Assessment of government policies and programs to enhance global competitiveness of sugar industries: Lessons from major sugar producing countries

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DECLARATION

I, the undersigned, hereby declare that the study which is presented in this research project entitled ***"Assessment of government policies and programs to enhance global competitiveness of sugar industries: Lessons from major sugar producing countries"*** is original work of my own, done independently in partial fulfillment of the requirements for the award of **Master of Arts Degree in Business Leadership (MBL)** with the guidance and assistance of the research advisor, Bantie Workie (PhD). I further declare that the paper had not been presented for partial fulfillment of any educational qualification at this university or any other and in any projects by any means, and all sources of materials used in the research project had been properly acknowledged.

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ADDIS ABABA UNIVERSITY

School of Commerce

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Advisor	**Signature**	**Date**
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Abstract

As the Government of Ethiopia is planning to privatize some of the sugar factories to potential investors, understanding the role of government policies and programs to enhance competitiveness of sugar industry in major sugar producing countries is important. Thus, the purpose of this study was to assess the government policies and programs adopted in major sugar producing countries that enhanced competitiveness of their sugar industry; and to identify lessons that can be adopted in the Ethiopian sugar industry to improve its competitiveness. Multiple case study method was adopted for the study. The research strategy chosen for the project was a comparative case study analysis using multiple secondary data sources. The conditions of the sugar industry and government policies and programs to enhance competitiveness of the industry were studied through consideration of the three dominant cane sugar producing and exporting countries: Brazil, India and Thailand. The three countries for the case study were selected using purposeful sampling based on preliminary assessment of their historical performance in sugar production and their global share of cane sugar production and export performance in the past few decades. Secondary data which were extracted from various documents and databases were used for the study. The collected data were analyzed using both qualitative and quantitative methods. Analysis of the data was carried out to assess how government policies were used to support the industry and compare how differently the sugar industries in the selected countries compete within the world sugar market and gain a competitive advantage. Overall, the study revealed that all the three countries used various government regulations, policy instruments and programs to increase sugar production. In addition, the findings showed that the government regulations and policies enacted in their respective countries helped the countries to increase sugar production and exports to world sugar market and thereby get greater market share in the international market despite depressed world sugar prices. Hence, the study concluded that appropriate government policies and programs can be used to enhance competitiveness of the sugar industry in countries with competitive advantage in sugarcane production.

Key words: *Sugarcane, Sugar, Sugar Industry, Production, Export, Government Policy, Competitiveness.*

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Chapter 1 Introduction and Background

1.1 Introduction

The aim of this chapter is to give brief background and introduction to the global sugar industry and the Ethiopian sugar industry. It also deals with the concept of competitiveness in the sugar industry. The chapter also discusses the problem statement, scope, significance, and objectives for undertaking this research project.

The chapter starts with brief introduction of the sugar industry followed by problem statement. Next research questions and research objectives are presented. Finally, the significance and scope of the study are presented.

1.2 Background of the study

Competitiveness of domestic products at the global market is one of the foundations of a country's international competitiveness. Hence, understanding how industries and countries become competitive is an area of major interest for research (Banerjee, 2004). In this regard, assessment of factors that enhance the competitiveness of a country's global trade potential in commodities that a country produces competitively becomes an important issue.

Various studies indicated the political nature of international business and the role of government as one of the factors of competitiveness (Boddewyn & Brewer, 1994). As such, policy changes regarding some industries in a few major countries can impact the competitiveness of similar industries in other nations. This has important implications for the global agricultural markets in general and the sugar industry in particular (Christoffersen, 2002).

Competitiveness of the agricultural sector is an important component in enabling the economic transformation of developing countries in Africa. Developing competitiveness of agribusiness provides for a natural progress towards development of the industrial and service sectors (Smit, 2010). Further, Diao, Hazell & Thurlow (2010) argue that because growth in agriculture cannot be bypassed in the development of most countries, transformation of the agricultural sector is crucial

and a focus on competitiveness of agriculture is very important. Thus, these countries must focus on returns from agricultural products that they have a comparative advantage in producing.

The Government of Ethiopia (GoE) in its industry policy has indicated that the country gives priority to more labor-intensive and value-adding manufacturing industries and those sectors that use the abundant land and labour resources of the country (FDRE, 2002). Accordingly, agro-processing industry which includes the sugar industry is one of the sectors selected by the government (MoI, 2013). According to MoF (2019), one of the agribusiness sectors where Ethiopia can gain competitiveness and where there is high potential for export is the sugar subsector as the country possesses tremendous land and water resources with suitable climate for production of sugarcane. The country in its first Growth and Transformation Plan (GTP-I) also identified sugar industry as being one of the sectors with a great potential to stimulate new investments and job creation opportunities (MoFED, 2010). Besides its export potential, the selection of the industry was also justified on the ground that it is one of the industries that are labour intensive in addition to their comparative advantage in the export markets (Gebreeyesus, 2017).

That realization has, to an extent, resulted in ambitious investments that have led to the establishment of a number of new sugar processing plants and the upgrading of existing sugar factories (MoF, 2019). However, despite the huge potential in the sugar sector, the results obtained so far in the industry are not to the expectation of many and the actual performance was far below the planned targets (ESC, 2019). This indicates that there are problems that hindered to tap the potential in the sector and become competitive in the world market. The main question is: "What policy measures and programs can enhance competitiveness of the sugar industry?" In this regard, it is important to learn from the experiences of major cane sugar producing countries about government policies and programs used to enhance competitiveness in the industry.

1.3 Overview of the sugar industry

Sugar is derived from sugarcane and sugarbeet (OECD/FAO, 2021). Sugarcane is mostly grown in countries with tropical climate while sugarbeet is mainly grown in temperate climates (ISO, 2019). Sugarcane accounts for around 86% of the sugar production and sugar beet contributes

about 14% (OECD/FAO, 2021). The sugar industry has the potential to generate various by-products to enhance value addition (Ferraz et al., 2014). Apart from sugar, sugarcane is also used to produce ethanol and electricity (OECD/FAO, 2021).

Sugar is being produced in more than 110 countries and the global production has reached 183.4 million tons in 2020/21 while the global consumption in the same year was 184.2 million tons (USDA, 2022). The top five producers, namely, India, Brazil, EU, Thailand and China accounted for 59 percent of total sugar production in 2019 (MoAFW, 2019). The share of Africa in global sugar production was less than 7% with only about 12.5 million tons produced in 2020/21 (HIS market, 2021). In most years, over 70% of world sugar production is consumed domestically and the remainder is traded in the world market (ISO, 2019; OECD/FAO, 2021)

The international sugar market has several unique characteristics that distinguish it from other commodity markets (Borrell and Duncan, 1993). The world sugar market is highly distorted mainly due to heavy government interventions (Mitchell, 2004; Ethical Sugar, 2010). Government interventions including tariffs, quotas, state-regulated retail prices in domestic markets, import quotas, export subsidies, and domestic government support usually distort the sugar market (Nyberg, 2006; MoAFW, 2020).

The market of sugar is controlled in a certain way in nearly all sugar-manufacturing countries (FAO, 1996; Mitchell, 2004). Almost all sugar producing countries provide some sort of support to their sugar producers (Mitchell, 2004). Several developing countries also provide domestic farm subsidies to their sugar enterprises, directly or indirectly, causing high distortion in the global sugar market (MoAFW, 2020). Several countries also protect their domestic sugar industry by using various trade barriers (OECD, 2003; MoAFW, 2020).

Commercial sugar production in Ethiopia started in 1954 at Wonji (Kebede, Damtie & Gebregiorgis, 2017). Currently sugarcane is cultivated on more than 80,000 hectares and about 350,000 tons of sugar is produced annually (ESC, 2021). However, the domestic sugar production could not satisfy the domestic demand as consumption of sugar has increased considerably in

recent years mainly due to population growth as well as the country's economic growth (MoF, 2019), and thus the gap is being filled by importing sugar (ESIG, 2022).

Sugar production is one of the important economic sub-sectors in Ethiopia and it has a big contribution to its national income (Chare, 2020). Ethiopia has a very suitable climate, vast land with fertile soil and plenty of water for irrigation which enables large-scale commercial sugarcane farming (Kebede, Damtie, & Gebregiorgis, 2017). In the early 2000s the performance of the Ethiopian sugar industry was comparable to some of the major sugar producers of the world, even slightly better than some of them in terms of cane productivity and cost of production (ESC, 2018). A study conducted by the Ministry of Industry and Trade in 2010 indicated that the Ethiopian sugar industry was one of the best in terms of productivity as well as low-cost producer and competitive in the world in terms of cost of sugar production (Gutema, 2020). Hence, considering the potential to produce sugar competitively in the country, and to satisfy the domestic sugar demand as well as exploit the export potential in the international market, the Government of Ethiopia, in parallel with expanding the existing sugar mills, envisaged establishing new sugar factories with a plan to produce more than 2.25 million tons of sugar (MoFED, 2010).

Despite its potential, however, the sugar industry in Ethiopia currently faced many challenges such as: lack of appropriate sugar policy, inadequate financing for new projects, shortage of foreign currency, and inadequate infrastructures which resulted in decline in cane productivity and increase in cost of production (ESC, 2018; Chare, 2020). In particular, inadequate supply of sugarcane to the newly established sugar factories resulted in very low annual sugar production (ESC, 2021).

To overcome the recent setbacks, the government is making some reforms in the sector that are planned to regain the competitive potential that the sugar industry enjoyed in its past. The GoE has recently begun a major restructuring in the sector and has launched privatization program on the state-owned sugar enterprises (Chare, 2020; ESIG, 2022). It is envisaged that privatization of the sugar sector will open new windows of opportunity for further development of the industry (MoF, 2019).

However, though the industry has been operating for more than six decades, there is no legal and policy framework in Ethiopia that is specifically crafted to the sugar industry (Chang, 2010; Gebreeyesus, 2015; G/Mariam, 2019).

1.4 Statement of the problem

While the increased domestic demand for sugar and high potential for expansion of the industry in Ethiopia may be good news for the industry players, the condition of the sugar market in the world and poor performance of the Ethiopian sugar industry in the recent years creates concerns. Building competitiveness of the sugar sector in the highly distorted global markets requires an understanding of factors that affect the competitiveness of the industry both in the domestic and the global markets. This requires proper analysis of the dynamics of the sugar industry so that the Ethiopian sugar industry will become competitive on a sustainable basis and can access the sugar export market.

In particular, government policies and programs that enhanced competitiveness in other major sugar producing countries need to be studied. However, review of existing literature (G/Mariam, 2019; Chare, 2020) indicates that adequate research works were not undertaken regarding policies that enhance the global competitiveness of the Ethiopian sugar industry so far despite its importance. Hence, this study is motivated by the relative scarcity of research done regarding sector specific government policies and programs that could improve the competitiveness potential of the sugar industry in Ethiopia.

1.5 Research questions

In the context of the research problems stated above, the following research questions were addressed in this study:

1. What are the government policies and programs adopted by the major cane sugar producing countries to enhance competitiveness of their sugar industry?
2. What lessons can be learned by the Ethiopian sugar industry to enhance its competitiveness?

1.6 Research objectives

1.6.1 General objective of the study

The general objective of the study is to explore government policies and programs adopted in major cane sugar producing countries and learn relevant lessons that can be practiced in the sugar industry of Ethiopia.

1.6.2 Specific objectives of the study

The specific objectives of the study are:

- To assess government policies and programs implemented in major cane sugar producing countries that enhanced competitiveness of their sugar industry; and
- To identify lessons that may be adopted in the Ethiopian sugar industry to improve its competitiveness.

1.7 Significance of the study

The Government of Ethiopia is planning to privatize some of the state-owned sugar factories to potential international and/or local investors (MoF, 2019; PEEHA, 2022). These investors may need to export the product to return their investment and obtain their profits in foreign currency. To be successful in their export endeavour, the companies should be competitive with sugar producers from other countries in the market. This requires deeper understanding of how the major players in the world sugar market used government policies and programs to enhance competitiveness of their sugar industry and gain lessons from them.

This study is expected to partly fill the existing gap in this aspect and provide better understanding regarding the global sugar markets and also provide insights in identifying specific government policies and programs to support the competitiveness of the sugar industry. Thus, the study is expected to have a practical significance for policy makers and other decision makers involved in the sector as well as for those companies interested in investing in the sugar sector in Ethiopia. It is also expected that researchers who are interested in the sugar business in Ethiopia will benefit from the study.

1.8 Scope of the study

As a result of the envisaged financial and time constraints, the study was basically restricted to assessing government policies and programs adopted in selected major cane sugar producing countries to enhance their competitiveness and identifying lessons that may help to improve competitiveness potential of the sugar industry in Ethiopia. The study mainly comprised of identifying major government policy measures and programs that were used in major cane sugar producing countries to enhance global competitiveness of their sugar sector, while measuring the specific impact of the policies is beyond the scope of this study.

1.9 Organization of the paper

The research project report is organized under 5 chapters. The first chapter provides background of the world sugar industry and the Ethiopian sugar industry. It also presents the research problems, objectives, gaps and questions addressed in the study. Further, the significance and justification for the study is also presented. Chapter 2 provides a detailed review of literature focusing on the sugar industry and world sugar market. The concept of competitiveness and a conceptual framework of the study are also discussed in the second chapter. Chapter 3 discusses the research methodology including the data collection and analysis strategy. The fourth chapter presents and discusses the results of the study. The fifth chapter presents conclusion of the study and recommendations based on the findings of the study.

1.10 Definition of key terms

Competitiveness refers to the ability to deliver goods and services at prices as good as or better than those of other potential suppliers while gaining adequate returns on the resources employed to produce the commodities.

Industrial policy is a type of government intervention that attempts to change the system of production in favor of sectors (e.g., sugar sector) that are expected to give better economic growth than would occur in the absence of such intervention.

Sugar is a sweet crystalline food substance basically consisting of sucrose produced mainly from sugarcane or sugar beets.

Sugar beet is an annual root crop cultivated in temperate climates which is used for production of sugar.

Sugar cane is a tall perennial grass crop cultivated in tropical and semitropical climates which is used for production of sugar.

Chapter 2. Review of Literature

2.1 Introduction

This chapter reviews existing literature related to the study to gain an understanding of the research topic. Topics reviewed included the concept of competitiveness, the impact of government interventions and policies on competitiveness as well as the conceptual framework.

2.2 Theoretical review

The concept of competitiveness is complex, raising questions such as how to define it, at what level to analyze it, and what are its major determining factors. Definition of competitiveness in agricultural export industries was given by Freebairn (1987) as the *'ability to deliver goods and services at the time, places and form sought by overseas buyers at prices as good as or better than those of other potential suppliers while earning at least opportunity cost returns on resources employed'*.

Generally, competitiveness represents the ability of a company or a business enterprise to get an adequate market share, within domestic or international market by being cost efficient thereby increasing returns to labor and capital employed in producing the products or services delivered to the market (Banerjee, 2004). The most common perspective on competitiveness from economics literature is based on international trade, with the focus on the performance of a sector in a country in comparison with the same sector in another country (Sarker & Ratnasena, 2014).

The concept of international competitiveness can also be broadly classified based on two perspectives, known as theories of comparative advantage and competitive advantage, respectively (Mahmood & Ezeala-Harrison, 2000). The concept of comparative advantage has been used mostly in economic literature, whereas strategic management and business literature has mainly focused on the idea of competitive advantage (Harrison & Kennedy, 1997; Mahmood & Ezeala-Harrison, 2000).

Competitiveness of the sugar industry is impacted by both domestic conditions as well as world sugar market conditions which depends on the existing natural, economic and political conditions

(Dunning, 1990; Zimmermann & Zeddies, 2001; Wijnands et al., 2015). According to Zimmermann & Zeddies (2001), competitiveness in sugar production is influenced by many geographical factors like natural features (topography, temperature, and rainfall), local economic factors (opportunity costs of land, capital, labor and productivity), political factors, taxes and legislative issues.

2.2.1 The theory of comparative advantage

The theory of comparative advantage focuses on the availability of factor endowments in different countries to achieve national competitiveness (Sposi, 2019). It advocates that the natural factors endowment of production and productivity level are the main determinants of trade competitiveness (Leamer, 1984; Huggins & Izushi, 2015). As natural endowments have major implications in the agricultural sector, the theory of comparative advantage is still considered a valid indicator of export competitiveness in agricultural products (Sposi, 2019). However, according to Petit & Gnaegy (1994), as the concept of export competitiveness has gone beyond the traditional comparative advantage theory, the concept of competitive advantage has to be included for a comprehensive analysis of agricultural export competitiveness.

2.2.2 The theory of competitive advantage

Porter (1990) introduced the concept of competitive advantage of nations, in explaining how nations achieved competitive advantage in particular industries. The theory of competitive advantage aimed to encompass factors not addressed by the comparative advantage theory, as Porter (1985) argued that factor endowments no longer played a critical role in competitiveness of various countries.

International competitiveness has been explained through Ricardo's theory of comparative advantage (1817) and Porter's diamond model of competitive advantage (1990). Ricardo's model of comparative advantage explains international trade based on natural resource endowments (such as land, labour and capital) by emphasizing that countries specialize and export certain products if they have a comparative advantage in producing that product (Ricardo, 1817). Porter (1990) advanced Ricardo's comparative advantage theory by combining factor endowments with other

determinants of competitive advantage to address competitiveness in advanced and industrial-based economies.

Porter's diamond model (1990) combined the factor conditions from the traditional trade theory, i.e. comparative advantage, with the theory of competitive advantage, thus providing the vital link between country-specific sources of competitive advantage to achieve international competitive advantage. The model is comprised of four major interactive determinants: factor conditions; demand conditions; firm strategy, structure and rivalry; and related and supporting industries (Porter, 1990). Government policy and chance are two additional determinants considered by Porter (1990) that enable nations in achieving global competitiveness; though they are considered to be components having external cause in his model.

Although Porter's diamond model (PDM) has been widely applied in relation to international competitiveness, there have been many criticisms of the model. Particularly, the PDM was criticized by Dunning (1990) for belittling the role of government by considering it as an exogenous determinant in the model. Rugman & Verbeke (1993) also argued that the impact of the trade policies of an importing country's government is not recognized directly by PDM on trade competitiveness.

2.2.3 The role of government policies

A primary difference between the theories of comparative and competitive advantage is the role of government in international competitiveness (Warr, 1994; Gupta, 2009; Smit, 2010). The neoclassical trade theory of comparative advantage assumes a world free of distortions, and it considers that government policies should not intervene in the market (Mahmood & Ezeala-Harrison, 2000; Coy, 2006). On the other hand, the theory of competitive advantage does not ignore the role of government, and considers government policy interventions to be important for enhancing the global competitiveness of a country (Mahmood & Ezeala-Harrison, 2000; Smit, 2010).

Review of existing literature shows that the impact of government interventions and policies is

considered an important determinant of competitiveness (Feenstra, 2008; Latruffe, 2010) as governments directly and indirectly influence international competitiveness through macroeconomic policies (Bhagwati, 2003; Krugman, 2008). Thus, there exists a role of government in relation to competitiveness of a country and its industries as the trade policy instruments are used in favour of domestic industries against foreign competitors (Porter, 1985; Mahmood & Ezeala-Harrison, 2000; Lall, 2013). Particularly, various trade distortions in the form of tariff and non-tariff barriers play an important role for export competitiveness in the case of the agricultural and agri-food sector (Latruffe, 2010).

Industrial policy and programs are frequently used by governments to stimulate particular sectors of the economy. Industrial policy refers to attempts by the government to improve productivity and transform production structures to stimulate industrial advancement using various policy instruments (Freebain, 1987). As stated in Mingo & Khanna (2013), industrial policy is a type of selective intervention by the government that attempts to change the structure of sectors that are expected to give better economic growth in a way that would not occur without such intervention.

2.2.4 Levels of analysis

Competitiveness can be analyzed at various levels: at the level of a country, at industry or sector level, at the enterprise level; or at the level of a product or aggregate of products (Buckley et al., 1988; Frohberg & Hartmann, 1997). On the theory of comparative advantage, countries have been considered as the level of analysis for competitiveness. However, the strategic management literature, which is based on the theory of competitive advantage, addresses competitiveness at the country, industry, firm and product levels. Hence, the concept of competitiveness is relevant at multiple levels of analysis with different units of analysis (Momaya, 2001).

Industry competitiveness is the ability to profitably gain or maintain market share in domestic or international markets (Feurer & Chaharbaghi, 1994; Fagerberg, 1996). According to D'Cruz & Rugman (1992), international competitiveness of an industry in a country refers to the collective ability of domestic enterprises in that sector to compete internationally. Competitiveness may also be represented by the relative productivity of the industry in the country and can be assessed by comparing with the same industry in another country (Depperu & Cerrato, 2005).

In the case of the agricultural and agrifood sector, the theory of competitive advantage does not compete with and thus is not a substitute for the theory of comparative advantage; rather the two complement each other in formulating international competitiveness (Warr, 1994; Mahmood & Ezeala-Harrison, 2000; Neary, 2003; Coy, 2006).Thus, the export competitiveness framework needs to include the export competitiveness of agricultural and agrifood products at the global level by comparing it with the comparative advantage of other major exporting countries (Momaya, 2001). Hence, both comparative advantage and competitive advantage approaches need to be considered when assessing competitiveness in the sugar sector.

2.2.5 Competitive strategy

Competitive strategy refers to the search for a favorable competitive position in an industry (Porter, 1990). Competitive strategy aims to establish a profitable and sustainable position against potential competitors and it seeks to relate the goals of the business enterprise to the means of achieving them (Porter, 1985; Neary, 2003). The competitive strategy evolves out of consideration of a number of factors that are external to the business enterprise and involves orientation of the business firm's internal environment with the changes of the external environment (Wheelen & Hunger, 2012).

However, business strategies at firm level alone are not adequate for the success of internationally competitive businesses (Porter, 1985). Though Porter (1980) focused business strategy analysis on the relationships between firms in competition, there is also a need to make the analysis on the relationships between firms and governments (Porter, 1990). Hence, the increasing global interdependence among economies makes it imperative that business enterprises consider the possible impact of government interventions on the formulation and implementation of competitive strategies (David, 2011; Hult, 2012).

2.3 Empirical review

According to Eaton & Grossman (1986), international competition among firms in many industries is imperfectly competitive due to the fact that governments usually assist their domestic industries by directly guiding their activities through various interventions. Government interventions that affect the competitiveness of their firms in international markets are referred as industrial policy.

Banerjee (2004) and Ngarmyarn & Techawed (1996) analyzed, in respect to the sugar industry, how government policies impact the competitive position of the domestic industry. Banerjee (2004) assessed determinants of international competitiveness using comparative study of sugar industries in Australia, Brazil and EU. The study highlighted the role of the government as being central in the economy. It also showed how the role of the government differs among economies based on the socio-political-cultural settings of the country. The study further indicated that Brazilian firms have acquired their valuable position based on their capabilities nurtured by government policies while Australian firms pursued international competitiveness based on traditional concept of economic factors. Another study on the competitiveness of the Thai sugar industry focused on the impact of lifting important trade barriers, i.e. market access, lower import quota, lower import tariff, and lower producer and export subsidies, upon the world production and trade on sugar industry (Ngarmyarn & Techawed, 1996).

The sugar industry in many countries benefit from policy support measures from their respective governments (OECD/FAO, 2016). According to Sturgiss et al. (1988) and Mitchell (2004), some countries such as the E.U., Japan, and the United States provide price support to their domestic producers that is higher than the world sugar market price. Such high price support by their respective governments has stimulated high production by local producers who would not be competitive at the prevailing world market sugar prices (OXFAM, 2002).

With regard to price instability in the world market, sugar has been one of the most volatile agricultural commodities (Pop et al., 2013). Sugar prices in the world market are affected not only by supply and demand dynamics (Zimmermann & Zeddies, 2001) but also by Regional/free trade agreements, government policies in major sugar producing countries such as export subsidies, import tariffs, domestic price support to protect domestic markets, exchange rates, and also other related factors such as ethanol and energy prices (MoAFW, 2020).

The cost of production of sugar in Ethiopia was relatively low due to high cane productivity per unit area in the country as a result of very suitable climate and soil conditions (Dametie & Yirefu, 2012) as well as the abundance of inexpensive labour (ESC, 2019). The history of sugar industry

in Ethiopia indicates that although relatively smaller, there were sugar and molasses exports in the 1980s with encouraging results (ESISC, 2002). Moreover, following the opening of a fourth sugar plant at Finchaa in 1998 and subsequent production of surplus sugar (Gutema, 2020), the years 2000 – 2002 have seen increases in sugar exports (UNCTAD, 2005; ESISC, 2002).

The experience of the Ethiopian sugar industry in the 1980s and the years of 2000 to 2002 in productivity and cost of production shows that the country has the potential to access global sugar market by exporting sugar produced in adequate quantity and at relatively low cost. However, according to Gutema (2020), harnessing such opportunities demands on putting in place appropriate policies and adequate government support to ensure that the sector not only participates in global markets, but also become competitive in the world market.

Though the Government of Ethiopia has made an ambitious plan of expanding the sugar industry towards that goal by adding 10 new sugar factories to the industry in its first GTP plan in 2010 considering the potential for increasing sugar production (MoFED, 2010), the sugar enterprises are currently suffering from low capacity utilization due to inadequate cane supply and decrease in cane productivity (ESC, 2018; ESC, 2021). On the other hand, domestic sugar demand continues to exceed domestic supply due to high population growth and rapid urbanization (MoF, 2022). Thus, sugar is imported to satisfy the domestic demand for the last few years (MoF & EIH, 2022; ESIG, 2022).

2.4 Research gap

Previous researches on the Ethiopian sugar industry mostly focused on the technical aspects of agriculture and sugar manufacturing technologies. Review of available literature indicates that adequate research was not undertaken on the business competitiveness aspects of the Ethiopian sugar industry. In particular, there is a research gap in assessing government policies and programs used to enhance competitiveness of the sugar industry in major sugar producing countries, and learning from the successes of the countries in order to make policies and programs that are suitable to the conditions of the sugar industry in our country. These issues motivated conducting this research.

2.5 Conceptual framework

Competitiveness of sugar industries is affected by various factors including sugarcane productivity, cost of production, duration of annual crushing season, etc (Depperu & Cerrato, 2005). Moreover, policy measures and market regulations also affect sugar competitiveness in international markets (Boddewyn & Brewer, 1994). Policy changes in a few major sugar producing countries lead to market imperfections in the world market and can cause dynamic changes in the competitiveness of other nations (Borrell & Duncan, 1993; Banerjee, 2004). This has important implications for competitiveness of sugar industries in developing countries like Ethiopia (Christoffersen, 2002).

The complex issue of competitiveness has to be conceptualized at different levels of analysis (Porter, 1990). In the context of sugar industry, both comparative and competitive advantage approaches are essential to assess factors that determine competitiveness of the sector (Banerjee, 2004). According to Depperu & Cerrato (2005), competitiveness in sugar industry can be assessed by comparing its performance with the same industry in another country. As pointed out by Winter & Prohaska (1983), the comparative method employs similarities and differences between objects and issues to draw systematic comparison.

Thus, this study has adapted a framework to understand potential international competitiveness of the sugar industry that combines the concept of comparative advantage and the concept of competitive advantage, taking multiple case study approach by focusing on selected major sugar producing countries (Goodrick, 2014; Bartlett & Vavrus, 2017b). The framework mainly focused on the role of government interventions (government policies and programs) on competitiveness of the sugar industry in selected sugar producing countries.

The conceptual framework of this study is illustrated in the following figure.

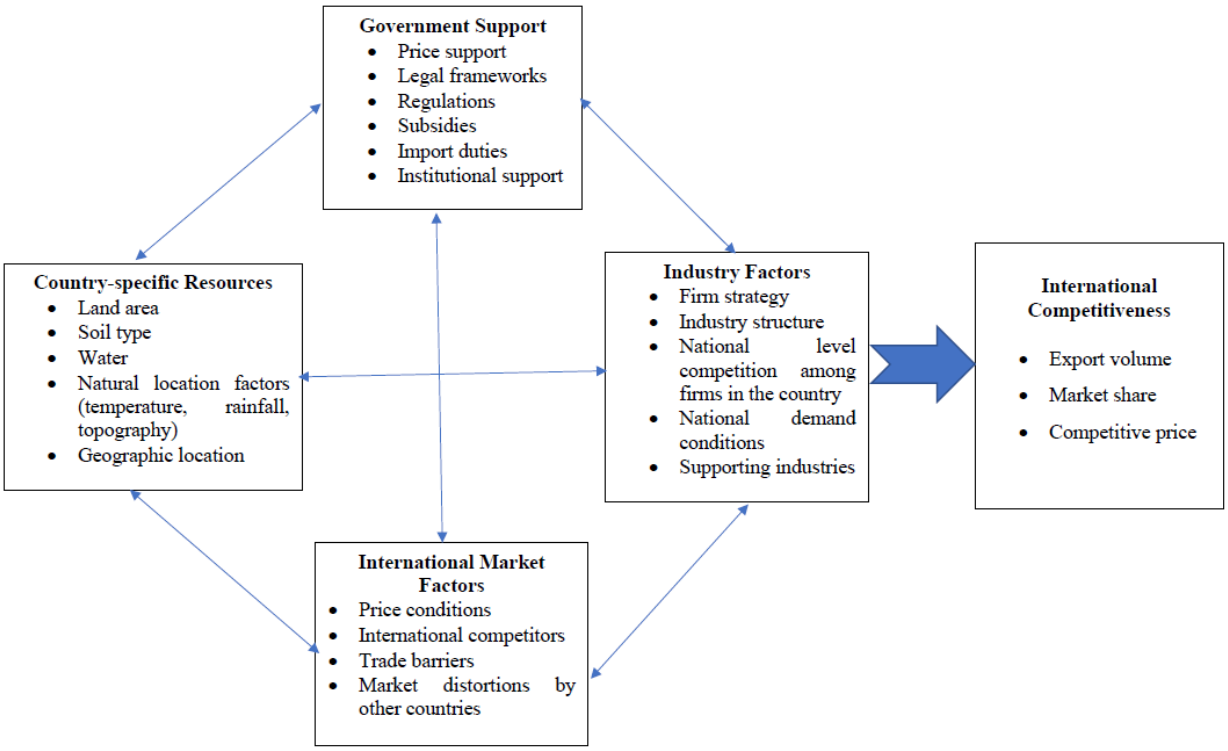

Fig. 1 Conceptual framework for the study

Source: Adapted from Porter (1990), Boddewyn & Brewer (1994) and Zimmermann & Zeddies (2001)

Chapter 3. Research Methodology

3.1. Introduction

This chapter presents the research methodology that the researcher used to undertake the study. It describes the approach and strategy that was used to undertake the study. The chapter also describes data types and sources, and the methods used to analyze the data.

3.2. Research paradigm

Positivism and phenomenology are considered to be two main research paradigms, while pragmatism utilizes the strengths of both philosophies (Collis & Hussey, 2003). Positivism is based on rationalistic philosophy with the underlying assumption of existence of a single reality as an objective truth (Guba & Lincoln, 1994), while the phenomenological paradigm considers that reality is subjective with interrelationships as understood by participants of the study (Maxwell, 2012). Pragmatism acknowledges the strengths and limitations of both positivism and constructivism in understanding reality (Johnson & Onwuegbuzie, 2004; Morgan, 2007). Pragmatic research paradigm focuses on the practical outcome of the research (Tashakkori & Teddlie, 1998). Pragmatism as a research paradigm is considered as the philosophical partner of mixed method research (Johnson & Onwuegbuzie, 2004) as it accepts using both qualitative and quantitative approaches (Leedy & Ormrod, 2005; Morse, 2016).

As it is a complex undertaking to analyze the competitiveness of the sugar industry sector, this study adopted a pragmatic approach to make assessment of government policies and programs adopted in major sugar producing countries to enhance competitiveness of sugar industries and gain lessons for the Ethiopian sugar industry.

3.3. Research approach

Quantitative and qualitative research methods are the two common methodological approaches in research (Denzin & Lincoln, 2000). The third approach, the mixed methods approach, provides a deeper understanding of the research problem by combining qualitative and quantitative approaches (Creswell, 2003). It, thus, combines the depth and strengths of quantitative and

qualitative approaches while overcoming the limitations of both methods (Creswell & Creswell, 2018).

Mixed methods research combines the use of both quantitative and qualitative method of data collection and analytical procedures (Creswell, 2003; Creswell & Creswell, 2018). Depending on the nature and purpose of the study, it may use quantitative research and qualitative research methods equally or unequally (Creswell & Clark, 2011). Hence, the weight given to either the quantitative or qualitative research methods may vary (Creswell, 2003), so that one research method has a dominant role, with the other having a supporting role, depending on the purpose of the research project (Saunders, et al., 2016).

Mixed methods research also makes use of multiple approaches in collecting and analyzing data (Creswell, 2003) in order to provide better understanding of a research problem (Creswell & Creswell, 2018). Thus, considering the advantages and strengths of mixed research methods as well as the complexity of the research problem, this study adopted a mixed methods research approach.

3.4. Research design

Research design refers to the general plan of the study that shows how to go about answering the research questions (Saunders et al., 2016). The importance of the research design is thus to provide a framework and direction to the study in the most efficient manner (Creswell, 2003). Research designs include exploratory, descriptive, explanatory, evaluative or a combination of these (Collis & Hussey, 2003).

A research strategy is a plan which a researcher will use for answering research questions (Saunders et al., 2016). The choice for a particular research strategy will, therefore, depend on the type of research questions of the study (Saunders et al., 2016). The survey strategy is very popular in business research, because it allows the researcher to collect quantitative and qualitative data on several types of research questions (Hair et al., 2020). A case study strategy, on the other hand, is used to generate insights from an in-depth study of a phenomenon in its real-life context (Yin, 2014).

A key advantage of the case study is that it helps to assess the holistic features of a business in its natural setting (Remenyi, Williams, Money & Swartz, 1998; Bartlett &Vavrus, 2017a). The case study can also accommodate the issue of business complexity (Yin, 2014) and, thus, it allows the researcher to explore different processes that can contribute to holistic understanding and lead to explanation (Creswell & Creswell, 2018). Since the case study approach helps to understand complex issues in their real-life settings (Yin, 2015; Creswell & Creswell, 2018), a case study research methodology was used in this study.

Goodrick (2014) suggested that the use of comparative case studies helps to analyze the similarities and differences involving two or more cases. Moreover, according to Bartlett & Vavrus (2017b), the comparative case study approach enables the researcher to simultaneously study multiple aspects of the subject area. The multiple case study method is also suitable for international business research in which data is collected from various countries and cultural settings (Goodrick, 2014). The comparative case study method also allows the researcher to work flexibly by using multiple data sources and helps to generate more comprehensive findings by comparing cases (Eisenhardt & Graebner, 2007; Bartlett & Vavrus, 2017b).

Therefore, considering the nature of the research project, a comparative case study method (Goodrick, 2014; Bartlett & Vavrus, 2017b) was adopted for this study.

3.5. Selection of cases

As the methodological approach used for the study is an exploratory comparative case study (Bartlett & Vavrus, 2017b), there was a need for purposeful selecting of most representative cases for the study. As Patton (2002) suggests, the importance of purposeful sampling emanates from the need for comprehensive understanding of the issue which leads to selecting relevant cases for the study. Hence, the primary criterion for case selection is relevance of the case to the research objective of the study (Bartlett & Vavrus, 2017b).

Thus, the cases for this study were chosen based on purposeful sampling and cases that are the most representative for the study were selected. The particular countries examined in this study were selected based on preliminary assessment of their historical performance in their sugarcane

and sugar production, their performance in sugar export and trends in relative competitiveness of their sugar industry in the past few decades.

3.6. Sources of data

It is difficult to get first-hand accounts of historical events of the sugar industry without using secondary data published in some form (Banerjee, 2004; Sheetal et al., 2020). It is also difficult to collect adequate longitudinal data from primary sources such as using interviews which is mostly subjective assessment based on opinions and perceptions of individuals on the subject (Denzin & Lincoln, 2005). Moreover, reliable aggregated data over long years can only be obtained from secondary documents and databases (Dale, et al., 1988).

Hence, this study was undertaken using secondary data which was extracted from various publications, documents and databases. Thus, multiple secondary data sources were used to undertake the study.

3.7 Data collection methodology

Both quantitative and qualitative data was collected for the study. The study considered trends in sugar production, sugar pricing issues, market structure, trade data, sugar policy issues, and government interventions that influence sugar industry competitiveness in major sugar producing countries. The data collected and analyzed was for a period of 20 to more than 50 years, based on the availability and accessibility of the data. Particularly, the study mainly used secondary data from the selected three major sugar producing countries between 1961 and 2021 to explore government policies and programs that enhanced competitiveness in the sugar industries of the countries.

The data and information used for the study regarding the global sugar industry was obtained from secondary sources which include books, published government records and reports as well as review of global literature. Particularly, the data for the selected countries was obtained from published books, research reports, and the database of relevant international organizations. Sugar industry policy and strategy documents of the selected major sugar producing countries were also reviewed to obtain relevant information. The data for the Ethiopian sugar industry was collected

from company reports, publications of international organizations, research reports, books, and reports from relevant government institutions.

3.8 Data analysis methods

In a comparative case study analysis, the cases are compared to draw similarities or differences until the researcher finds appropriate information to answer the research questions (Bartlett & Vavrus, 2017b). As the data was gathered continuously during the project, the analysis of the data was done in iterative steps, moving back and forth between the data sources as recommended by Dawson (2009).

The collected data was analyzed using both qualitative and quantitative methods as suggested by Creswell & Creswell (2018). Qualitative data which mainly includes sector specific government policies and programs used by each country in promoting their sugar industry was analyzed by first summarizing the information gathered, followed by categorization and presenting in a narrative form. Quantitative data which mainly includes sugarcane area, sugarcane production, sugar production and sugar exports was sorted, organized and then analyzed by using Microsoft Excel to visualize and to present the data in a meaningful way.

An analysis was carried out to compare how differently the sugar industries in the selected countries compete within the world sugar market and gain a competitive advantage. The analysis was based on the framework of comparative analysis to understand the government policies and programs that enhanced global competitiveness of the sugar industries in the selected countries. Conceptual analysis of government policies and programs that promoted industry competitiveness and domestic producers support or protection was made. Finally, a descriptive-analytical narrative was used to present the findings from the study.

3.9 Validity and reliability

The collected data was checked for consistency and missing values before using them for further analysis. In order to check and establish the validity and to increase the accuracy of the research, Data Triangulation (Begley, 1996; Yin, 2015) was used to verify the similarities of data obtained from different sources. Thus, to ensure the authenticity of the information, the data used for the study was collected from multiple secondary sources.

3.10 Research ethics

The study was undertaken consistent with sound ethical principles. The sources of data for the study were clearly indicated. Also, all appropriate ethical considerations were observed during the study.

Chapter 4. Results and Discussion

4.1 Introduction

This chapter presents how different countries have crafted different policies and programs for their sugar industry in order to improve international competitiveness. The first section of the chapter provides some background information on the world sugar industry. Then it discusses the sugar industry in the selected three major cane sugar producing and exporting countries including government interventions and impacts of the government policies and programs in the sugar sector. Comparison of the government policies and programs used in the three countries is presented. Finally the sugar industry in Ethiopia is discussed in view of obtaining some lessons from the major cane sugar producing countries.

4.2 Overview of World Sugar Industry

4.2.1 Sugarcane and sugar production in the world

Sugar is being produced in more than 110 countries either from sugarcane or sugar beet (ISO, 2019; Rastogi & Sengupta, 2021). The global production of raw sugar reached 182 million tons in 2017 (FAO, 2021). However, only 10 countries contribute for about 70% of that production (ISO, 2019). Another product of significant importance that can be produced from the sugar industry is ethanol, which can be used for a number of purposes including as a fuel for vehicles (Mitchell, 2004). Sugarcane can also be used for cogeneration of electricity from sugar by-product called bagasse (Murali et al., 2021)

Sugarcane supplies about 80% of the globe's sugar, the remaining coming from beet (Amrouk & Heckelei, 2020). FAO database reveals that the sugarcane is primarily used as raw material for sugar and ethanol production in more than 100 countries having tropical climatic conditions (FAOSTAT, 2019; FAO, 2021). However, only a few countries contribute the greater share of global sugarcane production. According to ISO (2017), Brazil, India, China, Thailand and Pakistan produced approximately 75 percent of the total world sugarcane production during 2012. Brazil alone contributed about 40 percent of the total sugarcane production in the world during the first decade of 21st century (FAOSTAT, 2019).

4.2.2 Characteristics of sugar industry

One special characteristics of sugar production is that it has two cost components, agricultural farming and factory processing, which are interdependent (Meyer et al., 2011). Thus, in most countries, sugarcane producers and sugar millers are separate business entities that can achieve economic efficiency only through mutual cooperative actions (Larson & Borrell, 2001; KPMG, 2007).

Another important characteristic of sugarcane is that the cane stalks cannot be stored after they are harvested (FAO, 1998). Sugar cane starts to degrade soon after the cutting of the cane (Meyer, et al. 2011). Thus, the harvested sugarcane should be transported to the sugar mill as soon as possible (Singh, 2020). Hence, the logistics for the sugarcane transport to the mills need to be well planned (Banerjee, 2004). On the other hand, the inability to store sugarcane requires a long harvest season to maintain the sugar mill operation cost-effectively (Kaup, 2015).

Another important characteristic of the sugar industry is that global sugar prices are highly volatile (FAO, 1996). This volatility is partly caused by the supply and demand characteristics of the global sugar market (ISO, 2019). On the supply side, it is difficult to make a prompt supply response during a period of sharp price decline due to the perennial nature of the sugarcane crop, which is the dominant crop used for production of sugar (Rastogi & Sengupta, 2021). Likewise, sugar demand is relatively not responsive to price fluctuations in the short run (Amrouk & Heckelei, 2020).

4.2.3 Major sugar producing and exporting countries of the world

The global raw sugar production reached 182 million tons in 2017 (FAOSTAT, 2019; OECD/FAO, 2021). The largest sugar producing country is Brazil, which increased its share in the world to 22 percent in 2017 (FAO, 2021). Brazil, India and Thailand are the three leading cane sugar producing countries during 2022 (OECD/FAO, 2022).

Sugar is widely traded in the global market, with global sugar trade constituting around 26% of annual production, the balance being used for domestic consumption (FAO, 2021). The global sugar market is dominated by Brazil, which is the largest sugar producer and exporter (ISO, 2019).

Between 2010 and 2014, Brazil accounted for 26% of the global sugar production (OECD/FAO 2016). Brazil also has an industry that easily switches for producing sugar for exports and producing ethanol directly from sugarcane for domestic use (OECD/FAO, 2022).

The 10 largest cane and beet sugar producers and their production during 2016 and the top 10 largest sugar exporters during 2019 are presented below (Table 1 & 2).

Table 1. The 10 largest cane and beet sugar producers and their production during 2016

Sugar produced from sugarcane			Sugar produced from sugarbeet		
Rank	Country	Production (in thousand metric tons)	Rank	Country	Production (in thousand metric tons)
1	Brazil	38,990	1	EU-28	15,240
2	India	24,790	2	Russia	5,770
3	Thailand	9,260	3	USA	4,240
4	China	9,080	4	Turkey	2,370
5	Mexico	6,090	5	Ukraine	2,000
6	Pakistan	5,610	6	Egypt	1,380
7	Australia	4,620	7	China	910
8	USA	3,510	8	Iran	810
9	Guatemala	2,900	9	Japan	610
10	Indonesia	2,230	10	Belarus	590

Source: International Sugar Organization Sugar Year Book (2017)

Table 2. The Top 10 largest sugar exporters during 2019

Rank	Country	Crop type used for sugar production	Export (in million metric tons)
1	Brazil	Sugarcane	25.51
2	Thailand	Sugarcane	18.11
3	India	Sugarcane	16.20
4	Australia	Sugarcane	10.55
5	Mexico	Sugarcane	10.24
6	Guatemala	Sugarcane	6.95
7	South Africa	Sugarcane	5.95
8	Eswatini	Sugarcane	5.35
9	Cuba	Sugarcane	4.09
10	Pakistan	Sugarcane	3.19

Source: International Sugar Organization (https://isosugar.org/sugarsector/sugar

According to ISO (2019), the export of sugar is dominated with Brazil, India, Thailand, Australia, and EU, which together account for 65% of world sugar exports. Brazil is the main sugar exporting country with a share of about 35.7% in 2020 (about 35.0% in 2019), followed by Thailand with a share of about 19.8% in 2020 (18.9% in 2019) (ISO, 2019; OECD/FAO, 2021). India is the largest sugar consuming country with a share of about 14.0% in 2020 (about 15.4% in 2019) whereas Indonesia and China are the largest importers of sugar with a share of about 7.9% in 2020 (10.5% in 2019) and about 8.1% in 2020 (8.0% in 2019), respectively (OECD/FAO, 2022).

4.2.4 Government interventions in the sugar industry around the world

Sugar is one of the most protected agricultural commodities in the world, as governments seek to protect domestic producers from low prices in the global market through the implementation of various policy instruments and programs (FAO, 1996; Mitchell, 2004). The countries have various reasons to protect the sugar sector, which mainly include food security, income redistribution, price stabilization, generation of tax revenue, efficient use of resources, economic development and employment generation (FAO, 1996; Larson & Borrell, 2001; Roney, 2003).

On the other hand, government policy interventions in the domestic sugar markets affect global and domestic sugar prices, incomes of sugarcane growers and sugar producers as well as investment decisions (Larson & Borrell, 2001). Particularly, the policies and programs of countries that dominate the global sugar market influence those of less important players as interventions by major sugar producing countries lower world sugar prices (Mitchell, 2004; Rastogi & Sengupta, 2021).

As the policies and programs implemented by different countries have various objectives and a variety of policy instruments are used to pursue their objectives (Mitchell, 2004; Pop et al., 2013), government interventions and policies towards the sugar industry were studied through consideration of the three dominant cane sugar producing and exporting countries: Brazil, India and Thailand. The three countries for the case study were selected based on their historical performance in sugar production and their global share of cane sugar production and export performance in the past few years as indicated above in Table 1 and Table 2.

4.3 The Sugar Industry in Brazil

4.3.1 Overview of the Brazilian sugar industry

The history of sugarcane and sugar production in Brazil is almost 500 years old. According to Kaup (2015), the first sugar mill in the country was established in 1532, following the beginning of colonization of Brazil by the Portuguese empire. Sugar was the most exported product from the country during the colonial period and, as a result, sugar cane became an important agricultural crop in the Brazilian economy (Sajid, et al., 2021).

Sugarcane is the most important crop in in the country, with a total production of 667.5 million tons and cane planted area of 8.99 million hectares in 2019 (Karp *et al.,* 2021). Economic activities in the sugar and ethanol sector have generated around one million jobs (Ferraz et al., 2014), and according to Karp *et al.* (2021), about 3.2% of employees in the agricultural sector were engaged in the farming and production activities in the sugarcane chain in 2017.

The sugarcane industry's most important products in Brazil are sugar, ethanol, and, more recently, electric energy (Ferraz et al., 2014; IEA Bioenergy, 2021). Besides production of sugar for domestic and export markets, a large share of the sugarcane crop is allocated to the production of ethanol for use as a fuel substitute for vehicles (Giersdorf, 2013). As a result of this dual use of sugarcane, the sugar industry in Brazil is closely associated with the domestic fuel ethanol industry (OECD, 2005; Karp *et al.,* 2021).

Brazil has 435 sugarcane mills, about 39 percent of which are pure distilleries used for making only ethanol, while only 16 (about 4%) of which are pure sugar mills (Chatenay, 2013). In Brazil, the flexible production of sugar and/or ethanol from sugarcane is a function of their prices on the domestic and international markets (ISO, 2019). Accordingly, about 50% of sugarcane in Brazil was used to produce fuel alcohol while the remaining 50% was used to produce sugar during the last few years (OECD/FAO, 2022). In 2019/2020, the percentage was even higher, with around 66 percent of the sugarcane produced in Brazil used to produce ethanol; while the remaining was used to produce sugar (Karp *et al.,* 2021)

Brazil is the leading sugar exporter as well as the third largest sugar consumer in the world (OECD/FAO, 2022). It is the most rapidly growing source of both white and raw sugar in the world market since the mid-1990s (Kaup, 2015). Sugar exports increased more than eightfold between 1990 and 2002 with the country's world market share rising from 6 to 31% over the same period (FAOSTAT, 2019).

Brazil is also the price leader on the global sugar market, being one of the low-cost sugar producers in the world (FAO, 2021). Brazilian sugar and ethanol producers have a large domestic market for ethanol and are able to switch production considerably between the two products based on the market demand (Kaup, 2015). Hence, based on the prevailing market price of the two products, millers switch sugarcane to sugar production, if sugar pays well; otherwise, they shift to ethanol production, if ethanol pays better (Sajid et al., 2021).

Brazil's comparative advantage in sugarcane production basically emanates from an abundance of farmland as Brazil is endowed with vast agricultural resources (FAO, 1996; OECD, 2005). However, Brazil's success with sugar production cannot be explained exclusively as deriving from a natural comparative advantage (OECD, 2005; McKay et al., 2015). According to Chatenay (2013) and McKay et al. (2015), the role of the government interventions in developing Brazil's sugar-ethanol industry complex was very significant.

4.3.2 Production and export performance of the Brazilian sugar industry

Today, Brazil is the top world sugar producer with 42.1 million MT in 2020/21, approximately 22 percent of the global production (GAIN, 2023a). Brazil is also the largest producer of sugarcane in the world with a production volume of more than 621 million tons of sugarcane in 2022/23 (GAIN, 2023a). The production of cane in Brazil has increased considerably starting in 2000 (Kaup, 2015). Within 10 years, between 2000/2001 and 2010/2011, the production of sugarcane increased to 620 million tons (more than 140%). Besides, the cane area expanded by more than 65% (from 4.8 million ha in 2000/2001 to more than 8 million ha in 2010/2011) (Kaup, 2015; Sajid et al., 2021).

Exports of sugar from Brazil also have grown at a great rate from just over 1 million tons in 1990 to around 14 million tons in 2003, making the country the top exporter to the global market (OECD, 2005; FAO, 2021). Brazil is also the second biggest producer of ethanol in the world (with about 27% of the world total, mostly produced from sugarcane), behind the United States (whose ethanol is produced mostly from corn) (Kaup, 2015; McKay et al., 2015).

Trends in sugar production in the recent 20 years (2000/01 – 2020/21) in Brazil is presented below.

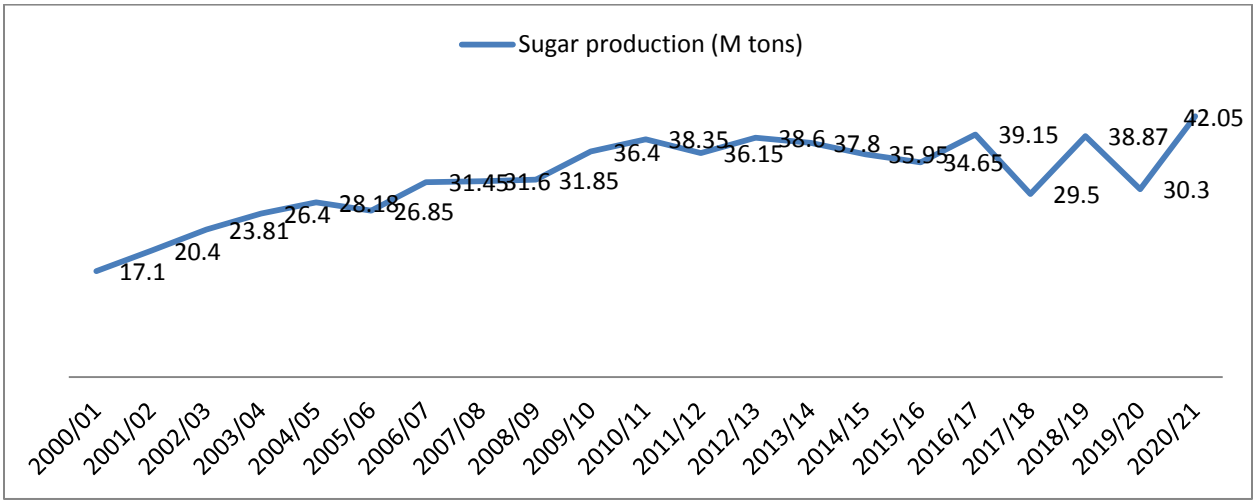

Fig. 2Trends in sugar production (M mt) in Brazil (2000/01 – 2020/21) (Source: GAIN (2022c)

4.3.3 Government policy support for the sugar industry

Review of literature shows that the emergence and development of the sugar industry in Brazil is vitally associated with government intervention and support to the sector (Chatenay, 2013; Azanha et al., 2014). According to Chatenay (2013), the Brazilian government practically started involving itself in the production planning of the sugar-ethanol industry with the formation of the Sugar and Ethanol Institute known as the *Instituto do Açúcar e do Álcool* (IAA) in 1933. Between the 1930s and 1960s, there were extensive interventions by the government including regulating production amounts, fixing selling prices, as well as establishing marketing standards (Azanha et al., 2014). For instance, mandating ethanol blend of 5 percent for fuel in vehicles was started in 1931 (OECD, 2005).

The second phase of large-scale government intervention in the sector started in the 1970s (Chatenay, 2013). The earlier measures (such as regulations on production and fixing prices) remained in place, and the government focused on increasing sugar exports, due to the favorable conditions in the global markets at that time (Ferraz, et al., 2014). Moreover, the government started to implement measures designed to stimulate both production and demand in ethanol. The government established the National Ethanol Program known as *Programa Nacional do Álcool* (Proálcool), the primary goal of which was to stimulate the production of sugarcane ethanol. To achieve its intended objectives, the Proálcool plan set forth well-defined regulations for production and marketing of ethanol, and also measures to protect producers from market risks (Azanha et al., 2014).

According to McKay et al. (2015), the current level of development of the sugar industry in Brazil is mainly the result of the 1973 oil crisis and the government's response to it. Worried about the impact of rising energy prices due to an oil embargo by the Organization of Arab Petroleum Exporting Countries (Ferraz, et al., 2014), a deteriorating balance-of-payments and dependency upon foreign fuel supplies, the Government of Brazil decided to stimulate the production of ethanol from sugarcane to be blended with gasoline for use in vehicles as fuel (Azanha et al., 2014). This resulted in the launching of the "Proálcool" program in 1975 (Chatenay, 2013).

With the Pró-Álcool initiative, the government of Brazil provided various incentives including subsidies and credit guarantees for the expansion of ethanol distilleries and sugar processing plants, and increasing the ethanol blend mandate for vehicles in order to stimulate domestic ethanol production from sugarcane (Azanha et al., 2014; McKay et al., 2015).

The types of government interventions and policy support to the Brazilian sugar industry can be categorized as follows:

1) **Mandatory blending of ethanol with petroleum**

In 1933 the Sugar and Alcohol Institute (IAA) had been founded in order to regulate sugar production by means of production quotas, providing price guarantees for products and by commercializing the sugar in the domestic and global market (Giersdorf, 2013). Following the oil

crises in 1973 and 1979 and subsequent rise in cost of imported oil, the Government of Brazil established the *Proalcool* programme, which was intended to advance the substitution of imported crude oil with domestically manufactured ethanol from sugarcane (OECD, 2005). The ethanol program involved various government interventions, which included compulsory blending of ethanol with gasoline for vehicles, building infrastructures for ethanol distribution at fuel stations, and the introduction of vehicles running on 100% ethanol (Azanha et al., 2014; Ferraz, et al., 2014).

The vital element of the ethanol policy in Brazil was the compulsory blending of ethanol with gasoline for use as transport fuel in vehicles (Azanha et al., 2014). The government sets the blending rate of ethanol in each year, which can vary between 20% and 25% (Sajid, et al., 2021). The government adjusts the percentage of the ethanol blend depending on fuel prices and the supply of ethanol (Mingo & Khanna, 2013).

2) Incentivizing ethanol-fueled cars

Other interventions by the government include supporting major manufacturers of vehicles in the country to produce vehicles that could run on pure ethanol (Mingo & Khanna, 2013); demanding public organizations to purchase 100% ethanol powered vehicles (McKay et al., 2015); providing storage credits to sugar millers (OECD, 2005); and putting a preferential excise tax rate which favours the use of ethanol over petroleum (Ackrill & Kay, 2014). The introduction of flex-fuel vehicles, which are capable of running on petrol, ethanol or any combination of the two in 2003 and government incentives for the adoption of these vehicles (Mingo & Khanna, 2013) further benefitted the sugar-ethanol industry of Brazil (Azanha et al., 2014; McKay et al., 2015).

Several initiatives were taken by the government to stimulate demand for ethanol-fueled cars, which included: fixing the price of ethanol below that of petrol; setting of tax for ethanol-fueled cars below that for petrol-fueled cars; and setting longer repayment periods for loans used for the purchase of ethanol-fueled cars (Ferraz, et al., 2014). The combination of these government incentives resulted in adoption of more ethanol-fueled and flex-fuel vehicles (Azanha et al., 2014).

3) Limiting competition by preventing purchase of private diesel vehicles

The other intervention by the government to support the sugar-ethanol industry in Brazil was limiting competition in the automobile industry by preventing acquisition of private diesel vehicles (Azanha et al., 2014; McKay et al., 2015). This very strict regulation by the government on vehicle choice also has shifted the vehicle market in favor of ethanol-fueled and flex-fuel cars which further promoted ethanol production and consumption (Chatenay, 2013).

4) Price support for ethanol

On strictly economic terms, ethanol was not competitive with petrol because the cost of its production was higher than that of gasoline (Azanha et al., 2014). Moreover, to be considered attractive by users, the price of ethanol should be 75% of the price of petrol, because ethanol fuel has lower energy efficiency in vehicles (Chatenay, 2013). So, one of the main policy tools of the government from 1979 was, thus, ensuring ethanol prices were below gasoline prices (Ackrill & Kay, 2014). To this end, the government devised a price support mechanism for ethanol producers (Chatenay, 2013). By providing this price support mechanism, the government guaranteed ethanol producers a price that provided a reasonable profit and minimized their risk of loss from ethanol production (Ackrill & Kay, 2014; Azanha et al., 2014).

5) Financing infrastructure development

Besides its control over the mandatory amount of ethanol blended into gasoline, the government of Brazil extended finance for building distribution infrastructure to ensure market outlets for ethanol sales and, thus, indirectly support its sugarcane growers (McKay et al., 2015). In 2011, the government financed the construction of a giant 830 miles long ethanol pipeline connecting ethanol production centers to major consumption sites in the country's southeast (Mingo & Khanna, 2013). In addition, the government made it obligatory for petrol stations to install ethanol pumps in all towns with a population of at least 1500 (Mingo & Khanna, 2013). These distribution infrastructures allowed ethanol to be sold in almost all gasoline filling stations in the country (McKay et al., 2015).

6) Credit and soft-loans

The Brazilian government also supported sugarcane producers by providing favourable credit terms (Chatenay, 2013). To make sure that enough sugarcane was available for production of

ethanol, the government started a subsidized credit program known as Prorenova in 2012 (Sajid et al., 2021). The program was intended to promote sugarcane production by providing finance for renovation of old sugarcane farms and expansion of new cane areas (McKay et al., 2015). Millers also received credit at preferential rates (Chatenay, 2013). Moreover, the government also made substantial loan forgiveness for sugarcane producers (Martinelli, et al., 2011).

7) Tariffs and taxes

One of the main policy tools used by the government of Brazil to support the development of its domestic sugar-ethanol industry has been the taxation policy (Azanha et al., 2014). The policy mix deployed includes implementation of favourable taxation for ethanol and heavy taxes for fossil fuels (Khanna et al., 2015). The Brazilian government also extended tax exemption to flex-fuel vehicles and ethanol-fuelled vehicles (Chatenay, 2013). This made it possible to sell an ethanol vehicle at a reasonable price (Mingo & Khanna, 2013).

8) Subsidy

The state also intervened by providing subsidies for sugarcane producers (McKay et al., 2015), particularly for less-competitive sugarcane producers in the northeast region of Brazil (OECD, 2005). The government of Brazil also provided subsidies to sugarcane and ethanol producers on inputs such as fertilizers and equipment (Hudson, 2019).

9) Institutional support

Over the years, the government established various institutions which were instrumental in promoting the sugar-ethanol industry in Brazil (Sajid et al., 2021). The IAA, which was established in 1933, was responsible for controlling the international sugar trade in Brazil and also to balance domestic production and consumption of sugar and ethanol in the country (McKay et al., 2015). The implementation of the Proálcool programme as an import substitution measure was mainly carried out by two institutions: the IAA and Petrobras (Ackrill & Kay, 2014). The IAA controlled the production and exports of sugar and ethanol by implementing a production quota and by fixing domestic price for ethanol (Sajid et al., 2021), while Petrobras, Brazil's state-owned monopolistic oil company, controlled domestic ethanol sales and distribution (Mingo & Khanna, 2013).

4.3.4 Impact of government policies and programs on the sugar industry

The historical development of the sugar and ethanol industry in Brazil shows that the government has boosted the sugar-ethanol industry through state interventions and various support mechanisms to the industry (Sajid et al., 2021). Brazil's government policies and programs have helped for the expansion of the sugarcane sector by providing a guaranteed market for cane producers (Ackrill & Kay, 2014). In particular, the government mandated blending of ethanol with gasoline for transport vehicles provided a guaranteed market for about 25 to 35% of the sugarcane output (Sajid et al., 2021).

The Proálcool programme helped the sugar industry to diversify the use of sugarcane and expand the production of capital goods in related industries (Ackrill & Kay, 2014). The addition of distilleries (and the corresponding increase in milling capacity and ancillary services) to sugar factories due to the Proálcool programme has also permitted sugar producers to exploit economies of scale that they would have been unable to do in the absence of the programme (McKay et al., 2015). Co-producing sugar and ethanol also helps to extend the milling season and allows greater use of fixed capital (McKay et al., 2015), thereby lowering the cost of production of sugar and increasing export of low-cost sugar to the global markets (Chatenay, 2013).

The implementation of the Proálcool program resulted in significant expansion in sugarcane area and increase in sugarcane production during that period (Kaup, 2015; GAIN, 2023a). Production of sugarcane increased from a level of 66 million tons during 1962-66 to 154 million tons during 1981 and made the country the largest producer of sugarcane in the world with corresponding increase in sugarcane area from 1.51 to 4.54 million hectares during the same period (Chatenay, 2013). In 1975, when the Pró-Álcool began, sugarcane was production in Brazil was only 91.4 million tons from 2.08 million hectares of cane planted area (Karp *et al.*, 2021). Between 1975/76 and 1990/91, following the implementation of the program, sugarcane production increased more than 200% from 68.5 to 222.4 million tons (Chatenay, 2013).

Thus, the current achievement of the Brazilian sugar industry can be considered as the cumulative result of long years of government interventions and support to the industry as the current capacity

of supplying sugar at low price to the international market would not exist without past subsidies (Chatenay, 2013).

Growth in sugar production after implementation of the Pró-Álcool Programme in Brazil is presented below (Fig. 3).

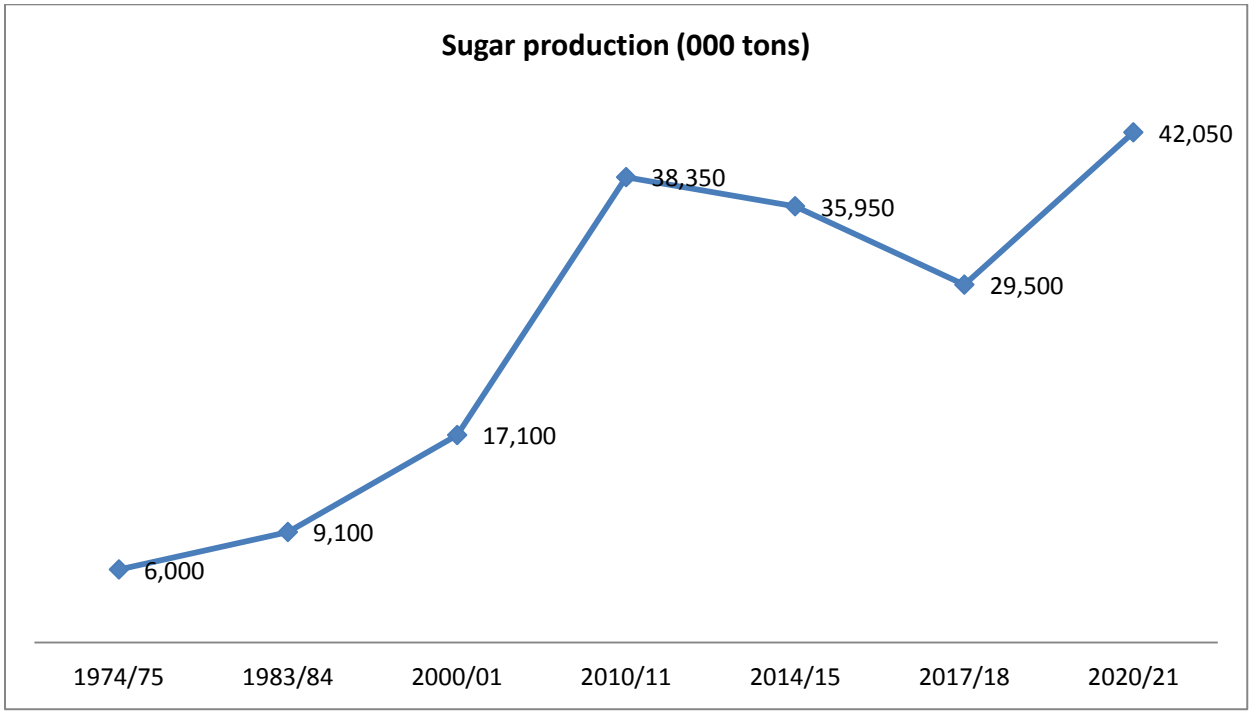

Fig. 3 Growth in sugar production after implementation of the Pró-Álcool Programme in Brazil
Source: Adapted from FAOSTAT (2019) and OECD/FAO (2022)

4.4 The Sugar Industry in India

4.4.1 Overview of the Indian sugar industry

After Brazil, India is the second largest producer of sugar in the world and it is the largest consumer of sugar (Deloitte India, 2021). However, it exports small percentage of its sugar production due to large domestic demand (Rastogi & Sengupta, 2021). Sugarcane is a major crop in India, accounting for almost 5% of total agricultural output (Singh, 2020), and sugar processing industry is the second largest agro-industry in India after textiles (OECD/ICRIER, 2018).

The development of the sugar industry in India started back in 1824, with the establishment of the first sugar mill (Sheetal et al., 2020). Then, in 1904, the first modern sugar factory was established in Bihar, with the setting up of the first vacuum-pan sugar processing plant (Sheetal et al., 2020). By the end of the 20th century, the area cultivated with sugarcane in the country increased to 4.4 million ha. In 2021, sugarcane was being cultivated on more than 5 million hectares, and processed in 530 sugar mills (Deloitte India, 2021). The sugar industry is an important agro-industry in the country and supports livelihoods of about 60 million sugarcane farmers as well as 600,000 workers directly employed in the sugar mills (Singh, 2020).

One important characteristics of the sugar industry in India is the existence of modern centrifugal mill sugar production side by side with a significant size of cottage industry that manufactures open-pan sugar (Meriot, 2016; OECD/ICRIER, 2018). Another characteristic of Indian sugar industry is the smaller size of sugar mills and sugarcane farms, which impacts the scalability of operations as well as the productivity of the sugar sector (Singh, 2020). More than 65 percent of sugarcane farming in India is undertaken on a landholding of less than one hectare of land (Deloitte India, 2021). Most of the sugar factories are also operating at a milling capacity of less than 3000 TCD with a small proportion of mills working at a capacity of 5000 TCD to 7500 TCD (Rastogi & Sengupta, 2021).

4.4.2 Production and export performance of the Indian sugar industry

India is the second largest producer of sugar in the world with about 15 percent share in the global sugar production (GAIN, 2022b). The area under sugarcane crop increased from about 1.7 million

hectares in 1950/51 to about 4.84 million hectares in 2019/20 (Singh, 2020). India has produced 306 million tons of cane and 25.6 million tons of sugar on a harvested area of 4.38 million hectares of land in 2017/18 (Solomon & Swapna, 2022).

The number of sugar mills in India also increased from 392 in 1991/92 to 529 in 2011/12 (Meriot, 2016); while sugar production has more than doubled from 13.4 million tons to 26.34 million tons during the same period (Singh, 2016). The country is producing up to 30% surplus sugar since 2011/12 (GOI, 2020). The production of surplus sugarcane and sugar has become a problem to the sugarcane farmers and sugar millers due to decline in world sugar prices in some years to less than the production cost in India (GOI, 2017) which, subsequently, led to large cane payment arrears to the sugarcane farmers and financial losses to the sugar processing companies (Murali et al., 2021).

The Indian sugar industry does not show a steady growth (Deloitte India, 2021). There were fluctuations in the amount of sugarcane production and the amount of sugarcane supplied to the mills generating a cyclical pattern in the annual sugar production (Meriot, 2016). Consequently, India has frequently witnessed 3-4 years of surplus sugarcane production which led to excess supply over demand and huge sugarcane payment arrears to the farmers (GOI, 2017). Usually, this scenario creates a decrease in sugarcane production and rise in sugar price in the next few years (Deloitte India, 2021).

Prices of sugarcane in India are regulated by the government (Singh, 2016; GOI, 2017), while sugar prices are determined by the market (Deloitte India, 2021). Accordingly, the sugar mills had to pay a price fixed by the government to the farmers for sugarcane supplied to the mills, regardless of the price of sugar on the market (Meriot, 2016). Thus, during periods of surplus production sugar prices decrease, consequently reducing the ability of the sugar mills to effect payments to the farmers for the cane supplied to the mills, which created a situation known as “arrears” (payments owed to the sugarcane growers by the millers) (Meriot, 2016; GOI, 2017; Rastogi & Sengupta, 2021). During years of high arrears, farmers usually shift from sugarcane cultivation to other crops which results in significant decrease in sugarcane production for the next crop season (Rastogi & Sengupta, 2021), thus pushing up sugar prices (Deloitte India, 2021). On the other

hand, when sugar prices are higher, arrears are paid to the cane growers, restoring their interest in sugarcane cultivation (Murali et al., 2021).

Though India is one of the leading producers of sugar in the world, it does not have competitive edge for exporting sugar to the global market (Singh, 2020). Exporting of sugar, thus, heavily demanded policy support from the government (KPMG, 2007; Deloitte India, 2021). Unlike Brazil, sugarcane cultivation in India is not synchronized with the demand scenario of the sugar sector (Rastogi & Sengupta, 2021). Hence, during years of surplus production and low sugar prices, large stock of sugar reduces profitability of the sugar mills (Murali, et al., 2021).

Total annual sugar production in India has fluctuated but generally increased over the past 20 years (FAOSTAT, 2021), while the domestic demand for sugar has not increased in tandem, and remaining stable at around 25 million tons (Singh, 2020). The trend in sugar production in the recent two decades is presented below (Fig. 4).

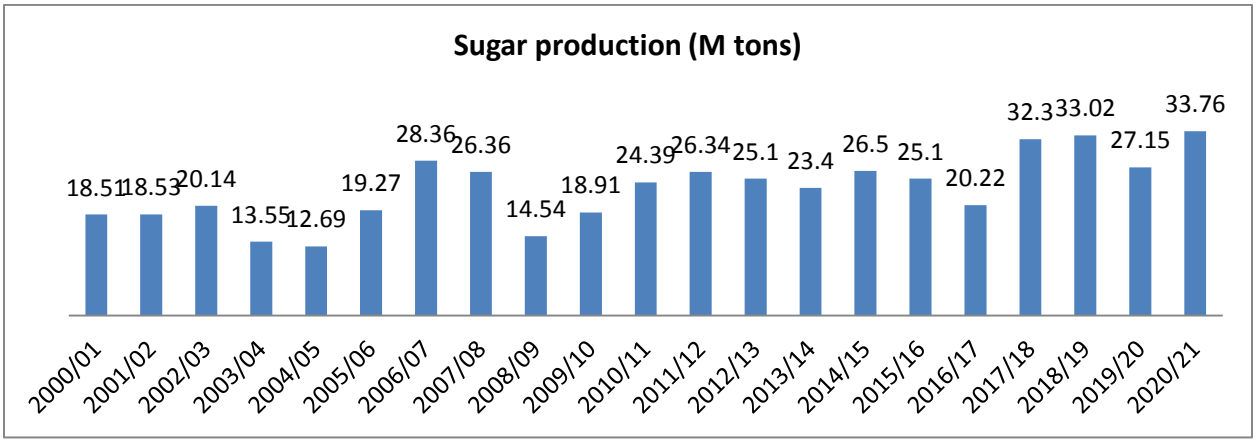

Fig. 4 Annual sugar production in India (2000/01 – 2020/21) (Source: FAOSTAT, 2021)

4.4.3 Government policy support for the sugar industry

According to Rastogi & Sengupta (2021), in India, the sugarcane sector is heavily regulated by the government. Almost all the activities taking place in the sugar supply chain are influenced by regulatory bodies of the federal and state governments (Deloitte India, 2021). The Government of India (GOI) intervened in the sugar industry by enacting regulations and controls at various times

both to promote sugarcane production and to protect the competing interest of sugarcane growers, sugar mills and consumers (FAO, 1998).

The Sugarcane Act 1932 was passed with a view to ensuring the farmers a fair and reasonable price for their cane produce (GoI, 1998), and conferred powers on the regional governments to fix minimum prices for sugarcane (Gangwar et al., 2014). Further, in 1955, the Indian Government enacted "The Essential Commodities Act" that regulates the production, distribution and trade of certain commodities, including sugar, in the interest of the general public (GoI, 1998). Besides, both the central and state governments provided various incentives to support sugarcane growers and imposed additional regulations on the sugar industry over the years (Larson & Borrell, 2001; Meriot, 2016)

The types of government interventions and policy support to the Indian sugar industry can be categorized as follows:

1) **Price support for sugarcane**

The most important intervention by the GOI in the sugar industry is determining the price of sugarcane, by fixing minimum price of sugarcane (GOI, 2017; Deloitte India, 2021). The GOI decided that the price of sugarcane has to be sufficiently attractive to motivate the farmers to grow more sugarcane and ensure the sugar mills will have sufficient cane to crush annually (Meriot, 2016). Thus, the sugar mills are obliged to buy sugarcane at the guaranteed price irrespective of the market price of sugar (GOI, 2020; Deloitte India, 2021).

The system of fixing minimum price for sugarcane by the government has made sugar cane one of the most profitable crops for farmers to grow (Gudoshnikov, Jolly & Spence, 2004). Interestingly, India's sugarcane prices, which are set significantly higher than other major sugar producing countries, are not related to sugar prices either in the domestic market or in the global market (Green Pool, 2021).

2) **Revenue sharing system**

As part of the support mechanism to the sugarcane growers, the GOI implemented a revenue sharing system which bases the calculation of sugarcane prices on a fixed share of the market value of the sugar produced from the cane (GOI, 2017). Thus, the current system of cane pricing practiced in India is based on a 70/30 revenue sharing system, which means 70% of the revenue from sugar sales goes to the sugarcane growers and 30% to the millers (Meriot, 2016; Deloitte India, 2021).

3) **Cane area determination and cane procurement**

The other government intervention in the sugar sector is the practice of allocating sugarcane area for each sugar mill, which ensures secured market for the cane growers as well as guaranteed cane supply to the millers (Deloitte India, 2021). Accordingly, every sugar mill is obliged to obtain sugarcane from designated sugarcane growers within a specified cane reservation area and, conversely, farmers are also obliged to sell to that mill (Singh, 2016).

4) Export subsidy

The high sugarcane prices set by the GOI by way of incentivizing sugarcane growers regularly generates surplus production of sugarcane (Rastogi & Sengupta, 2021). On the other hand, the cost of sugar production in the country is higher than that of major competing countries, and hence sugar exports from India are uncompetitive (Sheetal et al., 2020). Thus, by way of continuing to support surplus production of sugarcane and sugar, the GOI has adopted subsidizing sugar exports as one of several measures to remove the excess sugar production (Lee et al., 2020). Consequently, the government provides export subsidies to millers to promote sugar exports (Deloitte India, 2021)

5) Tariffs and taxes

While providing subsidies to promote sugar export, the GOI controls sugar imports from the global market by imposing high import duty and domestic supply through a levy system (Gudoshnikov et al., 2004). India maintains an average applied tariff of 100% for refined and raw sugar to discourage imports (Hudson, 2019). On the other hand, duty on sugar exports was removed in 2018 to promote export (GOI, 2020).

6) Credit and soft-loans

Besides export subsidies, the GOI also provide credit and soft loans to sugar millers in order to enable them to effect sugarcane payments timely to the cane growers (Meriot, 2016). Loans are also provided to the millers to build ethanol distilling plants in order to stimulate ethanol production from sugar by-products (Green Pool, 2021).

7) Ethanol Blended Petrol (EBP) program

The GOI also started a fuel-ethanol program to support the sugar industry, mainly to find a solution for the excess sugar on the Indian market (Meriot, 2016). Accordingly, the GOI launched its Ethanol Blended Petrol (EBP) program in 2003, initially at a blending rate of 5% (Murali et al., 2021).

Further, since the increased cane production in recent years necessitated diverting the excess sugarcane production to bring balance in demand and supply, the GOI has prepared a new road map in 2018 to increase domestic production of fuel ethanol (Murali et al., 2021). The new EBP Programme, allows ethanol to be produced directly from sugarcane juice and B-molasses, in addition to C-molasses (a sugar by-product with less extractable sugar remaining) in order to absorb surplus sugarcane production (Green Pool, 2021). To incentivize such diversion, the government has also set preferential pricing for ethanol produced directly from B-molasses and sugarcane juice (Green Pool, 2021; Murali et al., 2021). The new EBP programme targets a 10% blending percentage in vehicle fuels by 2021-22, and 20% by 2029-30 (Lee et al., 2020; Murali et al., 2021).

8) Institutional support

The GOI established various institutions to support the sugar industry including the Commission on Agricultural Costs and Prices (CACP) and Ministry of Agriculture & Farmers Welfare, which fixes the minimum price at which mills can purchase sugarcane from the farmers each year (GOI, 2017). The Agricultural Price Commission was set up by the GOI in January 1965 with an objective to fix sugarcane prices on a sound basis (GOI, 1998; KPMG, 2007), and since its establishment statutory minimum price for sugarcane is being fixed every year (GOI, 2020). The GOI also established Sugar Development Fund (SDF) to support the development of sugarcane

and the sugar industry by promoting R&D and providing soft loan for building ethanol distilleries and rehabilitation and modernization of sugar mills (Meriot, 2016; Singh, 2016).

4.4.4 Impact of government policies and programs on the sugar industry

Owing to government interventions and policy support in the sector, sugarcane prices in India are the highest in the world (Meriot, 2016; Rastogi & Sengupta, 2021). These higher prices of sugarcane encouraged more farmers to cultivate the crop (Deloitte India, 2021). In addition to higher prices, sugarcane growers also have an advantage over other crops as they have guaranteed buyers (GOI, 2020). Consequently, sugarcane production in India has significantly increased from 295 million tons in 2000-10 to 377.7 million tons in 2019-20, with a corresponding increase in sugar production from 18.5 million tons to 27 million tons during the same period (Deloitte India, 2021).

India's sugar industry is also highly supported by subsidies for raw sugar exports, which were introduced in 2014 (Rastogi & Sengupta, 2021). As a result, in the seven years following the introduction of these export subsidies, sugar exports from the country averaged 56% higher than the previous seven years (Deloitte India, 2021). In addition, according to Murali, et al. (2021), the EBP programme has benefited the Indian sugar industry by increasing profitability of the sugar industry and improving liquidity of the sugar mills.

Thus, as can be noted from the preceding discussions, policies and programs started by the GOI with the objective of supporting the sector have played a major role in the development and expansion of the sugar industry in the country. Growth in sugar production in India in the last four decades is presented below (Fig. 5).

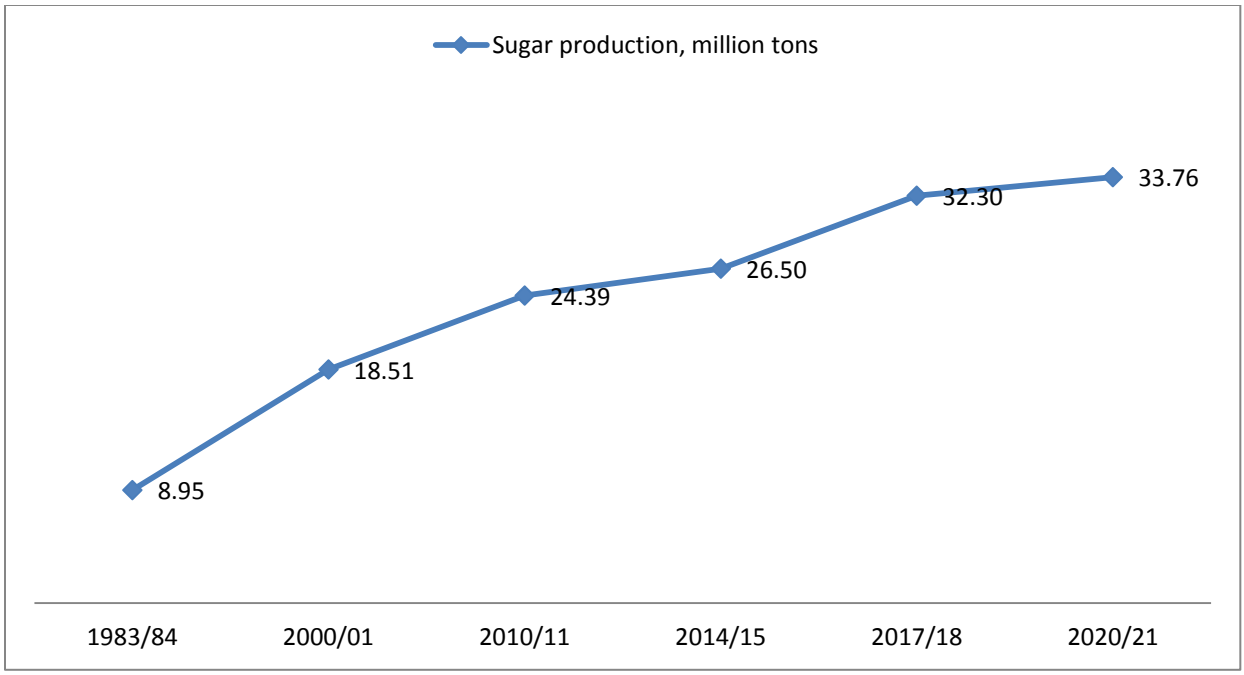

Fig.5 Growth in sugar production in India (1983/84 – 2020/21)

Source: Adapted from FAOSTAT (2019) and OECD/FAO (2022)

4.5 The Sugar Industry in Thailand

4.5.1 Overview of the Thai sugar industry

According to FAO (1998), sugar production in Thailand was started first as a cottage industry before 1350. Sugar production was then gradually developed and shifted to commercial scales. During 1930-1935, total annual sugar production in the country was only 40,000 tons (Manivong & Bourgois, 2017). A new era began in 1937 when the first modern sugar factory with a capacity of 800 TCD was established in the country (Athipanyakul et al., 2020). Since then, sugar production in the country has increased tremendously, and after 1960, Thailand became a net sugar exporter (Manivong & Bourgois, 2017). Further, in 1976, the country managed to export more than one million tons of sugar (FAO, 1998).

Thailand is now one of the world's top sugar exporting countries (ISO, 2019). Only about 30% of the sugar produced in the country is used for domestic consumption, the rest being exported to the global market (Athipanyakul et al., 2020). The country is conveniently located in proximity to the Asian net importing markets which gives export cost advantage in terms of reduced freight cost (FAO, 1998). Opportunities to export sugar to growing markets in Asia have encouraged Thailand to expand its sugar production. At present, Thailand has become the second-largest exporter of sugar in the global market (GAIN, 2023b).

Sugarcane became one of the most important agricultural crops in Thailand and a significant contributor to the economy of the country. The sugarcane supply chain, which consists of activities in the cane agriculture, sugar processing and related industries, provides jobs for more than 1.5 million people and generates about $6 billion US dollars annually (Manivong & Bourgois, 2017). Additional revenue is also generated downstream the sugarcane value chain through the use of its by-products in the form of ethanol, electricity co-generation, production of paper pulp and other products (NaRanong, 2015).

More than 80% of sugarcane growers in Thailand are small-scale farmers; with only about 15% having moderate-sized farms and the remaining 5% have larger farms (Athipanyakul et al., 2020). Most of the cane cultivation in the country is undertaken in rain-fed fields, with only 10% of the

total sugarcane cultivated in irrigated areas (Doner & Ramsay, 2004). From an industrial point of view, however, most of the mills in the Thai sugar industry are large and have excess capacities (Meriot, 2015). Currently, there are 57 sugar millers in the country while the total area used for sugarcane cultivation is about 1.75 million hectares (Athipanyakul et al., 2020).

4.5.2 Production and export performance of the Thai sugar industry

Thai sugar production is mainly dedicated to exports (GAIN, 2022a). About 70% of Thai sugar is exported to the world market, particularly to the Asian market (Athipanyakul et al., 2020). One of the distinctive characteristics of Thailand's sugar industry is its ability to respond promptly to global sugar market signals and shift production and export schemes from white to raw sugar and vice versa (Manivong & Bourgois, 2017). Thus, in 2000 Thailand increased white sugar exports to 1.9 million tons from 1.4 million tonnes in the previous year, then reduced it to just 1.1 million tons the year after, but came back to a 2 million tonne level in 2002 (Gudoshnikov et al., 2004). In 2015, Thailand became one of the world's top five sugar producers, with 11 million metric tons of sugar (Manivong & Bourgois, 2017) from sugarcane that has been cultivated on 1.4 million hectares (Meriot, 2015).

According to GAIN (2022a), the Thai sugar industry have an installed milling capacity in excess of 119 million tons of cane per annum in 2020/21, and factory milling capacity ranging from below 10,000 TCD to over 30,000 TCD. In the 2020/21 season, Thailand milled 73.9 million tons of cane and produced 7.57 million tons of Sugar (GAIN, 2021). For the year 2019/20, ISO data shows that Thailand was 4th largest sugar producing country at 14.05 million tons and 2nd largest sugar exporter after Brazil at 10.41 m tones (OECD/FAO, 2022). Thailand's record cane and sugar production was in 2017/18 season with a total cane production of 135 million tons and sugar production of 14.5 million tons of sugar (FAOSTAT, 2021; USDA, 2022).

The trend in sugar production in the recent two decades is presented below (Fig. 6).

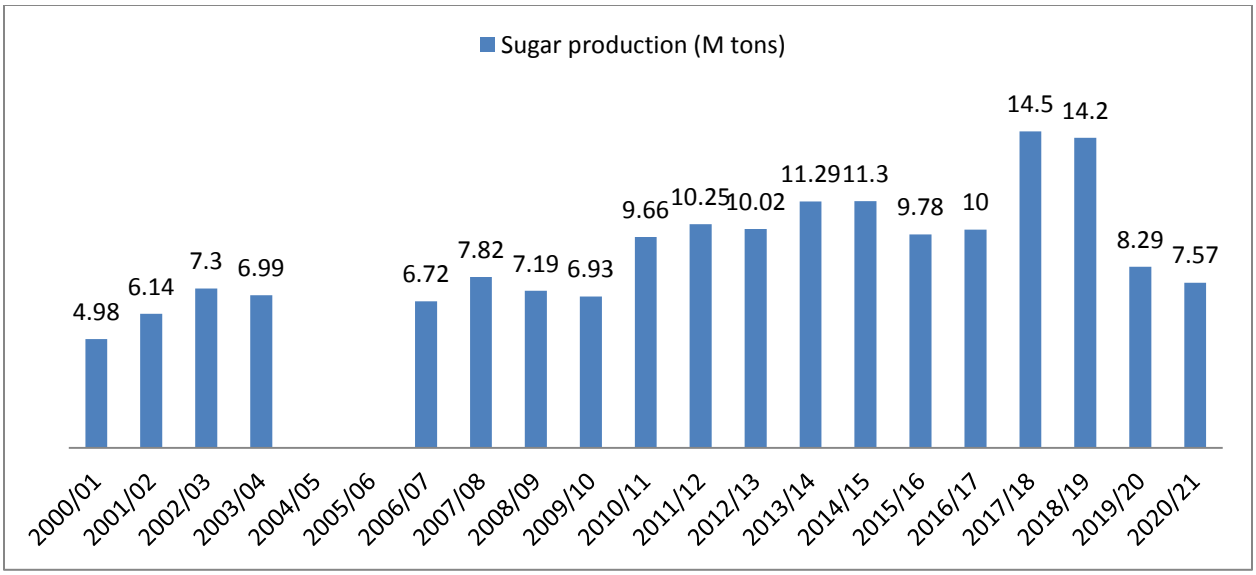

Fig. 6 Annual sugar production in Thailand (2000/01 – 2020/21) (Source: FAOSTAT, 2021)

4.5.3 Government policy support for the sugar industry

The Thai sugar industry has been protected since the early period when the country was still a net-importer of sugar (Meriot, 2015). The protection provided by government to the sugar industry continued even after Thailand had become one of the world's major sugar exporters (Ekasingh et al., 2008). According to the Thai Sugar Act of 1961, the principal policy was to advance sugar exports without directly using government budgets (Manivong & Bourgois, 2017). The Act established a sugar sales tax in domestic market, and the fund to be generated from the tax was intended to be used to stimulate cane production, to support sugar exports by providing export subsidies, and to support research and development on sugarcane agriculture (Doner & Ramsay, 2004).

The Thai government officially adopted a policy of supporting sugar exports in 1971 by setting domestic sugar prices higher than the prevailing global sugar price (Doner & Ramsay, 2004). This policy helped to subsidize the construction of new mills and provided the industry with a stable and profitable domestic market that protected it from the effects of price fluctuations in the global sugar markets (Meriot, 2015). As a result of the implementation of this policy, the Thai sugar exports started to increase significantly, rising from just about 50,000 tons in 1970 to more than 5.1 million tons in 2002 (Doner & Ramsay, 2004).

In 1984, the Cane and Sugar Act came into force following a crisis of surplus sugar production that affected domestic sugar prices (Meriot, 2015). This Act introduced a minimum domestic sugar price, a triple-quota system that is quite similar to the sugar quota system used in the EU at that time and a control of the distribution of value between cane growers and millers (Meriot, 2015). The Act aims to protect the interests of sugarcane farmers as well as sustained growth of the sugar industry while providing price stability to consumers (Meriot, 2015; Manivong & Bourgois, 2017). In addition, it has special provisions for the sugar mills to maintain their profitability even during times of low sugar prices in the global market (Meriot, 2015).

The types of government interventions and policy support to the Thai sugar industry can be categorized as follows:

1) High domestic sugar price

The Thai government supports the sugar industry by maintaining a high sugar price in the domestic market, which was considerably higher than the export prices (Meriot, 2015). The excess profit from the domestic sales of sugar ("Quota A" sugar) as a result of higher domestic price, which is set twice that of the then global prices (NaRanong, 2015), was used to support both sugarcane growers and the sugar millers (Manivong & Bourgois, 2017).

2) The sugar cane support system

Complementing the guaranteeing of high domestic sugar prices, the Thai government also support the sugar and cane industry by the state-controlled "70:30 revenue-sharing system," which has been implemented since 1982/83 after unexpected oversupply of cane and depressed global sugar price in 1981/82 (NaRanong, 2015). Adopted on a pilot level during the 1982/83 crop season, the 70:30 revenue-sharing system then became institutionalized in the Cane and Sugar Act of 1984 and remained the central regulation governing the cane and sugar industry in the country (FAO, 1998; NaRanong, 2000).

3) Agricultural crop zoning

In addition to the cane support system and guaranteeing of higher domestic sugar prices, the Thai government also supports its sugar producers by directing sugarcane planting decisions (Meriot,

2015). In 2012, the Thai government initiated the "Agricultural Crop Zoning system", which established different crop production zones based on a number of factors (NaRanong, 2015). The zoning policy stimulated many farmers to switch from rice cultivation to the cane production (Athipanyakul et al., 2020). The relatively high price of sugarcane compared to other crops has attracted more farmers to cultivate sugarcane, resulting in a significant expansion of sugarcane area (Manivong & Bourgois, 2017).

4) Quota system

In order to ensure segregation of domestic and export sugar, the Thai government used a quota system to control sugar sales (Meriot, 2015). Accordingly, each sugar mill may sell only a specified amount of sugar on the domestic market with a guaranteed higher price (Quota A - usually about 28% of its production); the remainder of its production (Quotas B and C) is exported to the world market.

The quota system enabled Thailand to regulate the domestic sugar price and ensure profitability of the mills as well as cane growers by guaranteeing higher domestic prices (NaRanong, 2015).

5) Export subsidies

By guaranteeing its sugar producers a higher price in the domestic market, the Thai government enabled the sugar industry to afford exporting sugar to the world market for whatsoever price it will bring, which is a form of indirect export subsidy (Meriot, 2015). The government also supports the sugar industry by providing subsidies for production of ethanol from cane molasses, which amounts to another indirect subsidy for cane growers and millers (Hudson, 2019).

6) Tariffs and border protection for sugar imports

Complementing the high domestic sugar price and the indirect export subsidy scheme, the government of Thailand also supports its sugar producers by providing border protection for domestic producers against lower-priced imports from the global sugar market (Meriot, 2015). Under the government support program to the domestic sugar industry, sugar imports to Thailand were totally banned until 1995 in order to raise domestic sugar prices (Larson & Borrell, 2001; Doner & Ramsay, 2004). Following the Uruguay Round of international trade talks, Thailand

replaced the ban on sugar imports with a system of import tariffs to provide border protection (Meriot, 2015). However, the basic tariff rate on sugar imports, with the exception of ASEAN members who have preferential tariffs for access to the Thai market, was 104%, which fully exploits Thailand's tariff potential under GATT (Hudson, 2019).

7) Credit policy

Complementing the indirect export subsidy scheme, the Thai government also supports its sugar producers by providing soft loans at below-market interest rates (Doner & Ramsay, 2004; Meriot, 2015). The Government supports cane growers with low-interest-rate loans, through the Bank of Agriculture and Agricultural Cooperatives, for cane management and to purchase cane harvesters and other farm machinery (FAO, 1998). In addition, sugarcane growers benefit considerably from soft loans the Thai government makes available to all farming activities (Meriot, 2015).

8) Institutional support

The Thai sugar industry is regulated and coordinated by a government body established under the Ministry of Industry, known as the Office of the Cane and Sugar Board (OCSB) (Doner & Ramsay, 2004). The OCSB formulates policies and programs for the development of the cane and sugar industry and also monitors domestic cane and sugar production and distribution (Meriot, 2015). The OCSB also acts as a mediation body to bridge commercial relations between cane growers and millers and administers various programs that support the sugarcane farmers and the sugar mills (Hudson, 2019).

The state-owned Bank of Agriculture and Agricultural Cooperatives (BAAC) finances activities undertaken by the Cane and Sugar Fund (CSF), which is another institution established by the government to support the sugar industry (Meriot, 2015), and also facilitates the implementation of various sugar support programs (Manivong & Bourgois, 2017). The CSF supports research and development activities in order to enhance cane and sugar production (Doner & Ramsay, 2004). The fund is also intended to subsidize sugarcane production and stabilize sugar prices when sugar prices fluctuate in the global market (Athipanyakul et al., 2020).

4.5.4 Impact of government policies and programs on the sugar industry

As discussed in the preceding section, the Thai government has intervened on various aspects of cane and sugar production, including zoning of sugar cane area, cane growers support system, setting higher domestic sugar prices, providing direct payments to cane growers, and providing soft loans and input subsidies to producers. The policy of maintaining higher domestic sugar prices by the Thai government also has resulted in increased sugar production as well as increased exportable surpluses (NaRanong, 2015). These government interventions have significantly boosted Thai sugar production and exports over the past decades, and Thailand is now second only to Brazil in sugar exports (Hudson, 2019; USDA, 2022).

The large increase in sugarcane production in Thailand and the success in its sugar export in the last few decades cannot be explained solely by the country's comparative advantage in cane production (OECD/FAO, 2022). This growth was mainly originated and sustained by the policies and programs implemented by the Thai government to develop a competitive sugar export industry (NaRanong, 2015).

Thus, as can be noted from the preceding discussions, various interventions and policies by the government have played a key role in the development and expansion of the sugar industry in Thailand. Growth in sugar production in Thailand during the period 1961/62 – 2017/18 is presented below (Fig. 7).

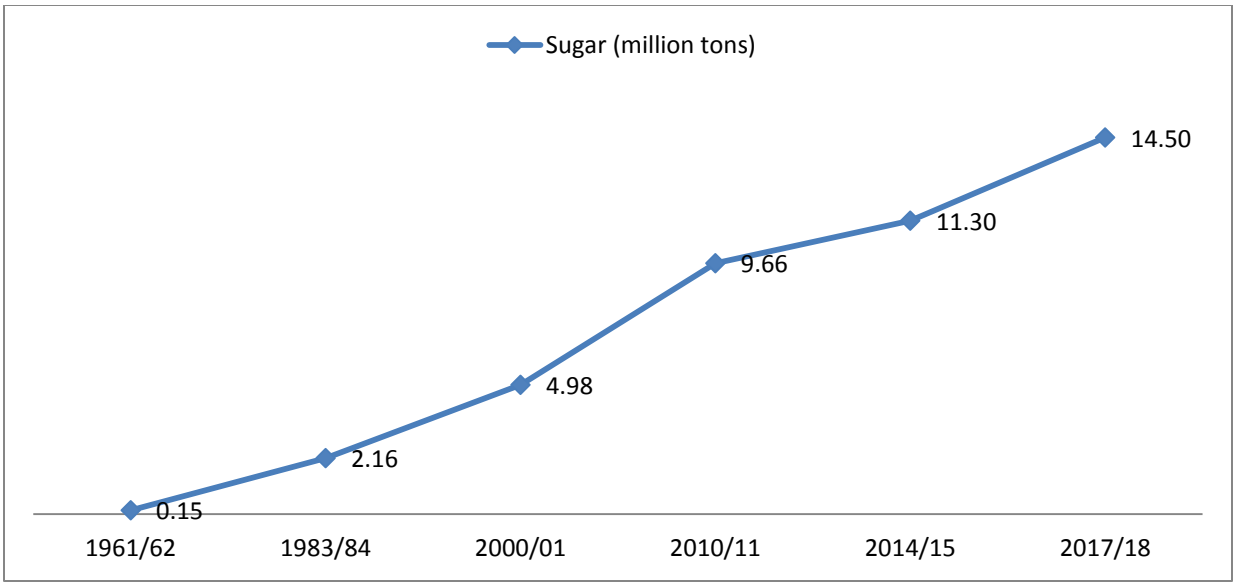

Fig. 7 Growth in sugar production in Thailand (1961/62 – 2017/18)

Source: Adapted from FAOSTAT (2019) and OECD/FAO (2022)

4.6 Comparison of government policies used in Brazil, India and Thailand

The discussions in the preceding sections clearly illustrate that all the three countries used various forms of government regulations and policy support tools to support their respective sugar industries in a variety of ways. Comparison of the type of policy instruments and programs used in the three countries to support their respective sugar industries is summarized below (Table 3).

Table 3. Summary of government policies and programs used in the three countries to support their sugar industry

Policy instrument/program	Description	Country		
		Brazil	India	Thailand
Price Support for Sugarcane	Providing price support for sugarcane growers through higher cane price, etc	No	Yes	Yes
Sugar Cane Support System	70:30 revenue-sharing system	No	Yes	Yes
High Domestic Sugar Price	Fixing higher price for sugar above world sugar prices	No	Yes	Yes
Crop Area Zoning	Cane area determination	No	Yes	Yes
Quota system	Use of quota for domestic and export sugar with different prices	No	Yes	Yes
Border protection for sugar imports	Use of border protection to ban sugar imports	No	No	Yes
Tariffs and taxes	Use of tariffs and taxes to regulate sugar imports	No	Yes	Yes
Subsidy	Providing direct subsidies to cane growers and millers	No	Yes	Yes
Sugar export subsidies	Providing export subsidy to sugar producers	No	Yes	Yes
Credit policy	Providing soft-loans	Yes	Yes	Yes
Mandatory blending of ethanol with petroleum		Yes	Yes	No
Incentivizing ethanol-fueled cars		Yes	No	No
Preventing purchase of private diesel vehicles		Yes	No	No
Price Support for Ethanol		Yes	Yes	No
Financing infrastructure development for ethanol distribution		Yes	No	No
Institutional support	Use of various government institutions to formulate policies, regulate and support the sugar industry	Yes	Yes	Yes

4.7 The Sugar Industry in Ethiopia

4.7.1 Overview of the Ethiopian sugar industry

Large scale commercial farming of sugarcane started in Ethiopia in the 1950s (ESC, 2019). Wonji Sugar Factory was established in 1954 as a first sugar production facility for commercial production of sugar by a Dutch company known as Handles-Vereening Amsterdam (HVA) (ECA, 1990). Few years later, the same company established the second sugar factory at Shoa, about 7 kms from the first sugar mill, in 1962 (Dametie & Yirefu, 2012). Subsequently, the same company with the involvement of some local shareholders (HVA-Ethiopia) established another sugar factory at Metahara, about 100 kms from Wonji in 1968 (ECA, 1990).

Although the two sugar estates were established by the Dutch company with the involvement of few local shareholders between 1954 and 1968, the collapse of the imperial rule in 1974 led to the nationalization of the sugar estates (ESC, 2015). After the revolution in 1974, the ownership interest of HVA-Ethiopia was reduced to one-third while establishing the Ethiopian Sugar Corporation in 1978 with the objective of overseeing the operations of the companies on behalf of the Ethiopian Government, and afterwards in 1980/81, the ownership of HVA-Ethiopia was totally taken over by the state and the Ethiopian Sugar Corporation became wholly state-owned enterprise (ECA, 1990). Since then, the government was the sole owner of the sugar industry in Ethiopia with little to no involvement of private companies in the production of sugar (ESC, 2015; Chare, 2020).

Though the sugar output in Ethiopia is very small compared to the volume of world production, sugar production in the country has shown a steady growth since it started in 1954 and in 1989 annual sugar production in the country reached 178,000 tons (ECA, 1990). Following the fall of the Dergue regime in 1991, the centralized administration of the sugar factories by the Ethiopian Sugar Corporation was dissolved and the sugar factories were reestablished as separate public enterprises (Kamski, 2016). In 1998, the Finchaa Sugar Factory, established some 350 kms to the west of Addis Ababa, started sugar production increasing the total sugar production in the country by more than 50% (ESC, 2014; Gutema, 2020).

In 1998, the government established a centre known as Ethiopian Sugar Industry Support Center (which was later reorganized as Ethiopian Sugar Development Agency) to assist the sugar industry through research and training to overcome some of the challenges facing the sugar factories and to support the government's effort to develop the sugar industry (ESISC, 2002; Gutema, 2020). Further, the Ethiopian Government started to undertake expansion of the existing sugar production facilities and development of new sugar projects in 2004/05 considering the increasing demand for sugar in the country and its potential contribution for the development of the country's economy (ESC, 2014).

The sugar mills that had initially different crushing capacities have gradually increased their production capacity to a total annual production capacity of about 300,000 tons of sugar in 2010 (ESC, 2014). Similarly, commercial sugarcane plantation area was expanded to 24 thousand hectares and has attained an annual cane production of about 2.7 million tons in 2010 (Dametie & Yirefu, 2012; ESC, 2014). However, since the demand for sugar was increasing from time to time in the domestic market (ESC, 2018; Gutema, 2020), the country's annual sugar production could not satisfy the domestic consumption, and as a result, the government started importing sugar from the world market (ESC, 2021). Thus, a massive sugar development plan was initiated by the Ethiopian government in 2010/11, with a goal of increasing annual sugar production to 2.25 million tons in 2014/15 (MoFED, 2010). Accordingly, following the initiative to expand the sugar industry, the Ethiopian Sugar Corporation (ESC) was reestablished in 2010 as state-owned company responsible management of the existing sugar factories as well as development of new sugar projects in various parts of the country (ESC, 2018; MoF, 2019).

In Ethiopia, sugarcane is predominantly cultivated on large estates developed by the sugar factories, with little involvement of small sugarcane farmers (Hodbod et al., 2015). Outgrowers are involved in sugarcane cultivation for commercial sugar production at two of the sugar estates (Wonji-Shoa Sugar Factory and Kesem Sugar Factory), but supply only small part of the cane requirement of the sugar factories (ESC, 2018).

4.7.2 Performance of the Ethiopian sugar industry

Following the expansion of existing mills and construction of new ones with initial support and policy direction by the government, the installed crushing capacity of the sugar factories has significantly increased from 13,000 TCD with only 3 sugar factories (at Wonji-Shoa, Metahara and Finchaa) in 2010 to a combined total installed crushing capacity of 73,500 TCD with 8 operational sugar mills in 2022 (ESIG, 2022). In addition, there are 5 uncompleted sugar development projects at various stages with a combined cane crushing capacity of 85,100 TCD (ESC, 2021). However, much gain is not achieved yet in sugar and ethanol production so far since the new sugar projects faced various challenges, including financial constraints to complete the projects, and the support from the government was not sustained to overcome the challenges (ESC, 2018).

Before 2010, annual sugar production has reached 300,000 tons (Dametie & Yirefu, 2012; Gutema, 2020). On the other hand, despite the increase in installed capacity since then, the maximum annual sugar production attained from all the sugar factories so far has not reached 400,000 tons because of low capacity utilization (ESC, 2018). This indicates that the contribution of the new sugar mills to increase annual sugar production in the country was very insignificant (ESIG, 2022). Moreover, adequate cane development was not undertaken in line with the increased milling capacity of the sugar factories (ESC, 2020). The maximum annual sugar production attained in Ethiopia was only about 370,000 tons in the year 2014/15 (ESIG, 2022). Thus, despite higher growth in milling capacity and increase in cane area during the period from 2015 to 2022, the outcome in terms of sugar production was very low, indicating the limitations of the approach followed by the ESC and lack of sustained support from the government (ESC, 2018; ESIG, 2022).

From the above information it can be observed that currently milling capacity constraint is not the basic problem for the low annual sugar production in Ethiopia. Rather, studies show that the sector suffered from poor project management (ESC, 2018) and low capacity utilization from the installed sugar mills (ESC, 2021). According to a recent report by ESIG (2022), most of the sugar mills operated below 50% of their installed production capacity. The reasons for the low capacity utilization and low sugar production is related to various factors such as lack of adequate cane supply, poor maintenance of the sugar factories due to shortage of spare parts, poor management,

inadequate supply of inputs, etc (ESC, 2018; ESC, 2019; ESIG,2022). Further, shortage of working capital, foreign exchange constraint, inadequate level of sugarcane mechanization, delays in input supply, and lack of skilled workers have affected the performance of the sugar factories (ESC, 2018; ESIG, 2022).

The other major constraint on the sugar sector in Ethiopia is that it depends on huge imports of industrial inputs which are needed to sustain production of sugar (due to the absence of domestic supporting industries) (UNDP, 2017; ESC, 2018). All major inputs for the cane agriculture such as fuel, fertilizers, farm machinery, cane haulage machinery, etc and for sugar processing such as spare parts for the mills, chemicals for sugar processing, etc are imported from various countries (ESC, 2018; ESC, 2019).

Thus, though the Ethiopian Sugar Corporation (ESC) has allocated significant financial resources to the the development of new sugar projects since the commencement of the first Growth and Transformation Plan (GTP I) by the Ethiopian government, there remained a wide gap between the plan and the results achieved at the end of the planning period (Kamski, 2016). Hence, despite the country's aspiration to become exporter of sugar and its by-products at the end of GTP-I period as per the government's plan (MoFED, 2010), Ethiopia is still a net importer of sugar, with annual imports increasing year over year (ESIG, 2022). The country has been importing a growing volume of sugar since 2011, with the imported sugar in 2017 exceeding 350,000 tons (ESC, 2018). In recent years the local production of sugar was not adequate to satisfy even half of the domestic demand for sugar (MoF, 2019; MoF & EIH, 2022).

According to MoF & EIH (2022), the domestic sugar demand was estimated at 1.2 million tons in 2020/2021 against local sugar production of only 340,000 tons in that year, resulting in a deficit of more than 0.8 million tons. Thus, by way of filling this gap, additional sugar has been imported annually with increasing quantities (ESIG, 2022; MoF & EIH, 2022). The demand for sugar in the country is also expected to reach 1.7 million tons by 2029/30 (EYGL, 2022).

4.7.3 Government policy support for the sugar industry

4.7.3.1 Government incentives and supports for the industry sector

The government of Ethiopia has designed different incentive mechanisms for investors (Oqubay, 2015). The incentives provided by the government to promote investment include exemption from corporate income tax (for specified years), exemptions on import duties for imported materials that are to be used for the intended projects and other non-fiscal incentives (PSI & GRIPS, 2022). Particularly, investment in the industry sector as a whole and some selected agricultural investments are given income tax exemption for 1-6 years, depending on the size, location and type of the investment activity (Gebreeyesus et al., 2017).

According to EIC (2017), all investments in manufacturing are eligible for customs duty exemptions, that is, 100% of the imported capital goods and 15% of the spare parts. Besides this, special incentives are available for investors involved in investment activities in some remote and arid parts of the country (PSI & GRIPS, 2022). Additionally, investors in the areas of manufacturing and investors who produce for direct export or supply their products to other exporters, or who export at least 60% of their products or services, are entitled to an additional 2 years of income tax exemption (PSI & GRIPS, 2022).

However, studies by Gebreeyesus et al. (2017) show that investment incentives in Ethiopia are not selective enough as they do not sufficiently differentiate between local firms and FDI, the size of investment, scale of operation and the country of origin of the FDI. Moreover, a study by Tesfaw (2021) showed that industrial policy formulation in Ethiopia as well as its implementation are relatively weak in facilitating input-output linkage within the value chain of products, in the level of cooperation between the government and the private sector, and in improving the doing business environment. Tesfaw (2021) also indicated that the incentive mechanism provided by the Ethiopian government to investors has no significant difference between investments in the strategic sectors identified by the government and other sectors selected by the investors based on their interest.

4.7.3.2 Government support to the sugar industry

The Ethiopian government policy on public investment for industry development has focused in a few strategic areas, and the sugar industry was one of them (Oqubay, 2015). During the GTP-I period, the priority industries selected for investment by the government included sugar and sugar-related products (MoFED, 2010). Accordingly, the government established the Ethiopian Sugar Corporation (ESC) by merging the existing sugar factories with the aim of implementing new sugar development projects in various parts of the country (ESC, 2018).

The government also supported development and expansion of the sugar industry by availing credit for the new projects. The sugar development projects were partly financed by the two major state-owned banks, Commercial Bank of Ethiopia and Development Bank of Ethiopia (Oqubay, 2015; ESC, 2018). The government has also permitted accessing external loans from foreign countries for financing sugar development projects by the ESC (Oqubay, 2015).

In Ethiopia, the government has not only been the sole owner in the sugar sector, but it was also involved in the distribution of the products (EEA, 2019). The government was also controlling the price of sugar in the domestic market by setting the selling price of the product, and its distribution through a quota system (ESC, 2018). Accordingly, the retail price of sugar was fixed and quota allocations were made to different consumer groups of the product by the Ministry of Trade (Chare, 2020).

However, various measures taken by the government in the sector did not bring the desired competitiveness and capability of the sugar industry so far (ESC, 2018), indicating either the failure of the policy or its inadequateness (Tesfaw, 2021; Gebeyehu, 2022). The industry was suffering from shortage of finance, lack of supporting industries, inadequate infrastructure (ESC, 2018) and lack of regulatory framework that allows the business to operate more efficiently (G/Mariam, 2019). According to Kamski (2016) and ESC (2018), the new sugar projects were started and implemented during GTP-I without properly undertaking detailed feasibility study and without ensuring the funds required to complete the projects were secured, resulting in excessive delay of the projects as well as incomplete development of some of the projects.

Thus, despite the good intentions and initial support made by the government, performance of the sugar industry in the GTP periods has not been satisfactory (ESC, 2018). For example, the government envisaged annual production target of more than two million tons of sugar and an annual revenue of US$500 million from export of sugar by the end of the first GTP period (MoFED 2010), but none of the new sugar development projects were completed at that time and thus the export target was not achieved (Kamski, 2016; ESC, 2018).

Hence, despite its high potential for development, the sugar industry in Ethiopia remained undeveloped and the country remained a net importer of sugar for the last more than 10 years (ESIG, 2022). The implication is that the existing government policy instruments and programs to support the industry were found to be insufficient and inadequate to address the major constraints in the sector, calling for revising the programs and additional support to the sector from the government (ESC, 2018; Gebeyehu, 2022).

4.7.4 Recent reforms in the Ethiopian sugar sector

Since the sugar industry requires a large and lumpy investment to be successful and does not provide quick returns (Oqubay, 2015), private investors did not make significant investments in the Ethiopian sugar sector (Chare, 2020). However, as the sector is strategically important to the country due to high domestic demand for sugar (Oqubay, 2015), the government has continued to invest in the sector (PSI & GRIPS, 2022). Hence, all the operational sugar mills and the on-going projects along with the sugarcane plantations in various parts of the country remained under the ownership of the state (Chare, 2020).

In recent years, as part of the economic reform program, the Ethiopian Government has started various reforms in the sugar sector which are aimed at increasing participation of the private sector in the ownership and operation of the sugar enterprises (EYGL, 2022). In July 2018, the government has announced its intention to fully privatize some of the sugar projects (Chare, 2020; PSI & GRIPS, 2022). Accordingly, various tasks are underway for privatization of some of the sugar factories partially or entirely (MoF, 2022).

Following the decision by the government, the Ministry of Finance has started to take active measures to prepare the sugar factories for privatization (ESC, 2021) and has prepared bidding documents that will guide the privatization process (MoF & EIH, 2022). In this regard, the Government of Ethiopia through Ministry of Finance and Ethiopian Investment Holdings (EIH) has recently started tendering of eight sugar enterprises (MoF & EIH, 2022).

However, according to Chare (2020), while the Ethiopia government has declared its decision to privatize the state-owned sugar enterprises and is willing to provide incentives for the private investors, delays in creating an enabling legal and market framework to the sugar industry, along with other socio-economic and political factors, may jeopardize the privatization process of the sugar sector. Besides, in his study to analyze the institutional and legal framework governing the sugar industry in Ethiopia, G/Mariam (2019) identified that the regulatory framework as well as the institutional framework of the sugar sector in Ethiopia is weak and inadequate for managing active participation of the private investors. He also indicated that there is no specific legal and institutional regime to efficiently and adequately regulate the sugar industry in the country, including cane and sugar price determination, trade as well as dispute settlement system between various stakeholders that will involve in the sugar industry business (G/Mariam, 2019).

According to the study by G/Mariam (2019), contrary to the well-established practices in many other sugar producing countries, currently there are no well-defined regulations, policy instruments and programs particularly designed to support and regulate the sugar sector in Ethiopia. For instance, though the privatization program would necessarily require involvement of some cane outgrowers in the sugar production activity, currently there is no regulatory framework regarding sugarcane out-growers and cane pricing in Ethiopia (G/Mariam, 2019). Thus, the intended privatization of the sector requires a regulatory framework that accommodates the participation of different actors with distinct agency and interests, including domestic and international private operators of sugar enterprises and the governance of relationships between millers and sugarcane outgrowers (G/Mariam, 2019).

4.7.5 Lessons from major sugar producing countries

Ethiopia can learn from the successful experiences of other sugar producing countries to improve the performance and competitiveness of its sugar industry. As a preliminary effort to collect international experiences regarding government support in the sugar industry, common success factors and country-specific factors that influenced competitiveness of the sugar industries in three major sugar producing countries have been discussed in the preceding sections. The experiences of the countries in this study showed that the governments of the three countries have strongly supported their sugar industry through various policy instruments and programs. Moreover, they have established strong regulatory framework and responsible institutions for their respective sugar industry which helped to organize and smoothly conduct stakeholder interactions in the industry.

Specifically, in India and Thailand, it is common for the cane prices to be set based on a revenue sharing formula, whereby farmers are paid a percentage of the price of the sugar contained within their cane as it incentivizes the farmers to raise the sugar content of their cane (Meriot, 2016; Deloitte India, 2021). This is in total contrast to the current practice in Ethiopian sugar enterprises such as Wonji-Shoa and Kesem, where cane prices are set at a flat rate per delivered cane weight, without taking into account the sucrose content of the cane and with no adjustment for its quality (G/Mariam, 2019; Gutema, 2020). Moreover, sugarcane prices for the outgrowers are set by negotiation with the individual mills with no regulatory institution at the state level (G/Mariam, 2019).

The other factor that influences competitiveness of the sugar industries is sugar pricing. Sugar prices in Ethiopia are usually subject to price limits, with varying price for direct retail consumers, for industrial consumers, and for beverage quality sugar (ESC, 2018). These price limits are periodically adjusted, based on the need to balance affordability for consumers and cover costs of production (G/Mariam, 2019). In this regard also, Ethiopia can learn from the experiences of the three countries included in this study, where they implemented various incentives to support the sugarcane and sugar producers.

From the experiences of the three major sugar producing countries in this study, the involvement of the private sector in the industry alone will not make the sugar industry competitive. Thus, designing appropriate government policies and programs to support the sugar industry in parallel with the effort to privatize the sugar enterprises will help to improve the competitiveness and performance of the sugar industry in Ethiopia. On the other hand, the design of the policy instruments and programs to support the sugar industry must reflect the country's specific contexts as identical policies and programs may produce different outcomes because of the different initial conditions in Ethiopia compared to the countries in the study.

Chapter 5. Conclusion and Recommendations

5.1 Introduction

This chapter presents conclusion and recommendations of the study. It also presents lessons for the Ethiopian sugar industry based on the findings of the study and implications for further research.

5.2 Conclusion

This study, which focused on the assessment of the impact of government policies and programs to enhance the competitiveness of sugar industries in major cane sugar-producing and -exporting countries, has revealed the significance of government support to the sugar industry through various policy instruments and programs. Brazil, the largest sugar producer and exporter, has promoted its sugar industry basically using its biofuel policies. In fact, Brazil is endowed with vast natural resources - plenty of land, ample sunshine and adequate rainfall. But the study showed that despite its endowment in natural resources, superior performance of Brazil's sugar industry in the world market is founded upon many years of strong government support through various policy instruments and programs. India, the second largest sugar producer, also has a sugar sector which is heavily regulated and supported by the government using a variety of government policies to protect local sugarcane and sugar producers. Thailand, the second largest net sugar exporter, also used a variety of government support tools to enhance the volume of sugar production and increase exports.

Generally, the study revealed that systematic government legislations and policy support by government institutions have helped the sugar industries of the three countries in expanding sugarcane area, increase in sugar production and enhance sugar exports to the world market. The study also revealed that government interventions were one of the characteristics of the sugar industry for many decades in all the three countries. The interventions to support the industry were made in the form of production quotas, mandated ethanol-gasoline blending, price controls in the domestic market, and subsidized credit for cane growers as well as for sugar processors. The countries also used various policy measures to regulate excess domestic production.

The study also showed that the countries followed different paths for development of their sugar industries based on the level of their resource endowments and the prevalent domestic and international market conditions, at times even violating WTO rules. The study also showed that there are significant similarities between the policies and programs used to support the sugar industry in the three countries. However, there are also important differences in formulation of the policies and programs based on their domestic context, policy design, system of implementation and impacts.

Overall, the findings of the study showed that all the three countries used government regulations and various policy instruments to increase sugar production and stimulate sugar exports, thus enhancing the competitiveness of their sugar industry despite depressed world sugar prices. Among the policy instruments Brazil's National Alcohol Programme (Proálcool), and the price support systems in India and Thailand, along with a mix of other policy instruments and programs, were used to increase sugarcane area and thereby significantly increase cane and sugar production and exports. As a result, the amount of sugar production in Brazil increased from 6 million tons in 1974/75 when the Proálcool program was started to be implemented to 42.05 million tons in 2020/21, more than seven-fold increases in production. And, consequently, Brazil became world leader in sugar production and the dominant sugar exporter. In India also the amount of sugar production increased from 8.95 million tons in 1983/84 to 33.76 million tons in 2020/21, more than a threefold increase in production following various government interventions and support in the sector. Similarly, in Thailand, the amount of sugar production increased more than sixfold from only 2.16 million tons in 1983/84, when the Cane and Sugar Act was enacted, to 14.5 million tons in 2017/18, when the country produced a record high sugar production, which can be attributed mainly to the government support to the sugar industry through various policy instruments and programs.

Therefore, based on the findings of this study, it is concluded that government support to the sugar sector through various policy instruments and programs has helped to significantly increase cane and sugar production as well as sugar exports and thus enhanced the competitiveness of the sugar industries in all the three countries included in the case study. The findings are also in agreement with empirical evidences in support of the positive impact of government interventions and policy

support to the sugar industry in many other countries as discussed in the literature review part of the study.

5.3 Recommendations

The Ethiopian sugar industry has a comparative advantage in sugarcane productivity and long season of sugar production in most of the sugar factories compared to the countries discussed in this study and has the potential to fulfill local demand and can produce surplus sugar when all the ongoing sugar projects are completed and capacity utilization of the sugar factories is improved. However, the industry is less developed and could not satisfy local sugar demand so far. Thus, it needs extensive support from the government to ensure the industry will produce adequate sugar for the domestic needs and make it competitive in world market.

In this regard, the experiences of the sugar industries in the three countries included in this study show that other countries like Ethiopia with abundant land and water resources and favorable climate for sugarcane crop can produce adequate sugar for their domestic needs as well as can be able to compete globally with adequate government support. Based on the experiences of the three countries, the Ethiopian government, for instance, can use various specifically designed investment incentives to the sugar industry including soft loans and a favorable tax policy so that sugar and ethanol production will have some indirect subsidization in various forms, at least initially, to support the sugar industry and ensure that the country will become self-sufficient in sugar production and to be competitive in the world market.

Therefore, based on the findings of the study and the experiences of the three major sugar producing countries, the researcher suggests the following recommendations:

- As the Ethiopian sugar industry is at its infant stage compared to the major sugar producing countries in this study, it needs special and continuous support from the government to be able to produce adequate sugar for the domestic market and to be competitive in the world market.
- As sugar industry is relatively capital intensive, with high initial investment requirement compared to its operating cost, it needs government support to develop the large-scale

sugarcane agriculture and equip itself with adequate machinery to achieve economies of scale advantage by utilizing the installed capacity of the sugar factories. Thus, financial support such as long-term credit facility with low interest rate should be provided to the sugar industry.

- As all the sugar factories in Ethiopia are currently state-owned, the government should prepare special incentive mechanisms and put in place a favorable sugar policy considering the capital-intensive and complex nature of the industry both to encourage privatization of the existing sugar factories, at least partially, and attract new private investment in the sugar sector.
- The government should also arrange strong regulatory framework and institutional support mechanism to the sugar industry based on the experiences of countries with a well-developed sugar sector.
- As sugarcane cultivation in large plantations for commercial sugar production needs large scale irrigation development in the Ethiopian context, the Ethiopian government should support the sugar industry by developing irrigation infrastructures such as dams, main canals, etc in areas where new sugar development projects are being undertaken. As construction of these infrastructures require huge investment that private companies would not be willing to invest or not able to invest alone, it needs special support from the government to develop these infrastructures.
- Finally, this study identified the importance of special government support using various policy instruments and programs to increase sugar production and enhance the competitiveness of the sugar industry. However, as the topic by itself is vast and complex, a study of this type cannot fully explain the type of policy instruments and specific programs that can be applicable in the Ethiopian context, which is totally different from the countries in the case study. Therefore, it is recommended to make further research with an in-depth analysis of the current condition of the Ethiopian sugar industry to arrive at practical recommendations and select appropriate policy tools and programs to enhance the growth and competitiveness of the Ethiopian sugar industry.

Chapter 6 References

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