity, accessibility, the level of education and institutional support, designing services for the unconnected farmers, provision of market information, on-line selling platforms, extension services etc. and even access to finance.	High	Low
Gender and youth inclusivity: Despite the fact that cultural sensitivities often do not allow women to get involved at the production level activities on the farms that are located far from their homes. However, without disturbing the cultural fabric, women inclusion can increase efficiency of the rose value chain at many tiers. For example, nursery production near the homes, on-line marketing, product diversification at cottage industry level etc are some of the realms where women and youth can be engaged.	High	Low

Benchmarking with comparators:

Rose oil benchmarking				
Parameters	Turkey	Bulgaria	India	Saudia
Utilization of <i>Rosa damacena</i>	✓	✓	✓	✓
Active farmers' cooperatives	✓	✓	-	-
Modern oil extraction methods	✓	✓	-	-
Traditional and indigenous extraction method	✓	✓	✓	✓
Geographic identification established	✓	✓	✓	
Rose picking and cold transport	✓	✓	-	-
Quality parameters of indigenous rose oil defined	✓	✓	✓	✓
Control measures to avoid adulteration	✓	✓	-	-
Traceability system in place	✓	✓	-	-
Proper selling-buying platforms	✓	✓	-	-
Existence of processors' associations	✓	✓	✓	-
Product diversification	✓	✓	✓	-
Organic production	✓	✓	-	✓

Established crop management system	✓	✓	✓	-
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Stakeholders for the project Rose Component:

Various stake holders of the rose sector with their key interest and priority are indicated in the below table:

Rose sector stake holders		
Stakeholder	Key interest	Priority
PUBLIC AND CIVIL SOCIETY STAKEHOLDERS		
Ministry of Environment, Water and Agriculture and its various arms	Rural development, Job creation, Unit productivity enhancement, Income enhancement for small farmers	High
Taif Governorate	Rural development, Job creation	High
Saudi Commission for Tourism and National Heritage (SCTH)	Job creation Agri-Tourism and event-tourism development	High
Agricultural Development Fund (ADF)	Financial services provision to rural youth and women	High
General Authority for Small and Medium Enterprises (Monsha'at):	Entrepreneurship development	Medium
Cooperatives Society Council Taif Rose Cooperatives Society, Taif Agricultural Cooperative Society	Cooperative network formation with farmers, Support small farmers to get benefits of economies of scale	High
University of Taif	Research and development Incubation center establishment	High
Saudi Authority for Intellectual Property	Brand recognition, GI registration in Saudi Arabia	High
Ministry of Labour and Social Affairs	Establishment and capacity development of small producers' cooperatives. Facilitate establishment of small and medium enterprises (SMEs).	Medium
King Salman Youth Centre (KSYC)	Establish and entrench the concept of excellence and consolidation of entrepreneurship among the youth, Contribute to build a creative generation of future leaders who will continue achieving progression and prosperity for the country.	Medium
Saudi Standards Organization (SASO)	Establish and approve standards for Rose oil	Medium
PRIVATE SECTOR		
Farmers from Taif and Jazan	Increase production, Increase income, increased employment opportunities	High
Rose processors	Assured rose supply for processing – good quality, good price, Higher profits	High
Rural youth and women agri-entrepreneurs https://wardatstore.com/	Entrepreneurship opportunities	Medium
Input suppliers	Provide inputs like nursery plants, irrigation equipment, agrochemicals, farm machinery etc.	Medium

INTERNATIONAL STAKEHOLDERS		
The Organization for an International Geographical Indications Network (oriGIn)	Geographical Indications registration	Medium
Institute of Roses, Essential and Medicinal Cultures, Bulgaria	Technical expertise and knowledge sharing	Medium
Global Forum for Rural Advisory Services (GFRAS)	Rural Advisory Services development partner	Low



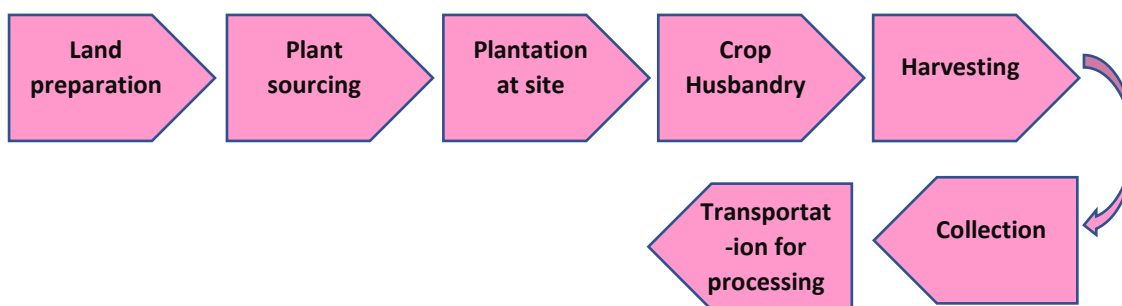
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Annexure-I:

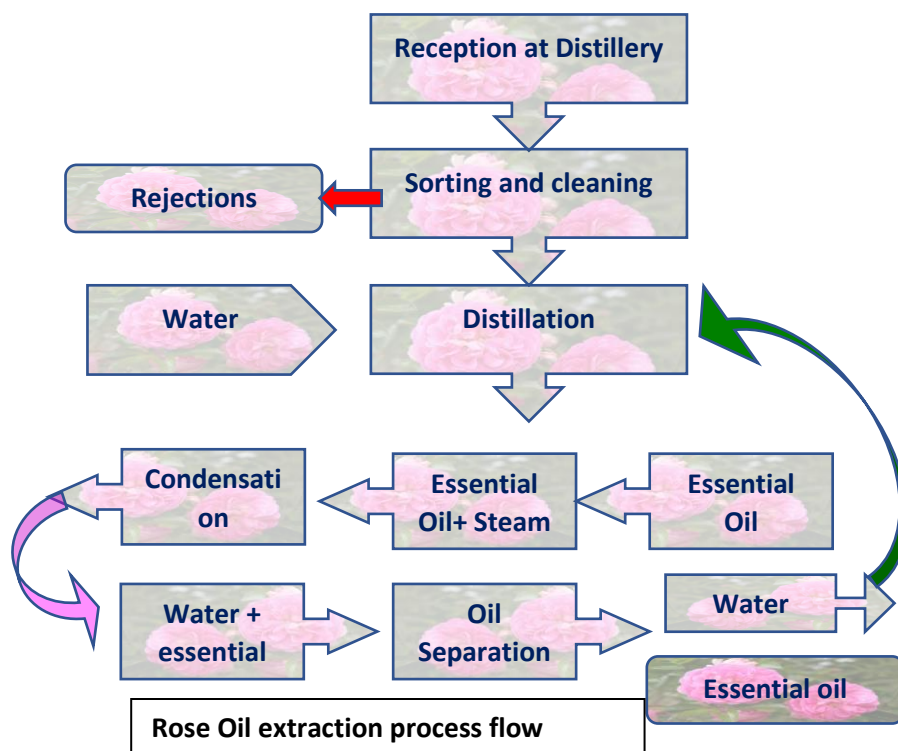
Additional Information

- a. **Rose cultivation flow:** The climatic conditions congenial for successful cultivation of roses include a moderately cool climate with bright sunshine, with an average temperature range of 15-27°C for good quality flowers. Roses prefer medium loam having sufficient organic matter, proper drainage and pH of 6.0 to 7.0. For rose plant cultivation, after removing the weeds, the field is ploughed and leveled, if it is terrace, the land in terrace is levelled. Before rose planting, a small pit (30×30 cm) is prepared to accommodate the earth ball of in case of a new plant. Rose plantation is done immediately once the rose plants arrive at the planting site. Regular pruning is carried out once the plant reaches a height of more than 1.5 feet. Irrigation, nutrient management and pest management is practiced. The rose, although can start blooming in the first year of plantation, but it is generally discouraged to maintain good health of the plant. Proper flower harvest starts in second year with skilled workers carefully plucking the flowers in the early morning to avoid excess heat that adversely affects the aromatic compounds in the petals.



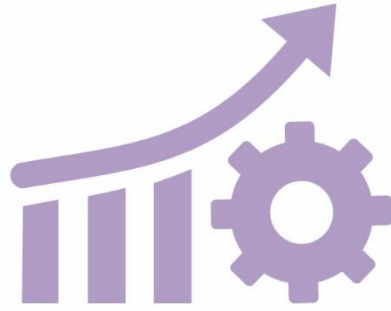
- b. **Rose oil extraction process:** The rose oil extraction process starts with the arrival of rose petals at the factory where these petals are sorted and rose hips and other inert material/debris are removed. The petals are soaked in the container, which has water for preventing overheating and charring of the plants, and then heating water with plants till the steam comes out. The oil comes out and it goes to the condenser where the oil and water are collected in separation flasks. The oil collected in the top layer of hydrosol can be isolated. In this method, the extraction temperature always is below 100°C to avoid the evaporation of water and oil together. Heating systems in the extraction of essential oils using water distillation are direct fire, steam jacket, closed steam jacket, closed or open steam coil.

Although this method is conventional and widely utilized throughout the kingdom for being comparatively less expensive and easy to operate as well as ease of movement from one place to other place for smaller units, it still has quite a few disadvantages as well. For example, complete oil extraction is not possible, some of the oil ingredients like esters are



sensitive to hydrolysis while other compounds like acyclic monoterpene hydrocarbons and aldehydes are susceptible to polymerization, some phenols have a tendency to liquify in the distilled water and the distillation unit is not able to remove them completely. Additionally, a lot of fossil fuel is burnt to carry out the boiling and hence distillation process which is not environment friendly. Almost all of the oil factories are using copper stills instead of food grade stainless steel of grade 304 or 316.

Many better rose oil extraction methods are available across the globe including Super critical CO₂ extraction, Solvent-solvent extraction, Microwave aided distillation and Hydro-distillation. Currently the main part of the rose flowers harvested is used for production of rose oil through distillation. Large companies from the Taif region occupy the lion's share in the local production of rose water and oil.



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