

## Effects of corona virus on commercial farming in the kingdom of Eswatini

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World Journal of Advanced Research and Reviews, 2023, 20(02), 295–305

Publication history: Received on 21 September 2023; revised on 04 November 2023; accepted on 06 November 2023

Article DOI: <https://doi.org/10.30574/wjarr.2023.20.2.2235>

### Abstract

The aim of this study was to investigate the effects of the COVID-19 pandemic on commercial farming (particularly sugar cane, pineapples and citrus fruits) in the Kingdom of Eswatini. The study concentrated on how the pandemic has affected the workers, marketing of the final products as well as the strategies adopted in order to ensure that production was maximized and the target goals were met in the midst of the COVID-19 pandemic. The study adopted the qualitative approach of data collection and analysis. Due to restrictions on movement and visitation imposed by the government in an effort to curb the spread of COVID-19, data was collected from only nine (9) respondents, comprising of supervisors and managers (four from Royal Swazi Sugar Cooperation, three from Illovo and two from Rhodes using a questionnaire. The study found that, since commercial farming (specifically sugar cane, pineapple and citrus fruits) form the backbone of the country's economy, production continued normally even though a few alterations had to be made to accommodate the COVID-19 regulations so as to ensure that the GDP is less affected. Despite that borders were formally closed and/or operating under strict rules and restrictions, (mainly on emergencies), it was not hard to export the products. This is solely because drivers were allowed to pass through, although at times the products would delay due to fumigation at the border post. Also, the COVID-19 pandemic has taught both the government and the commercial organizations that they need to be always prepared for unforeseen occurrences through ensuring that there is more than enough food or products available for local consumption and export. The study recommends that measures to increase production be put in place to fill up the production deficit, while the relaxation of more COVID-19 control measures is effected in order to ensure a full recovery of the agricultural commercial sector in Eswatini – a significant sector in the country's economy.

**Keywords:** Commercial farming; COVID-19 pandemic; Workers; Marketing; Strategies; Sugar cane; Pineapple; Citrus fruits

### 1. Introduction

The Kingdom of Eswatini has not been spared from the current world battle of corona virus commonly referred to as COVID- 19, which is a threat to human health, and mostly on their survival. Necessary measures towards minimizing the spread of the virus involved a total lockdown (which started from 27<sup>th</sup> March 2020 up to 7<sup>th</sup> May 2020, then lifted gradually after) [1], staff minimization and quarantine in the different sectors across the globe, which resulted to people losing their jobs, hence a decrease in productivity. The agricultural sector in the country has the second highest employment rate with a minimum of 12.28 per cent of employees in Eswatini [2] and because of COVID- 19, some of those employees ended up losing their jobs which, in turn means a decrease in production revenue.

Since the beginning of year 2020, the world has been struggling to combat the COVID- 19 pandemic and that has come with a lot of changes, which have impacted both positively and negatively on different sectors in the whole world. For instance, in the early stages of the pandemic, 'the number of people in a particular area should be minimized due to the rising numbers of COVID- 19 cases, and this would help minimize the spread of the virus' which has been the case since March 2020 in Eswatini's sectors which include, but not limited to, agriculture and industry [3]. The focus of this study

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is on commercial farming, particularly cultivation of crops, which is the second largest sector that provide formal employment in the country as it contributes 8.77 per cent to the Gross Domestic Product (GDP) [4]. The rules and regulations of the COVID-19 pandemic have affected commercial farming in the country as they tempered with what had been planned before. The question that arises, therefore is, 'what are the effects of the pandemic on commercial farming in the country?' Commercial farming in the country include the growing of sugar cane, pineapple, citrus fruits, cotton and forest plantations as well as raising livestock [4]. However, for the purpose of this study, the focus is mainly on pineapple, citrus fruits and sugar cane.

Commercial pineapples in Eswatini are grown in the Middleveld (Malkerns) and they cover a total area of 1480 hectares [4]. They are planted in spring (so that they can catch the summer rains) and commercial growers of pineapples use herbicides to control the growth of weeds, also harvesting happens between February and May [4]. Important to note is that, harvesting of pineapple is labour intensive as the fruits are picked one by one which means seasonal workers are employed to pick the fruits up [5]. For instance, most pineapples in Eswatini are specifically grown for the Swazican fruit processing factory (now known as Rhodes) and the factory ensures to meet the strict food safety certification condition of the key overseas markets and it has a licensing agreement to supply products for many global brands, which suggests that there is a greater market for Eswatini pineapple [4].

On the other hand, commercial citrus fruits in Eswatini are grown in the Lowveld and Lower Middleveld where they cover an area of about 2 000 hectares with an average yield ranging from ten to thirty-five tonnes per hectare (70 000 metric tonnes per year) [4]. The best time to plant citrus fruits is in spring (late September) and harvesting takes place from early April to late September and these two processes involve a lot of steps which means that more people are needed to do the job, hence there are seasonal workers who focus on planting and others on harvesting [4]. Fertilizer application on citrus fruits (potash) is done in spring on a band of forty to sixty centimeters and citrus fruits need to be watered during the dry season and there must be no weeds under the tree area [5]. In terms of marketing, the Swaziland Citrus Board is responsible for exporting 'high enough quality' of the citrus fruits to the European Union, Eastern Europe and Japan, with the remaining fruits sold to local canning factories like the Swazican [4].

Furthermore, sugar cane in Eswatini is mainly grown in the Lowveld agro-ecological zone under irrigation since annual rainfall is low and erratic compared to the other agro-ecological zones [6]. Noteworthy is that, there are four categories of growers namely; sugar estates owned by the sugar mills, large scale growers, medium size growers, and small holder growers. Evidence depicts that sugar estates owned by the sugar mills contribute the largest share of sugar cane production at 49 percent, followed by small holder growers (21 per cent), large scale growers (18 per cent), and medium size growers (12 per cent) [6]. In terms of the contribution of sugar cane production on agricultural exports in Eswatini, it makes about sixty per cent and provides employment to a lot of workers as they are needed during planting and harvesting [4]. Therefore, sugar cane production just like pineapple and citrus fruits involves employment of seasonal workers. Planting is done between October and February and harvesting is from May to November, and that is when the sugar content is at its highest. Noteworthy is that, commercial sugar cane farmers in Eswatini contribute a share of eighteen per cent to the sugar production and their cane is processed by the Royal Swazi Sugar Cooperation (RSSC) mills in Mhlume, Simunye and Ubombo [4].

Furthermore, the Eswatini Sugar Association is accountable for all selling and marketing of sugar. It is also important to note that, Eswatini is a competent and low-cost producer of sugar, which means that it is competitive on the world market.

Noteworthy is that, planting and harvesting of pineapples, citrus fruits and sugar cane occurs throughout the different months of the year [4], but due to the fact that a better part of the year's months have been spent on lockdown restrictions, commercial farming is likely to have been affected in many ways. Consequently, the study focuses on how the COVID- 19 pandemic and its regulations have affected commercial farming in Eswatini.

The argument raised by the study is that international efforts to control the virus by limiting human movement certainly caused economic shocks and social costs that have led to issues in agriculture and food systems worldwide [7]. In this connection, the COVID- 19 restrictions (social distancing, lockdown, quarantine or mobility) embraced in most countries across the globe to deal with the crisis of COVID- 19 are likely to have reformed the procedure settings of agricultural labour, food security and marketing criteria [8]. Needless to say, COVID- 19 has completely changed a lot of operations in all sectors including agriculture, and because of that, commercial farming in the country has been affected either positively or negatively. In as much as it is an issue to the farmers and the employees in terms of production levels and amount of work, it is an issue to the entire country as it tempers with the Gross Domestic Product and has led to an increase in the unemployment rate. For instance, about ninety per cent of agricultural workers are informal, which puts them in a vulnerable place economically because the COVID-19 pandemic somehow led to them losing their jobs [9].

Due to the fact that they are no longer at work, production may be decreased as planting and harvesting of the crops may be delayed, which may also lead to slow production, thus a decrease in yields. All in all, this is likely to have an effect on the amount of products to be exported as well as on the Gross Domestic Product. This, therefore, necessitates an investigation of the effects of the COVID- 19 pandemic on commercial farming in Eswatini.

This, paper, therefore, aims to contribute to the agriculture commercialization debate by exploring the impacts of the COVID-19 pandemic on commercial farming in the Kingdom of Eswatini. Specifically, the paper seeks to investigate how the COVID-19 pandemic has affected farm labour, marketing of farm products and to uncover the strategies put in place by commercial farmers to respond to the COVID-19 challenge in the commercial agriculture space. The paper will not only help to shape local commercial farming policies but will also be helpful in informing solutions aimed at increasing the resilience of the agriculture sector, especially on how the commercial sector can maintain productivity in the midst of confounding factors such as the current COVID-19 global pandemic and other similar pandemics.

### 1.1. Study area

Commercial sugar cane farmers in Eswatini are found in the Lowveld region in Big Bend, Siphofaneni, Mhlume, and also in Simunye [10]. The area in which the major commercial sugar cane plantations are found in Eswatini lies between latitudes 26°04'35" S and 26°59'35" S and between longitudes 31°18'36"E and 31°53'33" E (Figure 1). The area is located, approximately 47-93 km from Manzini city which is the Commercial Hub of the Kingdom of Eswatini. Commercial Pineapples in the Kingdom of Eswatini are mainly found in Malkerns, Eluyengweni and Mtilane in the Middleveld [11], between latitudes 26°53'15"S and 26°57'52"S and longitudes 31°17'29"E and 31°18' 59"E [12]. Citrus fruits are grown in Ngonini, Tambuti, Malkerns and Nsoko, which is the Upper Middleveld and the Lowveld of the country (Figure 1).

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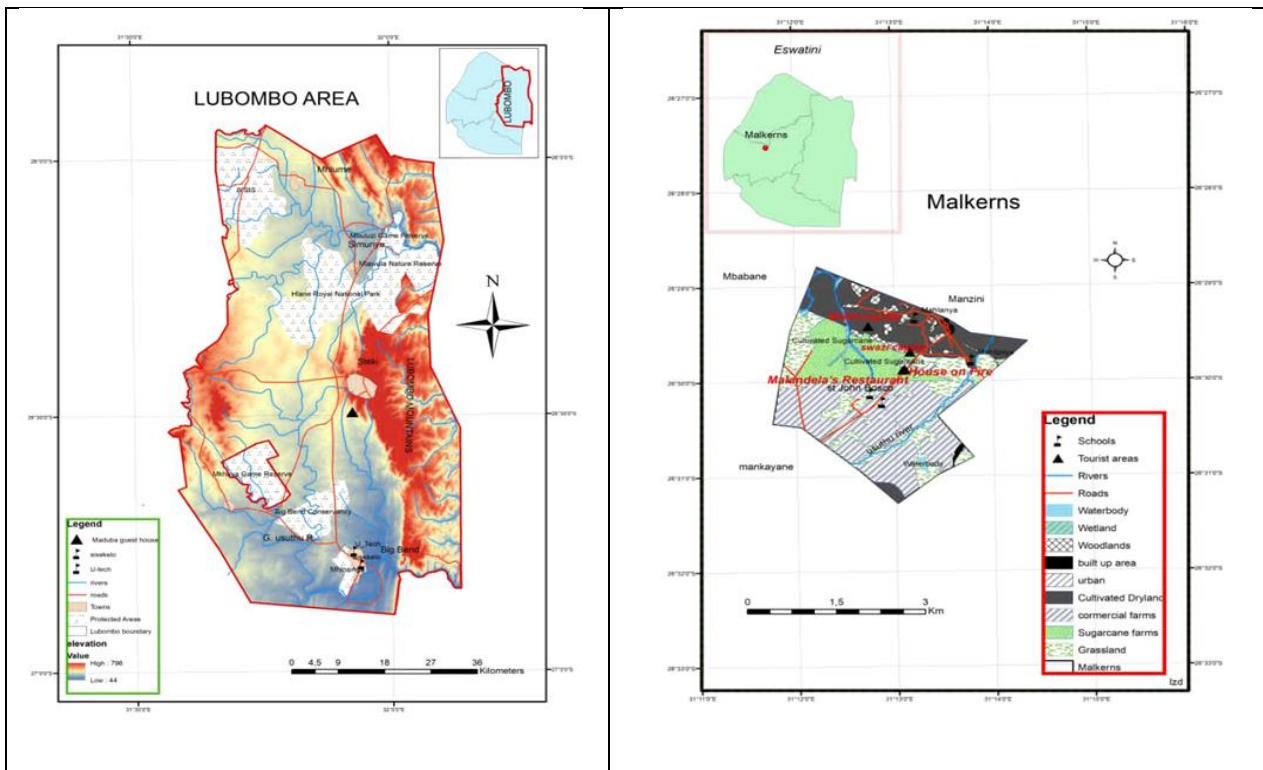
## 2. Materials and methods

This study employed an explanatory research design, which may be described as a study set out to explain and justify for descriptive information and to pinpoint why a certain phenomenon occurs [13].

The targeted sources of information in this study included workers or farmers and managers from the different commercial organizations (Swazican, Royal Swazi Sugar Cooperation (RSSC), and Ubombo Sugar Limited). As mentioned earlier, the agriculture sector employs a lot of people (about 37 140 people) [14]. However, it was not possible to collect data from all the targeted sources of information due to the situation prevailing then, owing to the COVID-19. Therefore, organizations were very strict on having or accepting external visitors, and consequently data was collected only from the management of each organization.

RSSC has more than six branches where they grow sugar cane namely; Simunye, Mhlume, Tisuka, Malkerns, Sidvokodvo and Dalcrue. Notably, out of the six branches, three were selected for inclusion in the study and these are: Dalcrue Agriculture Holdings, Tisuka and Sidvokodvo. Two questionnaires were sent to each branch, but only four responses were received. In Malkerns - Rhodes (Swazican) company they have a very strict policy that does not allow external visitors and due to adherence to COVID-19 regulations three questionnaires were sent to the management but only two of those questionnaires were completed. Then with Ubombo Sugar Limited, a total of five questionnaires were given to the management but only three of the questionnaires were completed.

The data was collected using a semi-structured questionnaire which had four sections namely: demographics, information on labor in the different organizations, marketing of farm products as well as the working strategies in the organizations. Then data was inductively coded (through descriptive coding, where the responses are summarized into a description) which is basically when data collected through interviews and questionnaires are split up into smaller sections and then grouped by theme [15] as this study engaged narrative data analysis. Finally, the data is presented using tables and narratives.

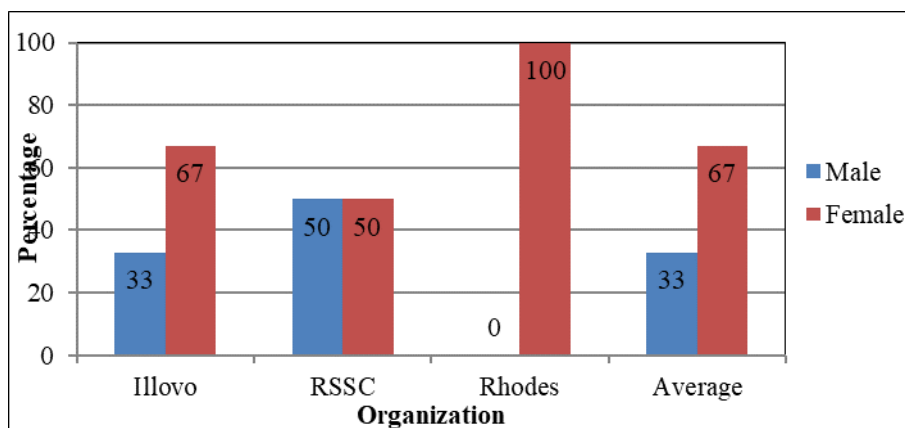


**Figure 1** Sugar cane, citrus fruits and pineapple commercial growing area in Eswatini

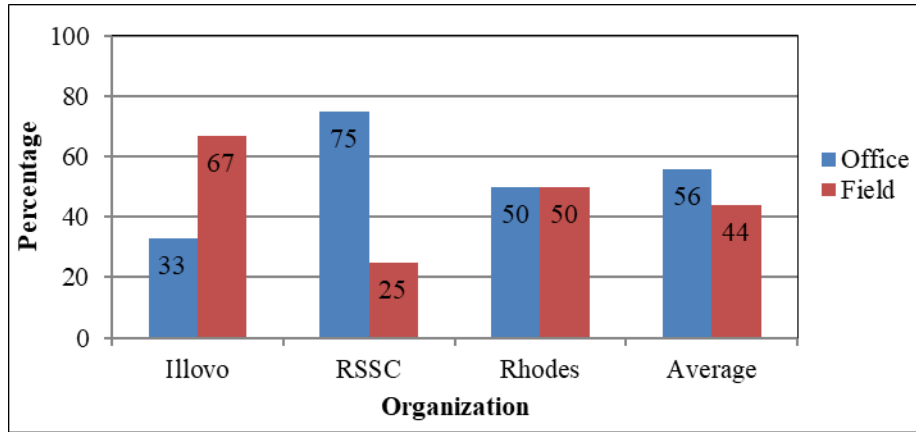
### 3. Results and discussions

#### 3.1. Demographic characteristics of respondents

Due to the current ongoing COVID-19 pandemic, the study targeted the management of the three big commercial organizations in the country, that being Illovo, Swazican (Rhodes) and RSSC, basically because it was not easy to have access to the employees, (directly affected by the pandemic). The findings indicate that of all the respondents 33% were males and 67% were females (Figure 2), with 56% working in the office and 44% being field workers (Figure 3), working between six to ten hours in a day. Moreover, all the respondents had tertiary education as their highest qualification and they have been with the organization for four to more than ten years (Table 1). Furthermore, the distance covered by the respondents to work ranged between three (3) to more than 10 km (Table 1).



**Figure 2** Gender of Respondents



**Figure 3** Type of work done by respondents

**Table 1** Demographic characteristics of respondents

Variable	Category	Company			Total
		Illovo	RSSC	Rhodes	
Years of Existence/work	4 – 6 years	33%	50%	50%	44%
	7-9 years	33%	50%	50%	44%
	10 years+	33%	0%	0%	11%
Distance to work	3- 6 km	33%	0%	0%	11%
	6-9 km	67%	100%	50%	78%
	10 + km	0%	0%	50%	11%

### 3.2. Effects of COVID-19 on workers

Being infected with COVID-19 is a very sensitive issue to both individuals and organizations or groups, which is why disclosing some of the information pertaining to it is not ideal, hence some of the information on labor or workers was not clearly disclosed by those who responded to the questionnaires, especially information on how many employees were downsized or laid off. Also, this led to respondents not giving out information on the number of employees who were present at the beginning of the year 2020 before the COVID-19 pandemic. Seasonal workers in the three organizations are usually employed two times in a year particularly during planting and harvesting (Figure 4). In some cases, it happens that seasonal employees are required for applying manure and weeding more especially if the machines are not functioning. As mentioned earlier on, planting commercial crops takes a lot of time and to ensure that less time is taken, more hands need to be used, that is through employing seasonal workers.

The data further indicate that 67% of the respondents highlighted that the target production was not met on time due to the new adaptations to COVID-19, which came with precautions which reduced working hours as well as the number of people in a working environment (Figure 5). On the other hand, 33% of the respondents indicated that the production target was met on time because there were no layoffs and production in these sectors continued as it was classified as an essential service (Figure 5).

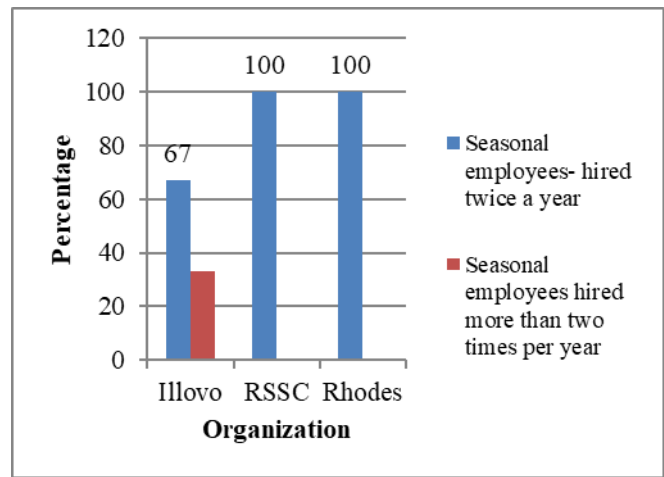


Figure 4 Type of seasonal employees per organisation

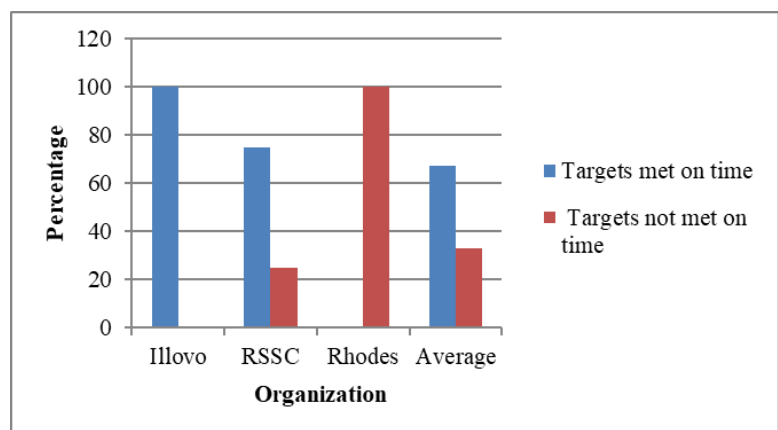


Figure 5 Employees meeting targets

The findings depicts that there were challenges encountered by organizations which contributed to their failure to meet the target produce on time (Figure 6). The challenges include failiure to adhere to COVID-19 precautions (Illovo 33.3%, RSSC 50% and Rhodes 50%) and inability to keep time precautions (Illovo 33.3% and Rhodes 50%) (Figure 6).

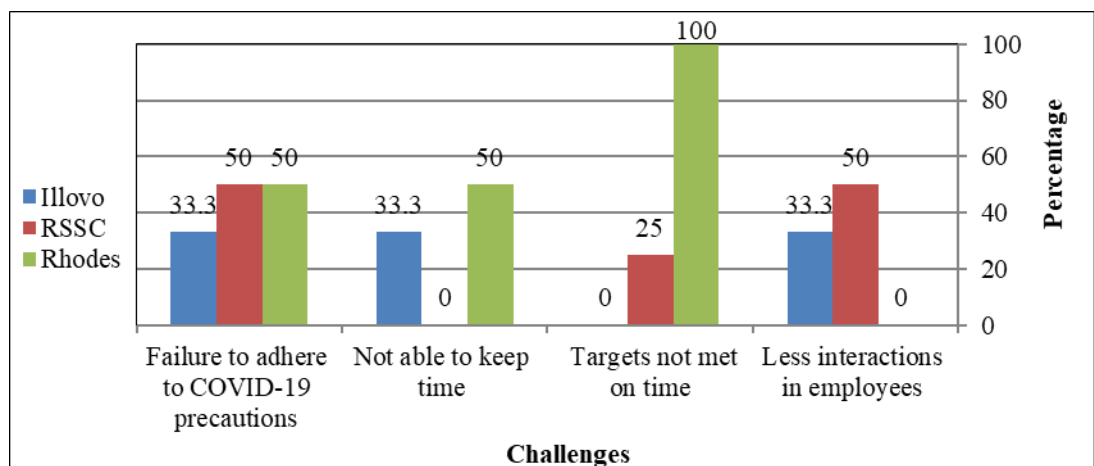
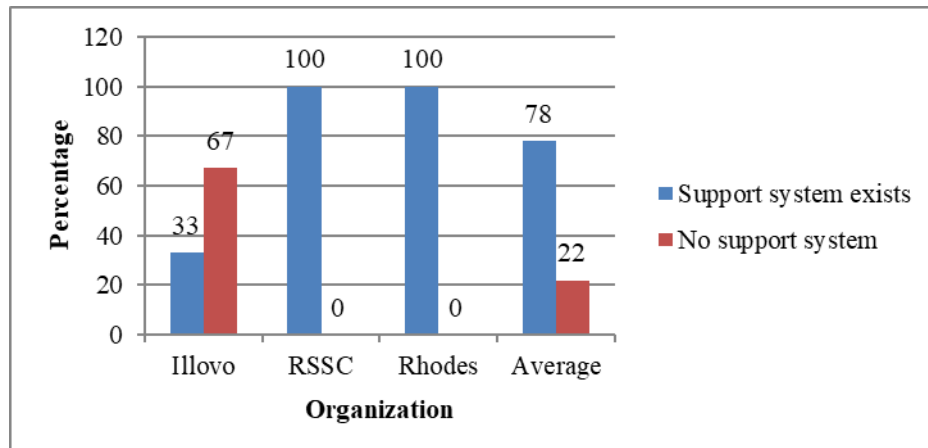


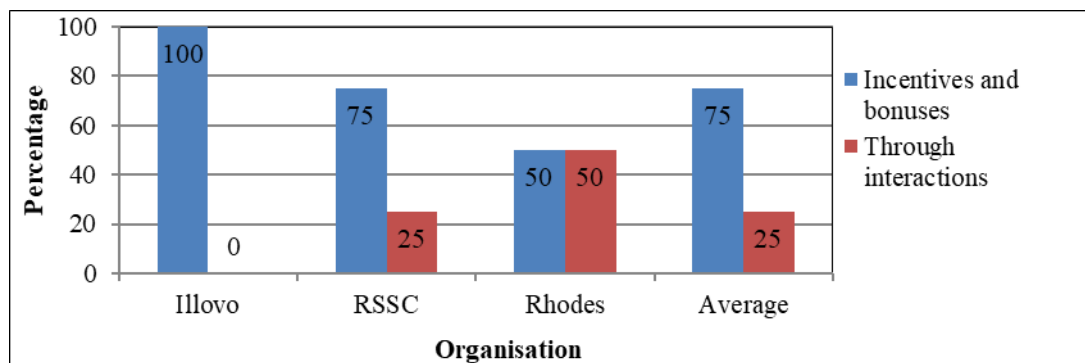
Figure 6 Challenges faced by organizations

Furthermore, the findings indicate that 78% of the respondents acknowledge that the organizations do have support systems within them that are specifically for emotional, mental and physical wellbeing of the employees (Figure 7). In contrast, 22% of the respondents denied existence of any support systems in the organizations (Figure 7).



**Figure 7** Existence and non-existence of support systems within organizations

In addition, the organizations motivate employees with incentives and bonuses (75%) as well as through interactions (25%) (Figure 8).



**Figure 8** Strategies of motivating employees

The findings are corroborated by those of a study conducted by the Joint United Nations Programme on HIV and AIDS [UNAIDS] in 2002 on the impact of HIV and AIDS on commercial farming where it was observed that absenteeism was common among infected employees and it resulted on slow production of the products as well as loss of labour through early retirements of infected employees and death [16]. Similarly, HIV and AIDS has led to more than 6.3 per cent decline in agriculture production in the country [17]. Likewise, in the case of the COVID-19 pandemic, it is inevitable that agricultural production will decline significantly if no measures are put in place to control its spread. Moreover, since HIV and AIDS contributed to absenteeism among infected workers, organizations had to request some employees to work overtime so that they could try and maintain production levels and this has financial implications. Similarly, in the case of COVID-19, an infected person had to be in isolation for a minimum period of 14 days.

Moreover, the findings of the study relate to those of the United Nations in Swaziland on the 2015 drought where it was observed that the agricultural sector (especially commercial farming) was affected by lack of rainfall [18]. Noteworthy is that, as result of the lack of rainfall workers had to work twice as much in order to ensure that production goals were met. In the same vein, the continuation of the drought resulted to some employees (especially seasonal employees) losing their jobs because the yield decreased due to the fact that crops which were planted were not doing well under the hot temperatures with no water [18]. Likewise, COVID-19 contributed immensely on the loss of jobs both those who were permanently and temporarily employed. On the other hand, it must be noted that although these natural disasters did not come with complicated regulations like those of COVID-19 (lockdowns, social distancing as well as quarantines); they had an impact on the employees in commercial farming organizations.

### 3.3. Marketing of products

The target market of the products in the organizations (Rhodes, RSSC and Illovo) are both locally and internationally which basically means they had to be exported to other countries and that usually happens through road transport. However, due to the COVID-19 pandemic, borders had to be closed in order to minimize movements between countries as a way of minimizing the spread of the virus. It was a slightly different case with commercial farming in the country because it was classified as an essential service because it is one sector that boost the economy (contributes 8.77 per cent to the Gross Domestic Product). Therefore, marketing of sugar, pineapple and citrus fruits continued despite the closure of borders, because their transportation to the market place was allowed. Important to note is that, there were cases where the product would be delayed due to fumigation of the border posts.

Noteworthy is that, the organizations are not responsible for marketing of the products. For instance, Rhodes products are marketed by the Eswatini Citrus Board, whereas sugar is marketed by the Eswatini Sugar Association. These organizations ensured that the target market of the products was reached as soon as possible. Furthermore, the products are in demand both locally and internationally and that resulted to an increase in the prices of the products. Since a lot of people were locked down at home, the demand for food also increased significantly [19]. Although the initial requirement of the products was met, there was a need for more products in all three commercial organizations and unfortunately the organizations were not able to meet those demands on time because what they produced was already bought by the people. It is therefore, expected that if the pandemic continues, the prices of the products may continue to rise. Also, marketing of the products had minimal effects on the producing organizations because their concern is mainly producing what has been ordered not on how it gets to the market.

The findings are corroborated by a study on the impact of Covid-19 on agriculture markets, undertaken beginning in March 2020, where it was contended that COVID-19 and the lockdown that was used in an endeavor to contain its spread have had a major economic impact that has affected all sectors of the economy including the agricultural sector and agricultural markets [20]. According to an impact assessment conducted by the Food and Agriculture Organization, there are vulnerabilities of inadequate storage infrastructure, weak market linkages, inadequate diversity of suppliers, and labour dislocations which prevents food products from reaching markets hence creating supply and demand imbalances as well as food losses along supply chains [19].

In terms of production prior to the COVID-19 pandemic, in the year 2018/2019 Eswatini exported about 4 755 tonnes of pineapple which surged by about 117.2 per cent compared to 2017/2018 and its worth was plus or minus 8.67 million USD in 2019 and that had increased by 8.52 per cent from 2018 sales [11]. In the year 2020 shipping of pineapple decreased to less than 4 000 tonnes which further decreased its worth by more than 10 per cent [11] and it is expected that it will rise again by end of the year 2021 because there have been strategies to maximize production with the current COVID-19 pandemic. With respect to the production of citrus fruits, in 2019 it increased by 1.04 per cent from 2018 (4 539 tonnes exported in 2019 and 4 491.8 tonnes in 2018) [11]. The end of 2020 came with a decline in the tonnes of citrus fruits exported (close to 10 per cent decline) due to the fact that there were less employees and COVID-19 was still a critical issue worldwide, but the number of tonnes exported is expected to rise at the end of 2021 because of the working and production strategies that have been developed from 2020 (beginning of the pandemic). On the other hand, the situation was a bit different with sugar production because at the beginning of 2020, the area planted sugar cane increased from 62 000 hectares to 70 000 hectares which increased production by 12.31 per cent in 2019/2020 [6].

### 3.4. Working strategies

The COVID-19 pandemic came as a shock to the country as it resulted in a swift change in the day to day operations of almost all the sectors in the country, from working in teams to working in shifts and not close to each other for longer periods, from enjoying the freshness of the air to wearing masks every day. These are some of the changes that were observed by most sectors in the country including the commercial agriculture sector. However, the findings from the commercial organizations indicate that although adaptations to COVID-19 were very important; production or working continued. The reason for continued 'normal' operations in these organizations is that their products are crucial in the stability of the economy and also more people are employed in them as well as that a lot of the products are exported to other countries. In the sugar organizations, no employees were laid off, but they had to sometimes work in shifts and at times, all workers will be at work and ensuring that they observe the COVID-19 precautions. The case was a bit different at Rhodes because the findings depict that part of the seasonal workers were laid off, which means there was more work for those who did not lose their jobs and the time was not enough to meet the target goal on time, hence a delay on marketing products which in turn decreased sales revenue. Since the situation was a bit 'normal' in these organizations, there are a few strategies that were adopted by the organizations in order to ensure that production continued. For instance, Rhodes was using shifts as a way of ensuring continued production.



All the respondents (100%) unanimously agreed that the organizations had their own strategies that helped to ensure positive production in the companies despite the prevalence of COVID-19. Part of these strategies were ensuring to educate the employees on COVID-19 which was mostly done through pamphlets and flyers pinned around the working stations as well as in areas where employees have access to, such as toilets (Figure 9). Also, the management would arrange weekly meetings where they would have a dialogue with the employees about COVID-19 (Figure 9). Suggestions on strategies that would be employed in future to ensure that not much pressure is put on employees (especially in the event of an unforeseen occurrence) were that each organization produce a surplus of the products and keep them for emergency use.

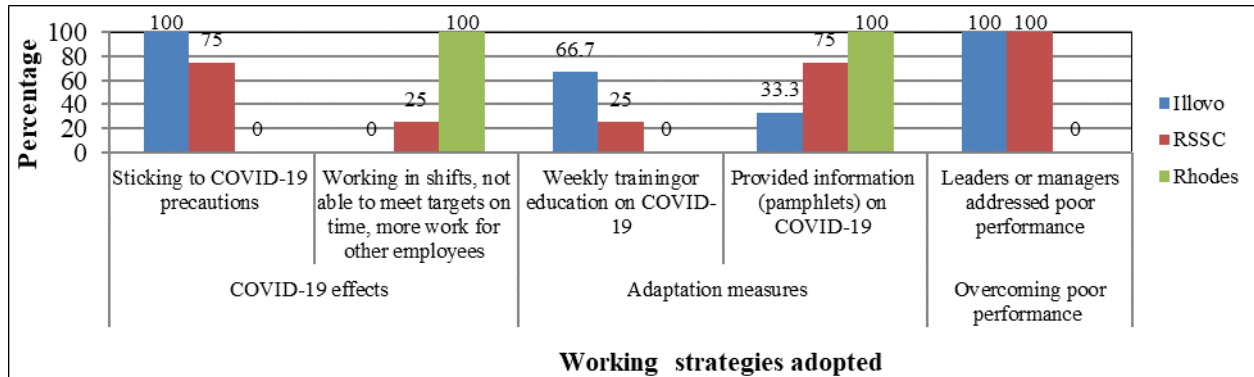


Figure 9 Working Strategies adopted by organizations

Earlier in the year 2020, governments of most countries across the globe implemented a strategy of a lockdown, which made people to stay at home in order to protect their lives from the raging COVID- 19 pandemic [21]. This change meant that businesses or organizations had to adopt new working patterns which include working with limited employees at a time (done through reducing the number of employees as well as working in shifts) in order to try and minimize the spread of the virus and which suggests that some people may have lost their jobs [21]. Important to note is that, some of the employees were already infected which then led to a demand for enforcing more COVID- 19 precautions which include practicing social distancing, quarantine as well as lockdowns. However, these regulations (especially lockdown) led to some workers losing their jobs particularly seasonal workers in commercial farming, which may result in a decrease in production [19]. On another note, there is a possibility that some employees were infected with COVID-19 and that meant they had to stop coming to work for some time so as to prevent spreading the virus to other employees as well as to take care of themselves at home until they recover which is not a guarantee as some do not recover but instead they die [3]. Furthermore, the International Labour Organization has projected that the rise of unemployment rates in the world will lie between 5.3 million and 27 million, although these estimates are uncertain, they indicate a considerable increase in global unemployment which will come as a result of a decrease in economic activities including commercial farming [22].

Adhering to the World Health Organization rules and regulations stipulated for the pandemic has led to cutting of employees in most sectors including the agricultural sector, which has had effects on the economy thus suggesting that production has been slow, hence a pronounced impact on production. Generally, labour is divided into two categories, namely permanent and seasonal labour. In commercial farming, production of most crops is highly dependent on seasonal workers particularly during planting and harvesting. However, under the COVID- 19 regulations, some seasonal workers may not have contracted their jobs and this implies that production is likely to have decreased. This decrease may also have been caused by an increase of cultivation costs which also delays planting and harvesting.

The findings are supported by a study on commercial farming organizations in the Kingdom of Eswatini which tried to implement strategies that aimed at preventing new infections of HIV through increasing knowledge on the disease since it is not just a ‘temporal’ disease but is permanent and can be passed from one person to the next [23]. This was all done to avoid losing employees to the virus as well as to increase their awareness on how they can prevent contacting the disease so that production would continue to be maximized. Part of the strategies involved educating the employees on everything that concerns being infected. Also, they were provided with health care facilities within the place of work [24]. The case is however different with the drought and the tropical cyclone as these are situations which lasted for a short period of time as compared to HIV, so strategies involved planning on how the organizations were going to keep up with the decrease in production in the next years [18]. Notably, the response to the COVID-19 pandemic had largely been on strategies aimed at prevention of new infections which according to the WHO include constantly washing your

hands with running water, sanitizing them and also eating food which is rich in vitamin C. This means that employees have an obligation to do these at all times, but this is possible with a support from their employers.

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#### **4. Conclusions**

In nutshell, all the commercial farming organizations came up with different ways in which they could maximize production bearing in mind that their products contribute a larger percentage to the GDP of the country. Although COVID-19 conditions were unforeseen, the organizations were most innovative in ensuring that employees mental, physical and emotional needs were taken care of, which was done through educating them on COVID-19, helping them to follow COVID-19 precautions as well as providing support systems for those struggling to cope (especially those that had to work extra shifts due to layoffs). The pandemic came with a lot of regulations one of which was closing borders to minimize the spread of the virus; however that did not affect marketing of the products to international markets as there are national organizations (Eswatini Citrus Board and Eswatini Sugar Association) that ensured that the products get to the market on time. Also, since COVID-19 came with precautions and regulations (washing hands, sanitizing, social distancing and lockdowns), organizations came up with new working strategies which helped maximize production without compromising COVID-19 regulations and precautions.

#### *Recommendations*

The study recommends that measures to increase production be put in place to fill up the production deficit, while the relaxation of more COVID-19 control measures is effected in order to ensure a full recovery of the agricultural commercial sector in Eswatini – a significant sector in the country's economy. Different operational models are also encouraged in different organization in order to counter the impacts of unpredictable circumstances, situations and diseases such as the COVID-19 in order to minimize losses from similar diseases.

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#### **Compliance with ethical standards**

##### *Acknowledgments*

Special thanks to the management of Illovo, Rhodes Food Group as well as Royal Swazi Sugar Cooperation for cooperation during data collection amidst the restrictions imposed due to the COVID-19 pandemic.

##### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

##### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

##### *Funding*

No funding was received for this study. The study was funded by the authors.

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