



POTATO VALUE CHAIN ANALYSIS REPORT FOR MALAWI

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CONTENTS

ACKNOWLEDGEMENTS.....	v
EXECUTIVE SUMMARY.....	vi
LIST OF ACRONYMS.....	viii
1 INTRODUCTION.....	1
1.1 Background.....	1
1.2 Rationale and objectives of the study.....	2
2 APPROACH AND METHODOLOGY.....	3
2.1 Study area.....	3
2.2 Sampling technique and data type.....	3
2.3 Data analysis.....	4
3 RESULTS AND DISCUSSION.....	5
3.1 Background of potato marketing.....	5
3.2 Demographic characteristics and business background of traders and producers.....	6
3.2.1 Demographic characteristics of producers.....	6
3.2.2 Demographic characteristics of potato traders in the study districts.....	6
3.3 Business background of trader.....	7
3.4 Potato marketing.....	8
3.4.1 Main demanded potato varieties.....	8
3.4.2 Reasons for demanding potato varieties.....	9
3.5 Most common potato varieties.....	9
3.6 Source of potato seed.....	10
3.7 Demand for seed.....	10
3.8 Utilization of potato.....	11
4 POTATO SUPPLY CHAIN ANALYSIS.....	12
4.1 Selling units.....	13
4.2 Most reliable potato customers.....	13
4.3 Months of higher sale values.....	14
4.4 Access to market information by traders.....	15
4.4.1 Marketing challenges.....	15
5 POTATO SUPPLY CHAIN ANALYSIS.....	18
5.1 Table potato market chain.....	18
5.1.1 Linkages Among Stakeholders.....	19
5.2 Input supply.....	20
5.2.1 Seed.....	20
5.2.2 Estimated demand for seed.....	20
5.2.3 Fertilizer and other inputs.....	22
5.3 Potato gross margin analysis.....	22
5.3.1 Potato farmers gross margin analysis.....	22
5.3.2 Potato micro-processors gross margin analysis.....	25
5.3.3 Price Transmission Along the potato Value chain.....	26
6 CHALLENGES IN POTATO MARKETING.....	28
7 SWOT ANALYSIS OF THE POTATO VALUE CHAIN.....	30
8 CONCLUSIONS AND RECOMMENDATIONS.....	31
9 REFERENCES.....	33

List of Figures

Figure 1: Trend in area under potato and production	2
Figure 2: Value and volume of potato imports in Malawi.....	5
Figure 3: Major source of potato seed planted during the 2020/21 rainfed season (Source: Quick Grow Survey 2021)	10
Figure 4: Months of higher sale values (Source: Quick Grow Survey 2021)	15
Figure 5: Potato marketing problems.....	16
Figure 6: Table potato market chain (Source: Quick Grow Survey 2021)	18
Figure 7: Estimated demand for improved potato seed in the study areas	21
Figure 8: Major challenges reported by potato traders	28
Figure 9: Major challenges associated with potato seed multiplication reported by farmers in the study areas	29

List of Tables

Table 1: Number of households, traders, consumers interviewed.....	3
Table 2: Demographic characteristics of potato producers in the study districts	6
Table 3: Demographic characteristics of potato traders in the study districts.....	7
Table 4: Basic business background information of potato traders across the markets visited	8
Table 5: Main demanded Varieties.....	8
Table 6: Main demanded Potato qualities	9
Table 7: Most common potato variety grown by farmers across the study district.....	9
Table 8: Use of potato harvested by households across the study districts.....	11
Table 9: Estimated average yield of potato reported by farmers during the study across the districts	12
Table 10: Common potato selling units.....	13
Table 11: Proportion of farmers ranked different traders as their most reliable market for the ware potato across the study districts.....	14
Table 12: Access to market related information	15
Table 13: Proportion of potato farmers and average amount of fertilizer and seed used.....	20
Table 14: Estimated demand for improved potato seed	21
Table 15: Summarized Table potato gross margin.....	23
Table 16: Potato producers' gross margin from the sampled districts per acre (n=272)	24
Table 17: Estimated average yield of potato reported by farmers during across the districts	25
Table 18: Detailed cost margin for Processors at Tsangono Market for Potato chips.....	25
Table 19: Detailed cost margins for potato crisps at Dedza Road Block.....	26
Table 20: Price Transmission along the Potato Value chain.....	27
Table 21: SWOT analysis	30

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EXECUTIVE SUMMARY

Potato is one of the key crops that need to be supported and promoted not only because it is a food crop that can address the challenge of food insecurity but more so because the margins of the crop are very attractive. Although the crop has potential both at household and national level the sector still remain underdeveloped right from the production side to marketing. Production of potato has been challenged by use of poor-quality planting materials due to unavailability of improved seed, use of other inputs like chemicals and fertilizers way below recommended quantities due to ever increasing prices. From the marketing side the challenge has mainly been non-existence of a functioning marketing system like the ones existing for other crops. This study was conducted to understand the marketing of potato and identify possible bottlenecks along the value chain as the crop exchange hands from producers to consumers. Evidence gathered in this study shows that if properly managed potato can compete seriously with other well promoted cash crops like tobacco, soybean, and groundnuts just to mention a few. The basis for this argument is coming from several findings noted in the study.

Firstly, the study found out that there is a huge demand for fresh potato within the domestic market and even in the neighboring countries like Zambia and Mozambique and this translates to a ready market for the crop. In addition to demand for fresh potato there is also an increasing demand for value added products from potato like crisp and frozen chips that currently is being supplied through imports from South Africa. Secondly the study noted that although the country produces large volume of potato there is still an increase in the imports of the crop from other countries especially South Africa mainly by supermarkets and hotels. One of the reasons contributing to the increase in potato imports is that quality of imported potatoes is much better compared to that produced locally by all quality attributes and this calls for intervention in the promotion and maintenance of quality attributes required by different market players. There is a need to sensitize producers on the specific quality requirements demanded by different traders if farmers are to benefit from these local traders.

On the other hand, the country is losing out the much-needed forex that could have been used to procure other necessities that cannot be locally produced. On this basis, the study recommends that farmers should be encouraged to adopt the newly released potato varieties to produced quality potatoes as required by different markets. It is also important to highlight that by just planting improved varieties farmers may not get the potential yields but rather they should also be encouraged to use right inputs like pesticides and fertilizer to get the best harvest and compete with imported potatoes.

The study also found out that one of the reasons why potatoes from Malawi are highly demanded by consumers in the neighboring countries is because they have some unique qualities like not breaking down easily when boiled; not taking too much oil when fried and the taste is very good. However, although potatoes produced in Malawi find its way to other countries there is a lot that must be done to improve the exportation system. Firstly, government is losing out in terms of revenue as most traders export the crop through porous routes and in return there is no revenue that goes to government from such exports.

Secondly, the study noted that the terms of export are not well clarified between Malawi producers and other countries traders which in the result in disagreements on the prices. Investigation into the reasons why potato producers and Malawian traders prefer to export the crop through illegal channels revealed that most traders run away from the bureaucratic and complex stages that are followed when exporting crops to other countries and as such traders feels that by the time the paper work is completed and the export permit is issued potato will have started changing form because they do not have trucks with cooling systems that could maintain the quality of the crop which in the end may result in traders or producers incurring huge losses

due to spoilage of the crop before taken to the market. Based on this finding the study recommends that government should intervene into the export processes of potatoes by making sure that the system is set up that will be faster and timely to avoid spoilage of the crop in transit and in so doing it will start getting revenue from such exports and the welfare of local traders and farmers will improve. There is also a lot of work that must be done on the improvement of quality of potatoes if the export market is to be seriously targeted so that locally produced potatoes can compete at an international level. The study also found out that domestic producers can benefit a lot from potato production if they could be linked directly to markets. Inexistence of a well-functioning potato seed system has heavily contributed to the low productivity of potato and even on the quality as other market describe quality in terms of tuber size and therefore the study recommends that with the coming in of the newly released varieties there is a need to set up a formal seed system within the local communities and even at national level so that seed is available and accessible all the time. There is also a great need to encourage private traders to invest in the production of improved potato seed because the study observed that there is a huge demand for seed from producers that cannot be met by CIP and DARS alone.

Seasonality remains one of the challenges hindering growth of the potato sector as mentioned by several players along the value chain. The direct impacts of seasonality include unstable market prices that directly affect production and processing costs, inconsistent supply of potatoes that also affect value addition. Although seasonality comes with its own negative impacts. There are better opportunities that are associated with it like better prices which translates to better income for producers and as such for farmers to tap on these benefits. The study recommends that farmers should be encouraged to intensify on small scale irrigation and private sector producers should be encouraged to invest in irrigation production to ensure that production is smooth throughout the year.

The study also noted that post-harvest losses is still a challenge faced by potato traders and such recommends that there should be more work that has to be done on this area to reduce losses.

LIST OF ACRONYMS

ADD	Agricultural Development Division
ASWAP	Agriculture Sector Wide Approach
CIP	International Potato Centre
CU	Concern Universal
DAES	Department of Agriculture Extension Services
DARS	Department of Agricultural Research Services
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GoM	Government of Malawi
MK	Malawi Kwacha
MoAFS	Ministry of Agriculture and Food Security
NGO	Non-Governmental Organization
NSO	National Statistics Office
USD	United States Dollar

1 INTRODUCTION

1.1 Background

Agriculture remains the main economic sector in Malawi and contributes significantly to the national development. It is a sector that receives high priority and attention from the Malawian Government. Its importance stems from the fact that it accounts for about 35-40 percent of the Gross Domestic Product (GDP), providing employment to about 84.5 percent of the labour force, contributes to over 90 percent of the export earnings and accounting for 82.5 percent of the foreign exchange earnings (ASWAP, 2010). Tobacco is the major export earner and contributes about 65% of the country's export earnings, followed by tea at 8% and sugar at 6% (NSO, 2011). However, recent trends in the production and prices of tobacco coupled with the global anti-smoking campaign have brought to light the need for diversifying the country's export base and have left the country searching for alternatives to this once main export crop. Malawi Government is putting in place several efforts and policies to diversify the export base like the promotion of livestock and crop sectors through the increase of budgetary allocation every year. In an effort of diversifying the economic base of the country the Government of Malawi identified several crops that are being promoted which include legumes like soybeans, groundnuts and pigeon peas, root and tuber crops like cassava and potatoes and cotton just to mention a few. Promotion of crops like potatoes is very strategic because of its multi usage as it is taken as a food crop as well as cash crop among smallholder farmers. This directly contributes to Pillar 1 of MW 2063 and Strategic objective 2 of the Malawi Country Strategic Opportunity (COSOP 2016-2021) "Smallholder households access remunerative markets and services". It also contributes to Strategic Objective 1 of the COSOP "Smallholder households become resilient to natural shocks" by focusing on the promotion of climate-smart agriculture and the mainstreaming of nutrition and directly relates to the 2 key focus areas outlined in the ASWAP which are food security and risk management as well as agri-business and market development.

The importance of potatoes in Malawi cannot be overemphasized as it is the third most important food crop after maize and cassava, and it is the main cash crop in the main production. The crop is mainly cultivated in Lilongwe Agricultural Development Division (ADD) which account for about 60% of the national production and specifically in Ntcheu and Dedza districts and in Mchinji and Ntchisi districts under the Kasungu ADD which together with Mzuzu ADD accounts for about 23% of the national production (Moas, 2011).

Statistics over the last 6 years indicate that the crop is fast gaining popularity as shown by the increase in area under the potato as shown in the figure 1 below. The figure 1 below shows that area under potato has increased from 60 000 hectares in 2010 to around 75 000 hectares in 2020 at national level whilst in the main producing districts the average area rose to around 20 000 hectares. Production is depicted to have jumped from 800,000 to 130000 in the same period (Moan, 2020).

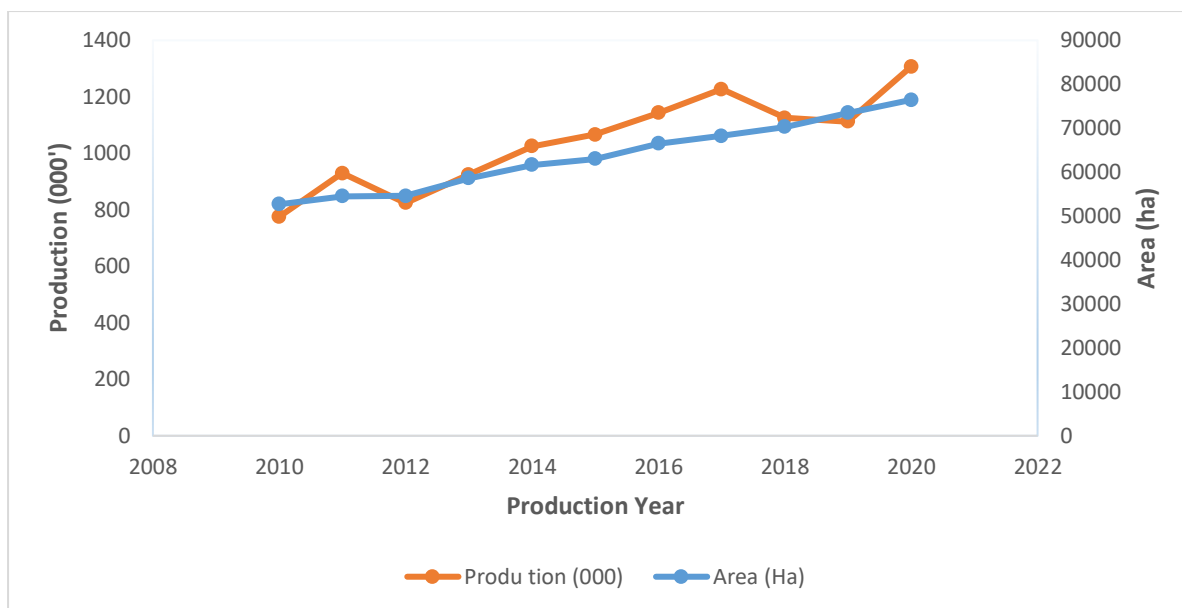


Figure 1: Trend in area under potato and production

1.2 Rationale and objectives of the study

To effectively make a significant impact on potato producers' economic returns, there was a need to understand how the crop is handled from producer through different players along the value chain to the final consumer. A good understanding of the potato value chain will be very crucial in the development and promotion of the crop as it details out the economic potential of the crop to producers at the same time it explores and analyses the margins obtained by various players along the chain. The study also identified some bottlenecks faced by number of players along the chain and come up with recommendations for improving such challenges.

Specifically, the study objectives were;

- To estimate the quantity of potato seed demanded each season
- To estimate the quantity of table potato demanded produced each season
- To document the quality attributes required by different markets in the potato value chain
- To identify major key players in the potato value chain
- To estimate gross margin for table potato realized by each player in the value chain
- To estimate gross margin for processed potato realized by micro processors
- Recommend the options for potato value chain upgrading

2 APPROACH AND METHODOLOGY

2.1 Study area

The study was conducted in Dowa, Dedza, Ntcheu and Mzimba where CIP is implementing its project activities. Additional data was also collected in the city of Lilongwe and Blantyre. The study used mixed methods and used both qualitative and quantitative data. Data was collected through use of semi structured household questionnaire that was subjected to potato producers who produced in 2020/21 season as the minimum. The study also employed Focus Group Discussions (FGDs) and Key Informant Interviews (KII) to triangulate the findings from the household interviews. FGDs were conducted in each of the targeted EPAs. They involved male and female producers and solicited data on broader trends that impact the overall producers and the potato value chain broadly. The information solicited was further beefed up and triangulated with KII. KII utilized authorities such as district Horticulture Officers, Agribusiness Officers, Market leaders and NGOs promoting potato activities including value chain development. Data collection was done using Kobo toolbox which was in the tablets. The study employed experienced enumerators who were trained for 5 days before commencement of the assignment to ensure that there is a common understanding of the study objective and the tools used. To boost quality of data pretesting was done in Ntcheu. This helped in refining of the data collection tools. Data that was collected by enumerators and was checked every evening before finally being sent to the server. Data was entered in Microsoft Excel and analysis was done using STATA.

2.2 Sampling technique and data type

The study mainly used primary data that was collected from various players in the potato value chain, and this was complemented by secondary data that was collected from reports and articles on potato production in Malawi. Purposive sampling was used to select sampled traders and consumers in the study areas as per the table 1 below. In addition to primary data collected from individual interviews, focus group discussions and key informant interviews were also conducted in all the districts with farmers and traders, representatives of NGOs and Ministry of Agriculture to validate some of the findings from individual interviews.

Table 1: Number of households, traders, consumers interviewed

	HH	Processors	Traders
Dedza	98	5	4
Ntcheu	100	4	4
Dowa	52		
Lilongwe			4

Source: Quick Grow Survey 2021

To capture primary data from respondents' different questionnaires were designed and administered to each player along the chain. Information collected included traders' demographic characteristics, experience with potato business, most demanded potato varieties on the market, volume of sales, months of highest sales, main customers, costs associated with the business as the product moves from one player to the other and challenges faced with the business and all other information that has helped to understand the functioning and dynamics of the potato value chain.

2.3 Data analysis

Primary data collected from individual interviews was entered and cleaned using SPSS 17 and later exported to STATA 12 for further processing and analysis. Analysis of the data included generating frequencies as well as computing different costs associated with potato business by various players along the value chain. Results from the analysis were complemented by secondary data gathered from various reports that have been quoted.

3 RESULTS AND DISCUSSION

3.1 Background of potato marketing

Potato is the main cash crop cultivated by smallholder farmers in the main growing districts of Dedza and Ntcheu and at national level it is the second most consumed fast food after rice in the major cities. Starting early 2000 the country has seen an increase in the number of fast food and other hospitality businesses which are among the highest traders of potato and other potato product. According to Banda (2007) 80% of the fast-food shops interviewed during the study reported that over one third of their daily sales comes from selling potato or potato related products. The report further indicated that over half of the potato sold in such places comes from other countries like South Africa. Statistics on the volume of potato imported from South Africa into Malawi indicates that there is an increase in trend both in terms of volume and value in figure 2 below;

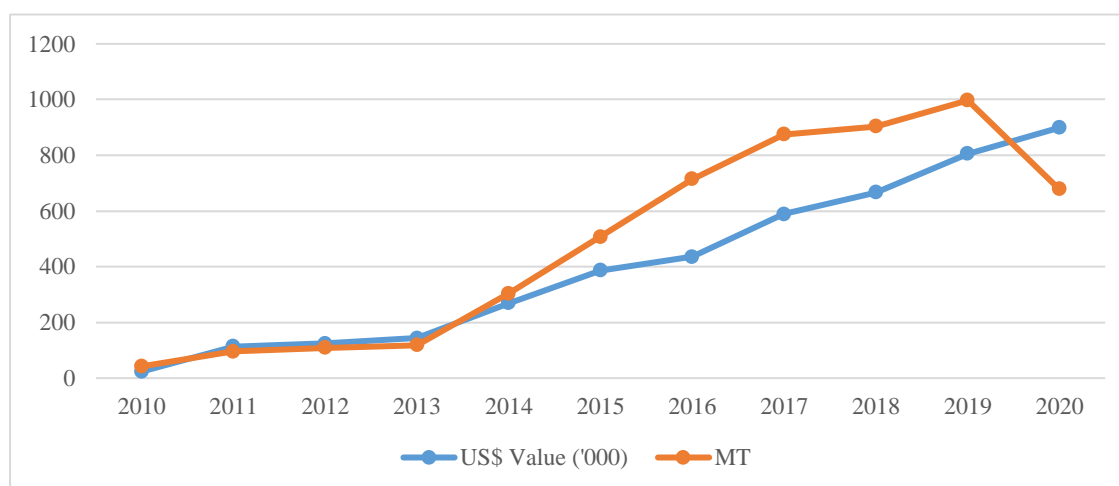


Figure 2:Value and volume of potato imports in Malawi

(Source: Trade Map (2012))

According to the figure 2 there was a very sharp increase of the volume and value of potato imported from South Africa from around 50 000tons in 2010 to over 95 000 tons in 2020 and \$30 000 in 2010 to around \$115 000 in 2020. The rising trend of value and volume of potato imports demonstrates the potential that the crop has. An investigation into the reasons why such traders import potatoes from other countries although the country produces a lot revealed that quality of potato imported was the number one reason as the volume of loss from wastage is very minimal and the product made like chips is of high quality that satisfies their customers and make it possible to retain them.

The increase in volume and value of potato imports from other countries demonstrate the potential that the crop has and as such it is very rational to expect that once the crop is supported and promoted to satisfy the domestic market demands could reduce the problem of food insecurity at household level but more so the much-needed forex used to import will be saved and used for the importation of other essential goods and services that cannot be produced within Malawi. Promotion of potential crops like potatoes can be achieved if there is a thorough understanding of the entire value chain right from the production side to the marketing point. Realizing this, CIP phase I project started working on the production side particularly the seed system and

the activities are continuing in the phase II where in addition there is an incorporation of the promotion of value addition and marketing of potato so that once all the information is available then it becomes easier to intervene in the value chain. To properly understand how the potato market operates marketing study was conducted and the results of the study are summarized below.

3.2 Demographic characteristics and business background of traders and producers

3.2.1 Demographic characteristics of producers

The demographic characteristics of the producers interviewed during the study are summarized in table 2 below. The study suggests that males continue to dominate potato production at 70 percent. However, it was worth noting the active participation of women at 30 percent. This gender divide partly explains the importance of potato as it continues to be an income generating crop hence dominated by men. Dedza had the highest women participation at 40 percent. The average age of producers was 39. Mzimba recorded an average of 35 years. This finding is important as it explains the participation of the economically active group in the production of potato. Education also plays an important role in potato value chain. The study found out that most producers had gone up to upper primary school. Ntcheu and Mzimba topped the list with 8 and 11 completed years of schooling. Household size affects the family labour supply the more the household size the readily available the labour can be. Producers in Dowa had the highest family size (7) with Ntcheu and Mzimba as the lowest (5). Household size and Education of the household head positively correlated as the more educated the family head of the family the less were the household size.

Table 2: Demographic characteristics of potato producers in the study districts

	Ntcheu	Dedza	Dowa	Mzimba	All
Producers (n)	92	90	44	46	272
Male producers (%)	70	60	80	74	70
Female producers (%)	30	40	20	26	30
Age (yr)	36	41	37	35	39
Education					
Years completed	8	6	6	11	7
HH size	5	6	7	5	6

Source: Quick Grow Survey 2021

3.2.2 Demographic characteristics of potato traders in the study districts

The study also interviewed traders in the study districts. As depicted in table 3, the study suggests that males continue to dominate potato the marketing of potato. About 54 percent of the interviewed were males while 46 percent were females. The male dominance in the potato business is mainly attributed to the bulkiness of the commodity that makes it hard for female traders especially when transporting from one place to another. Worth noting was the female participation in potato business at 34 percent. An exception was registered in Dowa where 60 percent of the traders interviewed were female. This can be attributed to the influx of Malawians of Burundi origin at the said market. The female participation in market among these Burundi is worthy emulating. The market for potato like the production continues to be dominated by the economic age category with an average age of 40 years. Education also plays an important role in in marketing of potato. The study

found 71 percent of the traders had attended secondary school up to upper primary school. Wakawaka and Blantyre markets topped the education list at 81 and 78 percent respectively (see table 3).

Table 3: Demographic characteristics of potato traders in the study districts

	Tsangano T/off	Lizulu	Wakawaka	Blantyre	Dowa T/off	All
Producers (n)	17	15	15	15	15	77
Male traders (%)	55	60	50	55	40	54
Female traders (%)	45	40	50	45	60	46
Age (yr)	38	39	42	40	38	40
Education						
Secondary	77	64	81	78	51	71
Primary	23	36	19	22	49	29

Source: Quick Grow Survey 2021

3.3 Business background of trader

Kotler (2005) reported that business experience is amongst several factors that contribute to the success of many businesses and in line with this, traders were requested to indicate their experience in potato business. Results in table 4 below indicate that on average in all the study areas traders have 9 years potato business experience with Blantyre Ntcheu and Dedza reporting more years compared to other districts. Traders were also requested to indicate whether their business was registered with the government and results show that 95% of the traders interviewed did not register their potato business with authorities. Complex stages associated with registration and fear of tax payment were the main reasons cited to be behind fewer registration of businesses.

Registration of businesses is important in any economy not only for tax revenue collection but more importantly for collection of market information like trade volumes and values. For instance, Chirwa and Zakeyo (2003) reported that significant market information like volume traded, value of crops traded and estimated demand for most crops that do not have a formal marketing system like that of tobacco, tea, sugar and coffee is very difficult to capture because most traders involved in such businesses are not registered.

Majority (68%) of the respondents indicated that they own other businesses on top of the potato business compared to only 32% that only depended on potato. Diversification of risk and uncertainties associated with potato business, seasonality of the crop and the desire to establish a one shop for all the produce were the main reasons mentioned to be behind ownership of other enterprises.

Capital is one of the main basic ingredients in any business and usually determines the scale of business. To understand thoroughly the category of traders involved in potato business, the study collected information on the categories of operating capital by all the traders in all the districts. The results show that there is variation not only across districts but also within the same district. In addition, analysis of results vindicates the assertion that potato business is one of the businesses that requires relatively larger capital compared to other agricultural produce related businesses. For instance, the study revealed that of the interviewed traders during the study only 20% of the respondents indicated that their business falls in the category of less than MK600 000 (\$800) working capital followed by the majority 43% in the range of MK610 000 - MK1,000, 000 category then 37% in the range of above MK1,000 000 category. Majority of traders in the main cities were in the category of above MK1,000 000 because of the volume of business they handle and because most of them do supply to small scale potato traders whose capital falls in the ranges of less than MK60 000.

Another important finding is that although the study used a narrow working capital range majority of traders in the category of over MK100 000 reported to have a working capital way above the lower limit of the range. For instance, in Tsangano turn-off market most traders interviewed indicated that their working capital was above MK500 000 (\$650) and those with less were roadside traders selling to customers travelling along the main road.

Table 4: Basic business background information of potato traders across the markets visited

	Tsangano T/off	Lizulu	Wakawaka	Blantyre	Dowa T/off	All
Business Experience (years)	21	17	14	17	15	17
Business license (%)						
Yes	10	8	11	15	2	9
No	90	92	89	85	98	91
Own other businesses						
Yes	32	21	14	23	31	25
No	68	79	86	77	69	75
Capital (MK)						
100,000 - 300,000	5	9	4	6	17	8
310,000 - 600,000	7	13	6	11	21	12
610,000 - 1,000,000	56	47	28	35	49	43
Over 1,000,000	32	31	62	48	13	37

Source: Quick Grow Survey 2021

3.4 Potato marketing

Production and promotion of improved quality potato could only be meaningful to farmers if they are able to sell whatever they have produced. However, it is not just being able to sell that matters but rather whether they are able to make profits out of their production. To make significant intervention in the marketing of any product there is a need to understand how the market for the commodity in question operates and how players in the value chain interacts (Kotler and Keller, 2006).

3.4.1 Main demanded potato varieties

There are several potato varieties currently grown by smallholder farmers in Malawi and they have different attributes. The study collected information on the main varieties demanded by different customers in all the study areas and results are summarized in the table 5 below. The results clearly show that majority (83%) of customers demand violet. This was followed by Rosita and Yoyera which tied at 8 percent. Holland was demanded by only 1 percent of the respondents.

Table 5: Main demanded Varieties

	Blantyre	Dedza	Lilongwe	Ntcheu	Dowa	All
Violet	82	88	87	85	78	84
Rosita	6	5	4	9	14	8
Yoyera	10	6	9	6	8	8
Holland	2	1	0	0	0	1

Source: Quick Grow Survey 2021

Different potato customers that were interviewed gave different reasons for the preference of these varieties in all the districts. For instance, households reported that they prefer violet because the size of the tubers are big, and this makes peeling of potatoes easier. On the other hand, chips vendors in all the districts indicated that they prefer violet not only because of the bigger tuber size but also because chips made from this variety does not absorb a lot of fat when fried which is very ideal for their business because they save on cooking oil.

3.4.2 Reasons for demanding potato varieties

Potato quality attributes should be thought together potato qualities. The quality attributes included free from bruises, free from diseases and in some cases the color of potatoes and free from soil. Bruised potato is not preferred because the bruises make the other potatoes to go bad easily. Other quality attributes indicated included red skinned and white skinned potatoes. These last two were especially related to products such as crisps and chips.

As depicted in table 6 farmers demanded potato seed for various reasons. As alluded to Violet was reported to be the most preferred variety. About 40 percent choose varieties because of big tuber size. 16 percent of the respondents reported using violet because it was the only cultivar available. 13 percent of the respondents indicated that their choice of variety was driven by variety being highly demanded by buyers whereas 10 percent and 7 percent regarded it has highly maturing and yielding respectively. While 14 percent indicated that their choice was because it was disease resistant. However as already discussed, farmers hinted that over time the cultivars have been susceptible to disease a feat they attributed to overuse of the cultivars.

Table 6: Main demanded Potato qualities

	Blantyre	Dedza	Lilongwe	Ntcheu	Dowa	All
Large tubers	71	79	68	83	90	78.2
Not bruised	14	11	16	9	3	10.6
Disease free	6	6	6	4	3	5
Red skinned	4	3	2	2	2	2.6
White skinned	5	1	8	2	2	3.6

Source: Quick Grow Survey 2021

3.5 Most common potato varieties

The study further investigated the common varieties grown across the study districts. Evidence suggest that Violet is the most grown variety. This is distantly followed by Rosita at 19 percent. Chuma, Mwai, Thandizo and Zikomo follows at 7 percent, 6 percent, 3 percent, and 3 percent respectively. The other category which mostly comprised the local varieties as reported by 2 percent of the respondents (see table 7)

Table 7: Most common potato variety grown by farmers across the study district

Variety	Ntcheu	Dedza	Dowa	Mzimba	All
Violet	40	41	74	81	60
Rosita	25	29	19	15	19
Chuma	15	11	4	3	7
Mwai	10	9	3	1	6
Thandizo	5	4	-	-	3

Zikomo	3	4	-	-	3
Other	2	2	-	-	2

Source: Quick Grow Survey 2021

3.6 Source of potato seed

The findings as presented in table 7 and figure 3 may point to the source of planting materials. As the evidence suggest in figure 3 farmers generally use seed bought from the market (47%) and own seed from previous season (43%). Use of own seed (recycled) was reported to have led to loss of vigor for violet variety. In addressing this farmer suggested use of seed multiplication groups. CIP injection of seed was reported by 5% of the respondents. This is mainly seed for research and promotion. 4 % of the respondent received seed from friends and relatives as gifts.

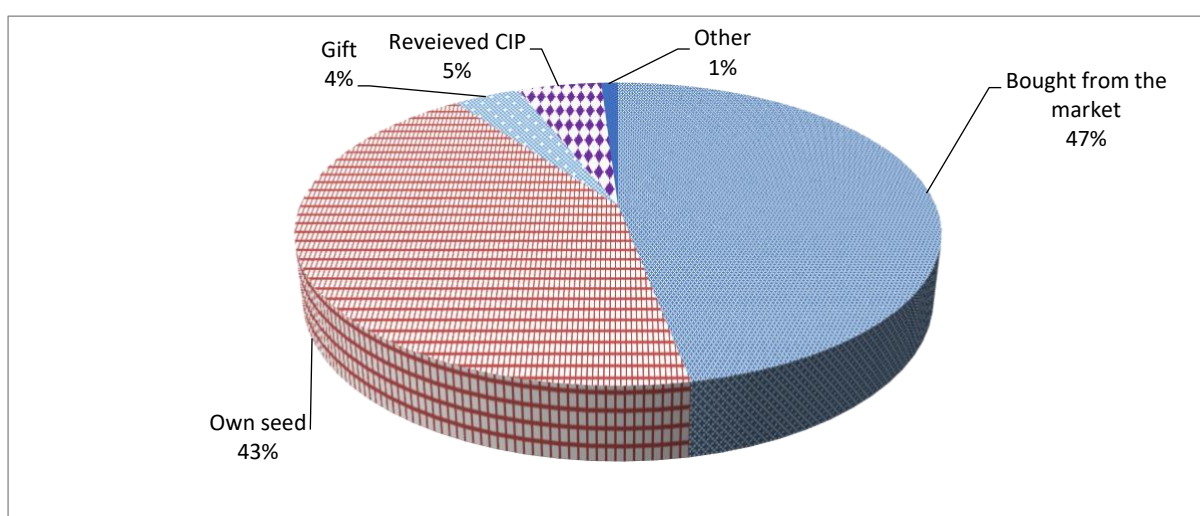


Figure 3: Major source of potato seed planted during the 2020/21 rainfed season (Source: Quick Grow Survey 2021)

3.7 Demand for seed

The study found out that most farmers do not meet the actual requirement of seeds to be grown in their areas. Most farmers cited seed being expensive and lack of money to buy seeds as some the major reasons for not meeting the required amount. Farmers face the tradeoff between selling potatoes and having good seed. In almost all cases farmers plant smaller potatoes after selecting big sized one. Smaller sized potato is thus synonymous to 'seed'. This means that farmers generally do not plant good seed. Sources of seed included own production, fellow farmers and markets with own production reported by a majority (92%) of farmers. Recycling of seed was reported to have contributed to loss in vigor of violet, the most preferred cultivar. Seed was reported to be expensive when compared to ware potato. There is little to no presence of seed multipliers across all the study areas with a few seed multipliers reported in Dedza. Seed multiplication was suggested to be a solution to the problem of lack of improved varieties and general access to seed. This was especially mentioned because it would be easy to multiply the crop as it can be harvested thrice a year.

The most popular varieties grown is Violet. The reasons for growing this cultivar include high yielding, disease resistance, most liked by the buyers and easy access of seed. Challenges faced by the farmers on seed are poor quality seed due to repeated use, expensiveness, and lack of new varieties. The solutions were suggested to be establishment of seed multipliers and introduction of new varieties. In Ntcheu some farmers grew *Chuma* and

Rosita as that was also the varieties available to them and preferred by traders who come from other countries to buy potatoes from them.

According to most of the farmers in all three districts, Violet is disease resistant and most preferred by consumers. The farmers cited “*Getsi*” and “*thukwa*” as the most common type of diseases in other varieties of potato. However, unlike in some parts of Dowa, farmers said they prefer Violet because it is the only variety they know, and its seed is easier to access.

3.8 Utilization of potato

Table 8 highlights the use of harvested potatoes by the households interviewed. 74 percent of the interviewed households indicated they sold the potato. This finding is in tandem with other scholars who found that potato is a cash crop (Banda, M.S. (2007). Maganga, *et al.*, (2012)). The study further indicates that Ntcheu and Dedza are the main potato producing areas. Use of potato as seed was reported at 12 percent. Farmers in Dedza and Ntcheu sell almost all the potato and only retain about 9 to 12 percent. This finding explains the farmers’ immediate need for cash. Farmers generally sale almost all the harvest to cover for family needs including procurement of maize for food. Consumption of potato was at 10 percent on average across the survey districts. Interestingly consumption of potato was low in the main producing areas. This is calls for interventions in promotion nutrition sensitive agriculture to promote potato for income and nutrition. A further probe into this through FGDs indicated that farmers select the best potato for the market and consume small, cut or bruised potato. The small potato is also considered for seed further constraining the farmers’ chances to consume potato. Potato post-harvest loss was reported 4 percent and was high in Dowa (6) and Mzimba (5). This finding can be attributed to lack of institutions promoting the value chain in the districts. While the works of CU and CIP has promoted use of Diffused Light Storage (DLS) in the past. The promoters were not available in across the districts by time of the survey. This highlights the need for interventions in promoting potato post-harvest handling.

Table 8: Use of potato harvested by households across the study districts

	Ntcheu	Dedza	Dowa	Mzimba	All
Sold	83	81	68	62	74
Retained as seed	10	9	14	16	12
Consumed	5	7	12	17	10
Loss	2	3	6	5	4

Source: Quick Grow Survey 2021

4 POTATO SUPPLY CHAIN ANALYSIS

There a number of supply gaps that were identified in this study. Malawi is characterized by low productivity of potato besides being an important food and cash crop. Inadequate technical knowledge and attention on potato farming by frontline extension officers is one of the factors affecting production and productivity in the country. Due to the low production, Malawi's key Potato processing company's were operating at only 50 percent of their capacity due to the scarcity raw material. Hence, potato market demand by far outweighs supply on the domestic market.

The study therefore recommends that there is need for collaborative efforts amongst all its stakeholders in investing in the effectiveness of the crop's seed systems, ensuring widespread availability of improved varieties' seeds and of specific importance will be breeding/improving of violet for resistance to late bright. There is need to strengthen the linkages among research, agricultural extension, and farmers to close the potato supply gap. There is need for government policy at creating structured markets for the crop so that benefits of the crop are not only accumulating at the upper part of the value chain i.e., traders, wholesalers, and processors but also at the farmer level. The typically low prices offered by buyers to these disintegrated small farmers, who act like many competitors with limited or no market information, could not incentivize investment in more production to meet market demand. According to an interview with a potato producer in Tsangano, some traders buy the crop very cheap. The farmers across the districts lamented the exploitation of small potato farmers due to lack of well-structured markets in Malawi. This tendency cannot attract investments in the production of the commodity by farmers as well as attract medium and large-scale farmers to invest in potato production. Finally, investing in marketing, transport and warehousing infrastructure would help to smoothen potato supply throughout the year, helping local processors and traders access the crop when they need it and help reduce post-harvest losses.

As given in table 9 The study estimates that Ntcheu produces about 28.4 metric tons (MT) of potato. This is closely followed by Dedza which is equally a potato producing district. Dowa anchors the table at a maximum production of 21.9 Metric tons and an average of 18.4MT. As discussed under demand for potato, the figures here are purely estimates as they are more potato producing districts that were not surveyed. The potato value chain has also seen a rise of new producers from non-traditional districts such as Kasungu. Interviews with traders from Wakawaka market in Lilongwe indicated Chamama EPA in Kasungu as a booming source of potato albeit being seasonal. This finding calls for an in-depth mapping on up-coming potato producing districts to help determine potato supply with precision

Table 9: Estimated average yield of potato reported by farmers during the study across the districts

District	N	Minimum	Maximum	Mean	Std Deviation
Ntcheu	92	16.8	28.4	18.7	19.9
Dedza	90	15.9	27.3	18.5	19.7
Dowa	44	13.6	19.7	14.8	16.1
Mzimba	46	17.3	21.9	18.4	16.2

Source: Quick Grow Survey 2021

4.1 Selling units

To effectively understand the entire potato value chain there was need to gather some from producers especially regarding how they sell their potato, and this information was adapted. There are several measurements used in selling and buying potato. In Ntcheu potato is packed in sacks with different names such as *Feeds*, *Mandaawana* and *Somali*. These bags are sold at different prices according to the season. In Dedza potato is packed in 50kg sacks and the prices range from K80 to K500 per kilogram according to the season. While in Dowa potato is sold using weighing scales and most of the farmers pack potato in bags weighing 120 kilograms. The prices are determined by the traders who are mostly from Dzaleka refugees' camp. The prices range from K150 to K350 according to the season.

The use of weighing scale is a new development that would help in pricing of potato is pluralized. In discussing the conducive environment farmers indicated that government policies neglect the potato value chain. Examples were given such as the missing of potato in the FISP and in list of commodities whose minimum prices are set by government. Setting of minimum prices would benefit from the use of weighing scales if the value chain can fully adopt the measure.

Table 10: Common potato selling units

Selling unit	Mzimba	Dowa	Dedza	Ntcheu	All
50 kg bag	75	5	62	47	48
20/ pail	12	89	3	8	25
90 kg bag	3	2	20	19	11
100 kg bag	2	2	11	21	9
Others	8	2	4	5	7

Source: Quick Grow Survey 2021

The results show that majority (48 %) of the sampled potato producers indicated that they use a 50kg bag to sell their potato followed by a 20l pail reported by about 25 % then a 90kg bag reported by 11 %. The preference of a 50kg bag as a selling unit is not surprising because as already indicated above, potato is very bulky and as such the 50kg bags are the most convenient means of carrying potatoes by both producers and traders to and from the market respectively. It is also important to note that although a significant proportion in all the districts indicated 50kg bag as the most common selling unit in Dowa it was only 5 % that reported this unit. An explanation of this difference is the fact that most of the potatoes grown in Ntcheu and Dedza are bought by traders who transport to major cities of Lilongwe and Blantyre whilst in Dowa the traders who buy do not normally travel to long distances as such the tradition is still using 20l pails. Another observation from the results is that the 90kg and 100kg bags were reported mainly in Dedza and Ntcheu again this is because traders that buy from these districts usually travel long distances and as such they want to save on transport by using bigger sacks as transport is charged on per bag basis.

4.2 Most reliable potato customers

The study showed that the majority (62%) of the potato producers that were interviewed reported that vendors were their most reliable customer for their produce. An investigation into the reasons why majority reported to have sold their produce to vendors despite complaining that they offer lower prices revealed that vendors are

the only traders that operate in their remote areas, and they also come to start buying produce just after the onset of harvesting season when farmers need money. The other reason that contributes to majority of farmers selling through vendors is the fact that most of the infrastructures in the potato production zones are in poor state to attract other traders and as such vendors take advantage of this to offer low prices to farmers that normally have little options. For instance, in Tsangano which is one of the potato hotspot areas in Malawi has a very bad road network and most of the traders shun this area because transporters do not normally operate on this road and when they operate, they normally charge exorbitantly to cover for their wear and tear. This study then collected information on the most reliable customers from traders that buy potatoes from farmers. The results show that 45% of the traders reported that they sell their potato directly to households followed by other potato retailers (31%), and then chips vendors (19%). Traders in Ntcheu, and Dedza reported that they also sell their potato to their fellow traders from in the districts and Lilongwe and Blantyre.

Table 11: Proportion of farmers ranked different traders as their most reliable market for the ware potato across the study districts

Trader	Ntcheu	Dedza	Dowa	Mzimba	All
Local vendor	52	54	63	70	62
Somali Traders	20	-	-	-	6
Zambian Traders	5	-	-	-	3
Aggregator	13	30	13	16	20
Outside vendors	8	13	22	13	7
Other	2	3	2	1	2

Source: Quick Grow Survey 2021

The study further found out that retailers that buy potato from fellow traders in the districts are those whose capital is relatively smaller, and they normally resell to final consumers by packing in small selling units like 5l pails or small plastic bags and sometimes putting in small heaps and a good example of such traders are those that sell to customers travelling along the Blantyre- Lilongwe road.

4.3 Months of higher sale values

Prices are affected with the time of harvest. In most cases, the study observes immediately after harvest, prices are low and the further the time is to harvest, the higher the prices. For example, in Ntcheu and Dedza during rainy season, potato is planted in October and harvested between February and March. Marketing starts in March through to May and June. In March, prices are low, medium in April and highest in June. The farmers attributed the change of price to availability of potato meaning that the more the potato is on the market, the low the price. When the demand for potato is high on the market, the price is high which is very beneficial to farmers. However, in terms of value of sales the months of November and December registers higher value of sales as most traders reported that about 50% of their annual sales value is generated in these months as shown by figure 4. The value of sales in the months of November and December are higher mainly because potatoes are usually off-season and hence in short supply on the market and traders take advantage by charging higher prices and normally the prices charged around this period are about 2-3 times the normal prices.

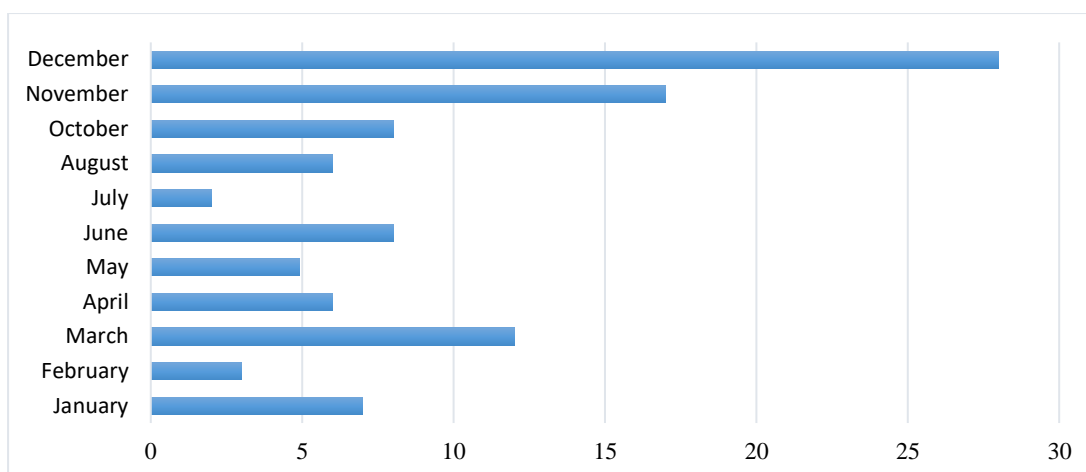


Figure 4: Months of higher sale values (Source: Quick Grow Survey 2021)

4.4 Access to market information by traders

Access to market information is very important for the growth and development of any marketing system because information provides different players in the market with vital elements like existence of markets, different needs by various players just to mention a few (Kotler and Keller, 2006). Traders were requested to indicate whether they had access to market information and the type of information they accessed as well as the source and the results are presented in table 12 below.

Table 12: Access to market related information

	Blantyre	Dedza	Lilongwe	Mzimba	Ntcheu	Dowa	All
Farmers' production costs	0	32	14	16	22	28	19
Prices in different markets	60	71	80	32	48	12	51
Good storage practices	5	11	9	0	8	4	6
Grading and packaging	20	0	15	0	9	0	7
Export markets	9	10	7	38	48	0	19

Source: Quick Grow Survey 2021

The most accessed market information by traders was potato prices prevailing in other markets as reported by 51% of the traders. Traders interviewed also reported to have accessed information on production costs, grading and packaging information with a few reporting on storage practices. Information on export markets was also mentioned by traders although they were quick to indicate that they only learn about such markets when they go to buy produce in areas like Ntcheu but they fail to tap on this market due to unavailability of clear information on what exactly is involved if they are to take potatoes to other countries bearing in mind so many restrictions associated with exporting agricultural produce. Traders also indicated that most of the market related information was accessed mainly through fellow traders, market committee and at times from farmers themselves especially information on production cost.

4.4.1 Marketing challenges

There are several challenges encountered by traders running any business whether on a small scale or large scale. Potato traders were requested to single out the most outstanding marketing bottlenecks encountered

when transacting their business and the results are summarized in the figure 5. Potato is one of the crops that is perishable especially if not handled properly and this was supported by majority of traders that indicated that rotting was the most encountered problems in their business. The problem is negatively impacting their businesses because when potatoes are in season storage becomes a challenge as sales do not normally match supply and as a result a lot is lost due to rotting and traders were quick to single out that this problem is very common with the mostly demanded variety on the market and more so when potatoes encounter water. Traders suggested that there is need to do more research on post-harvest handling and to sensitize the farmers not to harvest potato before they fully mature as this does not only affect the quality in terms of bruises but also affects the shelf life. Rotting also came top amongst the challenges and the company is greatly affected by this challenge especially when trying to buy in bulk to carter for off-season and as a result the company indicated that it is ready to invest in storage facilities if research can recommend that as one way of storing potatoes. The second challenge that was also mentioned by 17% of the traders was inconsistent supply of potatoes from producers a thing attributed to seasonality. Seasonality of potatoes does not only affect supply of potato but also fluctuation or instability of prices and this affect planning of business especially to those with contracts. Traders with contracts enter into a legally binding agreement to supply potatoes throughout the year at an agreeable price and when off-season they fail to honor the terms either because the prices become too much, or they cannot just get supply and in the end, they end up losing the market.

Quality of potatoes was another important challenge reported by most traders. The poor quality of potatoes was attributed to continuously use of low-quality planting materials and low usage of other inputs like fertilizer and pesticides by farmers due to high costs. Amongst different quality attributes that were reported, size of tubers and bruises were the most outstanding and traders indicated that presence of grades and standards can help to minimize this because farmers will be aware of the different prices that will be associated with different grades. On the issue of bruises traders feel that offering better prices to bruise free potatoes and intensifying sensitization will motivate farmers and unless this is properly handled our potatoes cannot compete with imported potato.

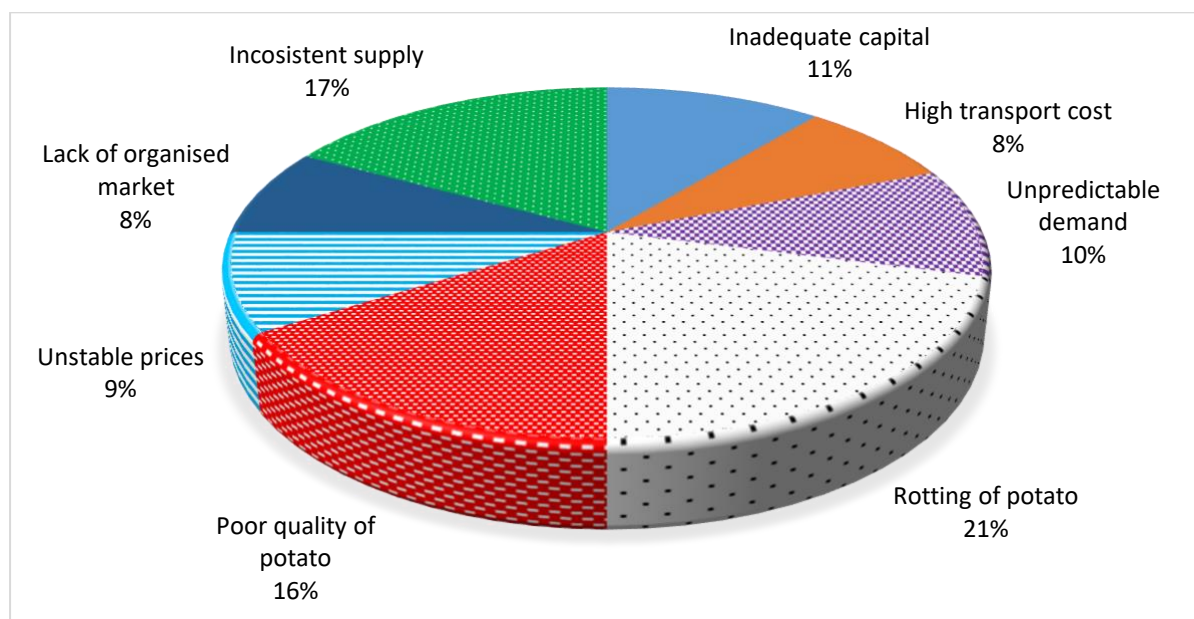


Figure 5: Potato marketing problems

About 8% of the traders reported that poor organization of the potato market negatively affect their business because some critical business decisions are difficult to implement. For instance, huge investments like cool storage cannot be made by single small-scale trader but if resources can be mobilized by a few traders that will benefit from such investments. The main contributing factor to the disorganized potato marketing system is because most marketing activities are done informally and both traders and suppliers are not organized a thing attributed to lack of promotion of the crop due to its hidden potential and unless deliberate efforts are put in place to change the mindset of players along the potato value chain the marketing system will not improve, and these challenges will still be encountered. Other bottlenecks mentioned included high transportation costs especially when moving potatoes from main production zones to the main roads due to poor infrastructure and high cost of fuel and as a result trader are forced to pass on the cost to consumer that end up complaining and respond by suspending consumption of the crop and go for alternative that are cheaper.

5 POTATO SUPPLY CHAIN ANALYSIS

5.1 Table potato market chain

Value chain includes the range of activities performed within a firm to produce a certain output. This might include: the conception and design stage, the process of acquisition of input, the production, the marketing and distribution activities, the performance of after-sale services, etc. All these activities constitute the ‘chain’ which link producers to consumers. On the other hand, each activity adds ‘value’ to the final product. Figure 6 below presents a summary of the main players in the marketing of table potato in all the four districts where the study was conducted. Farmers are the primary link of the chain as they are the core producers of potato, and they also consume a small proportion of their production and most part of it is sold. Because production takes place in areas that are far from consumers and/or end users there must be other players in the chain to facilitate movement of potatoes and the study found out that, rural vendors are the most reliable business partners to farmers as they collect potatoes directly from farmers and offer them cash in exchange for potatoes on the spot. The main limitation noted associated with rural vendors is that their scale of business is smaller as such they fail to absorb a lot of potatoes especially when they are in season and as a result there is usually loss on the part of farmers due to rotting.

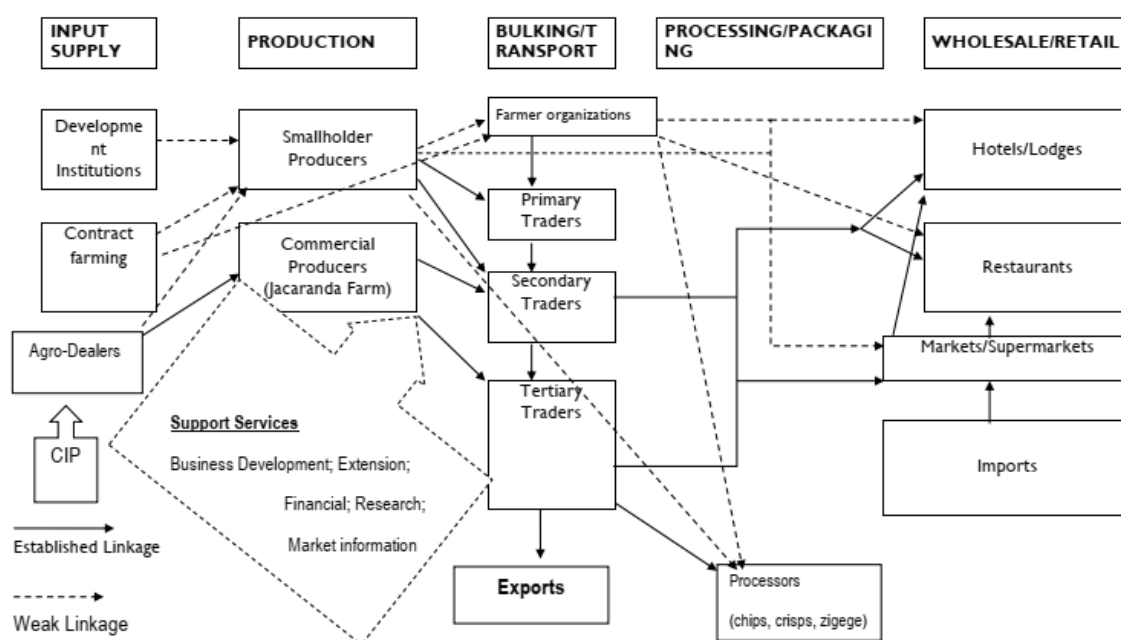


Figure 6: Table potato market chain (Source: Quick Grow Survey 2021)

Rural traders usually immediately supply to rural market brokers who do not normally buy on cash from vendors but rather they have a direct connection with urban traders/wholesalers as they are in common contact with them. Their main role is to look for a market and once they identify one, they contact rural vendors and agree on the price then supply to urban traders at a higher price than what they agreed with the rural traders and in return they get double commission from rural vendors and sometimes directly from farmers and from the urban traders for helping them to get potatoes. These players are trusted by urban traders because they help to reduce their transaction costs like searching for potatoes especially when they are looking for large quantities and again, they do not spend much on other costs like accommodation and storage.

Urban traders/wholesalers usually buy potatoes in very large quantities because they resell to urban retailers who in turn resell directly to end users. Urban retailers are many and differ depending on scale of their businesses. They include small restaurant and take away shops, supermarkets, institutions, and organizations running cafeterias and individual traders that buy and resell in heaps to consumers. Sometimes potato producers sell to rural brokers who resell to traders along the main road that connect the main cities of Blantyre and Lilongwe whose customer are usually road user travelling along the road.

The study found out that there is minimal contribution by the smallholder farmers towards collective marketing through Associations or Cooperatives thus little bargaining power during marketing. The analysis captured potato processing and packaging which is mainly conducted by small scale and large-scale processors. The small-scale processors are mostly not certified by the Malawi Bureau of Standards (MBS).

The study identified the potato wholesaling and retailing functions carried out by actors such as Hotels/lodges; Restaurants; and supermarkets. However, it was observed during the study that most supermarkets do import their potato from other countries like South Africa due to the poor-quality potato offered by the Malawian producers. Additionally, this is the level where consumers come in by buying from the retailers.

Finally, the analysis revealed that external support is also given at every stage of the value chain in terms of services like Business Development; Finance; Extension; Research and market information. The study found out that there is no support on these currently save for research activities by CIP. However, a similar study in Ntcheu by Concern Universal (2015) asserted that under Business Development, Concern Universal had trained farmers to take farming as business and established a farmer association which would try to link farmers to markets and established Village Savings and Loans Groups from which farmers are able to save and borrow money to finance their input requirement. On Extension services, farmers have been greatly assisted by CIP and Ministry of Agriculture and Food Security (MOAFS). The support has been through training, awareness meetings and distribution of IEC materials.

5.1.1 Linkages Among Stakeholders

The study establishes that there is a good linkage between farmers and their fellow farmers. Farmers added that they put so much trust in their fellow farmers than it is with other stakeholders. On a scale of 10 farmers, nine expressed satisfaction and gratitude with how their friends support them with farming information and most importantly given seeds on free charge.

Much as there is a linkage between farmers and traders, most producers expressed disappointment and distrust in trading with traders/vendors in selling potato. Traders cannot be trusted because they adjust prices for their own benefits leaving the producer with little or no choice in trading. It was observed that traders buy potato from farmers at a very low price and sell to processors and consumers at almost double the price, which does not seat well with producers.

“Umukhulupirira bwanji munthu amene amakubera. Ma vendor siwodalilirika, amaba. Koma nanga mkuchita bwanji poti timakhala tilibe otigula” [why trust a thief. Vendors are not trustworthy; they steal from us. But what else can we do as we do not have other markets] complained one of the Bembeke farmers in Dedza.

The study established that most traders offer to buy potato at very low price, and this leaves most farmers with no choice but to comply because there are no markets. Because potato is a perishable crop, farmers prefer to sell right away. The study further observes that the nature of linkage between farmers and other stakeholders is on verbal agreement basis weather to fellow farmers, processor or traders. An exception is made to farmers in Kanyama EPA in Dedza who most of them said they are required to sign an agreement form in their respective

association/cooperatives for day-to-day activities. While on the association, it should be noted that most of the producers do not belong and do not have access to enter into farmer associations and cooperatives.

5.2 Input supply

Agricultural inputs are one of the most important elements of production and they contribute significantly towards productivity. In the case of potato there several inputs that goes into the production of the crop and the study collected some information on their availability and the potential market that is currently prevailing.

Table 13: Proportion of potato farmers and average amount of fertilizer and seed used

District	N	Proportion of HH	Fertilizer		Seed	
			Average amount (Kg/HH)	Rate (Kg/ha)	Average amount (t/HH)	Rate (t/ha)
Ntcheu	92	85	125	278	1.2	2.2
Dedza	90	82	118	269	1	2.1
Dowa	44	68	74	105	0.6	1.3
Mzimba	46	63	83	109	0.7	1.5

Source: Quick Grow Survey 2021

5.2.1 Seed

Potato seed is the primary input into potato production and in the case of varieties there are several however the challenge is that currently the seed system for potato is either non-functional or non-existent. Potato seeds that farmers are currently cultivating is of poor quality and usually sourced from the market. The seed bought is usually the rejects from the markets and very small in size. Apart from being small the seed is usually not free from localized diseases, and this affects productivity of the crop. Realizing this gap CIP and partners like DARS, CU and UIL with funding from Irish Aid implemented a potato project that aimed at improving the seed system and through interventions like positive and negative selection criteria farmers in the targeted area have seen an improvement in the quality of seed used. Another outcome of the project is the official release of 6 improved potato varieties that are currently being multiplied to ensure that there is adequate supply of seed on the market both for small-scale farmers and commercial farmers and results are summarized in table 13.

5.2.2 Estimated demand for seed

The study collected information on seed requirement from farmers to estimate the demand for planting materials over a specified of time. The study adopted the approach of estimating the demand for seed per season in all the study areas. There is variation in the estimated demand for seed mainly because there are differences in the number of times potato is grown per year. To come up with the estimated demand for seed, farmers were requested to indicate their willingness to pay for improved seed as well as to indicate the quantity of seed that will be required every season. Farmers in all the districts estimated their demand for seed by indicating the commonly used unit for seed (20l pail) and the total number of units estimated were multiplied by the corresponding weight in kg of the unit and summed for all the interviewed farmers.

Table 14: Estimated demand for improved potato seed

District	Number of times potato is grown per year	Estimated volume of seed per season (tons)
Ntcheu	Three	1050
Dedza	Three	870
Dowa	two	95

Source: Quick Grow Survey 2021

It is also important to mention that the estimated demand for seed may not reflect the actual demand because of several reasons. Firstly, the study only interacted with a few farmers in all the districts as such this is just an estimate for those and to get a closer estimate this should be extrapolated to all the districts. Secondly farmers indicated that their seed requirement may also go up once they know the price of improved seed per unit. The other reason that may influence the demand for seed is that farmers will have to compare the performance of the on-farm trials against their own local cultivars before they can seriously commit their resources and given the yield performance of the newly released varieties the expectation is high that demand for seed will be more.

Figure 7 below show the estimated demand and supply for potato seed amongst producers and as clearly observed the estimated current supply of 12,700 Mt of seed is almost 9 times less than the estimated demand for seed. It should be noted that although there is such a wider gap between supply and demand for seed, most of the seed is still being traded using the informal market in absence of a formal market. On the other hand, the gap demonstrates the market opportunity that exist within the sector as there seem to be an already existing market for improved potato seed. The study also engaged seed multipliers on the reason why they are failing to take advantage of the market opportunity existing within the seed sector and most of them cited inadequate capital which mostly affect their production potential as the crop require adequate capital investment. On the possibility of accessing finance through commercial banks and microfinance institutions, most producers reported that they are usually turned back for failure to produce reasonable collateral.

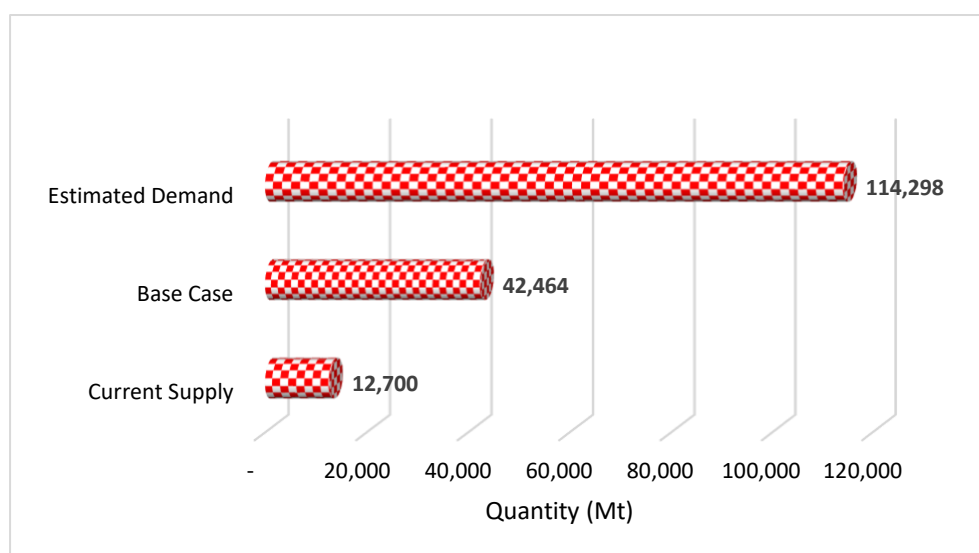


Figure 7: Estimated demand for improved potato seed in the study areas

5.2.3 Fertilizer and other inputs

Fertilizer is another important input in the production of potatoes that is applied to improve the fertility levels of the soils that have been lost due to over cultivation. The mostly used fertilizers in potato production are D-compound and CAN but farmers also apply Urea and 23:21:4S. The study noted that majority of potato producers realize that the crop has potential to transform their economic life and that is why they do not fail to apply fertilizer. However, despite this knowledge potato producers challenged by the continuous rising of fertilizer prices that does not match with the low prices at which they sell their harvest, and this usually results in use of fertilizer below the recommended levels which in turn implies that productivity will also be compromised. Potato producers must improve on their output per unit area in order to survive the crucial realities of high input cost and low output prices and the only way to do this is to use the recommended inputs together with improved seed. It is however difficult for farmers to manage buying inputs like fertilizers at that higher cost and hence calling for formal finance institutions to provide finances or inputs on credit. Other inputs that go into potato production include pesticides like Cypermethlyn and fungicides like Dithane and karate. All these chemicals are important in the production of table and seed potatoes and are locally found within the potato production areas.

5.3 Potato gross margin analysis

5.3.1 Potato farmers gross margin analysis

The study collected information on different production costs in the production of potato by smallholder farmers and the results were extrapolated to 1 ha and the results of the analysis are summarized in table 15. The study estimated that on average under smallholder farmers and with good management and right application of fertilizer and pesticides yield can go up to 18 tons/ha however, the analysis used an average yield of 13tons. The study further collected information on prices of potato sold by farmers that prevailed in the previous season and the average price of MK75/kg was used for all the areas.

Table 15: Summarized Table potato gross margin

Item	Area (1 Ha)		Unit Price	Amount
	Unit	Quantity		
INCOME				
Income: Potato Yield	Kgs per Ha	13,000		
Price			75	
Total Income (I)				975,000
Variable costs				
Seed	Kg	1400	150	210,000
Fertilizer				0
D-Compound	50kg	8	15,000	120,000
CAN	50kg	4.5	11,500	51,750
Pesticides				0
Cypermethlyn	ml	500	7800	7,800
Fungicides				0
Dithane	Kg	3	3,800	11,400
Total Input costs	MK			400,950
Labor costs				
Land clearing	MK	25,000	25,000	
Spraying	MK	15,500	15,500	
Ridging	MK	38,000	38,000	
Planting	MK	15,000	15,000	
Weeding	MK	10,000	10,000	
Fertilizer application	MK	12,000	12,000	
Banding	MK	24,000	24,000	
Harvesting	MK	25,000	25,000	
Total labor costs	MK			164,500
Other costs				
Rent	Ha	1	50,000	50,000
Transportation of inputs	MK	25,000	25,000	
Transport from farm to house	MK	12,000	12,000	
Total Variable Costs (TVC)				652,450
Gross Margin (GM) [I– TV]				322,550
Break Even Yield (TVC/P)				8,699
Break Even Price (TVC/Yield)				50

Source: Quick Grow Survey 2021

Costs of inputs had the largest share out of the total production costs as it accounted for almost 55% of the total having fertilizer and seed cost taking the largest share. Farmers indicated that they buy seed separately from table potato. It was indicated that seed is expensive. Costs of labor took the second share of the total production

costs having accounted for about 30% of the total and suffice to mention that the labor cost was lower as all the activities are manually done with no use of mechanization.

To really show that there is great opportunity in the production of potato the study analyzed data on profitability. Results of the analysis show that by producing potato on an average area of 1 ha farmers can get a gross margin of over MK322,550.00. The analysis further indicates that assuming other factors constant with total variable costs of around MK652,450.00 farmers will only need to realize an average yield of about 7.3tons/ha in order to break even and it can be further shown that with the average yield of potato estimated at 13tons/ha farmers will only need to sell their potato at MK50/kg in order to break even. It is important to mention that the study adopted the average yield of 13tons/ha because this was average farmers could get with inputs applied below optimal levels but other farmers that used closer to recommended levels of inputs reported to have obtained yield closer to or even more than 20tons/ha. The output per ha could increase even further if farmers can use not only optimal levels of inputs but also improved varieties that are currently being multiplied and will soon be available for farmers to grow. Another important point to note is that the profitability of the crop is even more than this especially if farmers can be linked to traders that offer better prices.

The study also calculated revenues generated by farmers in all the districts. After the costs were calculated, the revenues were calculated by multiplying the volume sold (Q) with the selling price (P) and, subsequently, by adding additional sources of income, such as revenues of selling the production waste of a product. Looking at the table 16 below, from the 272 interviewed farmers, it was observed that on average, Ntcheu registered the highest revenue (Mk1,900,000.00) and Dowa recorded the lowest revenues (Mk1,350,000.00).

Table 16: Potato producers' gross margin from the sampled districts per acre (n=272)

	Ntcheu (n=92)	Dedza (n=90)	Dowa (n=44)	Mzimba (n=46)
Realized Revenue	1,900,000	1,800,000	1,350,000	1,500,000
Total Variable costs	675,000	548,000	705,000	580,000
Gross margin	1,225,000	1,252,000	645,000	920,000
Gross margin as % age of Income	64%	70%	48%	61%

Source: Quick Grow Survey 2021

The study also looked at profitability analyses by identifying the cost of production for all the farmers in the study area for one growing season. On average, the overall mean for the profitability index for farmers was found to be 60.7 percent. Dedza registered the highest margin, estimated at 70 percent and the lowest was in Dowa district at 48 percent. While Ntcheu is one of the key potatoes growing districts, it had higher revenues but on average also recorded higher production costs compared to Dedza which reduced its margin. The other reason for the two districts to have higher margins compared to other sampled districts is because of the strategic location of the trading markets, Lizulu and Tsangano which holds huge volumes of potatoes on daily basis. The other main differences in profitability levels could be attributed to the differences in yields per unit area as highlighted in the table 17 below, Ntcheu reported an average of 22.7 tons/ha higher than all other districts with Dowa reporting minimum with 12.8 tons per hectare.

Table 17: Estimated average yield of potato reported by farmers during across the districts

District	N	Minimum	Maximum	Mean	Std Deviation
Ntcheu	92	16.8	30.4	22.7	19.9
Dedza	90	15.9	27.3	20.5	19.7
Dowa	44	13.6	19.7	12.8	16.1
Mzimba	46	17.3	21.9	18.4	16.2

Source: Quick Grow Survey 2021

Analysis of the market data further reveals that farm-gate price in Malawi accounts for about 45% of the selling price. The fraction of the final price could be less especially as the value chain progresses with the addition of more and more players along the chain. Although farm-gate price accounts for a significant proportion of the selling price, it is important to mention that the study discovered that some of the traders do not get potatoes directly from farmers because of the existence of middlemen (*Ndagwira*) who normally exploit farmers by shielding them from meeting traders directly.

5.3.2 Potato micro-processors gross margin analysis

Having mapped the value chain, the study also looked at certain aspects of a value chain in depth. There is a wide choice of aspects that can be further elaborated upon. One of these is costs and margins, or more simply said, the money that an actor in the value chain contributes (his/her costs) and the money that an actor in the value chain receives (his/her margins). Measuring costs and margins helps to determine how pro-poor a value chain is. It also helps to understand whether a value chain is a good source of income for the poor and, secondly, whether a value chain is accessible for the poor. **Historic costs and margins**, on the other hand, help to ascertain what the financial trends have been in the value chain and whether the chain has potential to grow in the future and possibly where more profits are made.

Table 18 and 19 highlight the detailed gross margins for processors and aggregated gross margin for potato farmers in all the districts under study. It was revealed that as we move up the value chain the margins doubled, implying that profitability increases as we add value to the potato. In terms of processing, those who were into dry crisps (*zigege*) processing doubled their margins from 1 kg of potato compared to those doing chips. It was revealed that on average, more than 140 kg of potato is processed per day which translated to around Mk75, 000.00 in revenue compared to Mk35, 000.00 realized by Traders for the same volume.

Table 18: Detailed cost margin for Processors at Tsangano Market for Potato chips

Cost Margin for Processors (Tsangano Market)			
Description	Qty	Unit cost	Total Amount
Cost of procuring 1 bag of Irish	1	35,000.00	35,000.00
Transport	1	400.00	400.00
Ingredients for salads			
Cabbage	3	500.00	1,500.00
Tomatoes	1	1,000.00	1,000.00
Onions	1	500.00	500.00
Kambuzi/green pepper	1	500.00	500.00
Firewood	5	800.00	4,000.00

Cooking Oil	8	1,900.00	15,200.00
Salt	1	500.00	500.00
Tomato Sauce	1	1,500.00	1,500.00
Tooth picks	1	200.00	200.00
Water (zigubu)	5	100.00	500.00
Lunch	4	300.00	1,200.00
Jumbo (bundles)	2	800.00	1,600.00
Total Costs			63,600.00
Revenue Per 140 kg bag	7	10,000.00	70,000.00
Profit margin			6,400.00

Source: Quick Grow Survey 2021)

Table 19: Detailed cost margins for potato crisps at Dedza Road Block

Cost Margin Dry Chips (140kg Bag)			
Pails	3	3,000.00	9,000.00
cooking oil	10	2,100.00	21,000.00
firewood	1	3,500.00	3,500.00
pepper	1	500.00	500.00
salt	1	200.00	200.00
garlic	1	3,000.00	3,000.00
Jumbo	1	1,500.00	1,500.00
Meals	5	1,500.00	7,500.00
Labour	1	4,500.00	4,500.00
Transport	1	500.00	500.00
Sub Total			51,200.00
Revenue	3	20,000.00	60,000.00
Profit Margin			8,800.00

Source: Quick Grow Survey 2021

5.3.3 Price Transmission Along the potato Value chain

The study also looked at price transmission and value changes along the value chain under study. The area of focus were farmers, traders and low-level processing. The trader's mean price for potato was 65 percent higher than that of the farmer. The processors price was 153 percent higher than that of the trader. When compared between the potato value at farmers' level and that of the processor, the processors price was 317 percent higher. These processors include both small scale potato chips producers who buy raw Irish potatoes to process into chips and relatively medium-scale processors, like restaurants in towns.

Table 20: Price Transmission along the Potato Value chain

	Farmer	Trader	Processor	
			Fried chips (chiwaya)	Dry chips (crisps)
Gross Margin (Mk)	3,450.00	4,700.00	6,400.00	8,800.00
Value change	Base	1,250.00	2,950.00	5,350.00
% margin		36%	86%	155%

Source: Quick Grow Survey 2021

6 CHALLENGES IN POTATO MARKETING

Limited capital was by far the highest challenge reported by traders. About 30 percent of the traders surveyed indicated having limited financial capital to do their business. The influx of foreign traders was also viewed as a challenge by 16 percent of the respondents.

As earlier pointed out potato market have seen the penetration by Somalis, Mozambicans and Zambians who pose a great competition as they offer high prices to farmers which the local traders cannot manage.

It was also revealed that 14 percent of the traders surveyed confirmed on the perishability of potato. The level of rotting however was reported to be common in some not all varieties. This perishability is even affected by the fact that there are no proper storage facilities in all the markets visited. Interventions on storage facilities can help the traders avoid the post-harvest losses. 12 percent of the respondents also indicated that potato is rudimentarily characterized by seasonal production. As indicated in section 3.8 production of potato varies greatly across seasons which affects the traders. As a remedy to this promotion of irrigation can help smoothen the supply of potato in the markets. Most areas in this study had poor road infrastructures whereby during rainy season roads are usually in bad conditions for farmers to transport their crops to the local market. This had the effect of raising transport costs as reported by 15 percent of the respondents. Traders and middlemen come up with prices to buy potatoes by not considering how much the farmer had spent till the harvest resulting in very low prices of potatoes. Local markets are very far from their villages hence they prefer middlemen and traders to buy from them with their dictated prices.

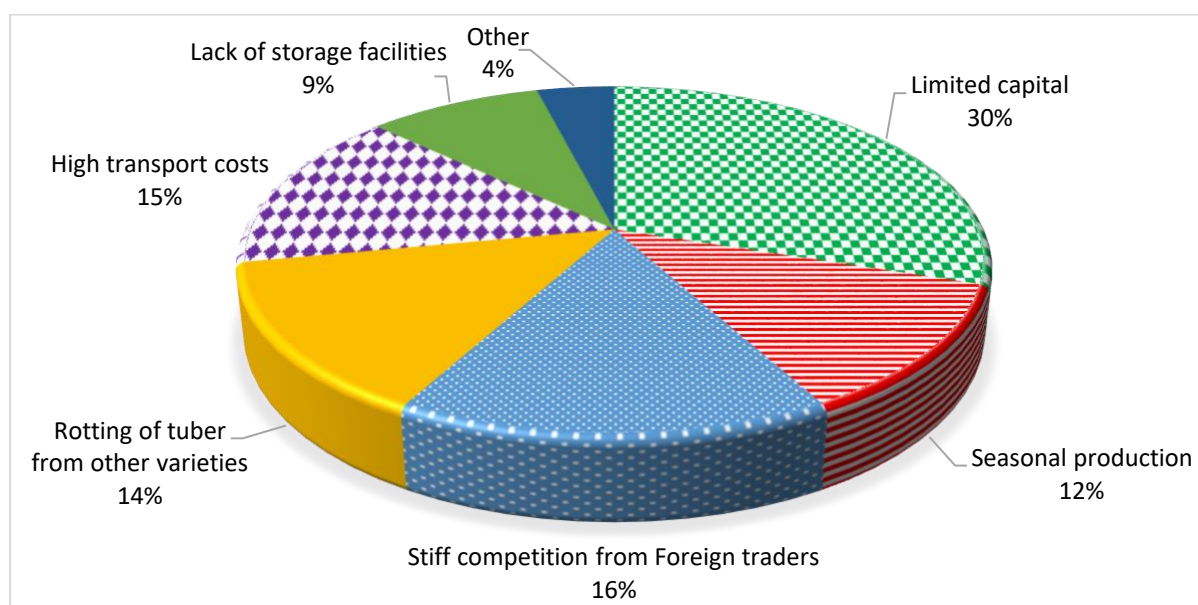


Figure 8: Major challenges reported by potato traders

On the other hand, farmers also reported challenges associated with potato seed multiplication. Disease attack was reported as the number one problem. The most common disease was late blight commonly known as *chiwawu* or *gets*. About 38 percent of the respondents indicated the disease as the number one challenge in seed multiplication. This was followed by availability of poor seed (18%). Other problems included small seed size (16%), use of recycled seed (12%) and lack of resistant cultivars respectively. Lack of resistance cultivars was

especially mentioned in connection to the influx of late blight which has spared almost none of the varieties. This finding calls for focused research into late blight leading to breeding of resistant varieties.

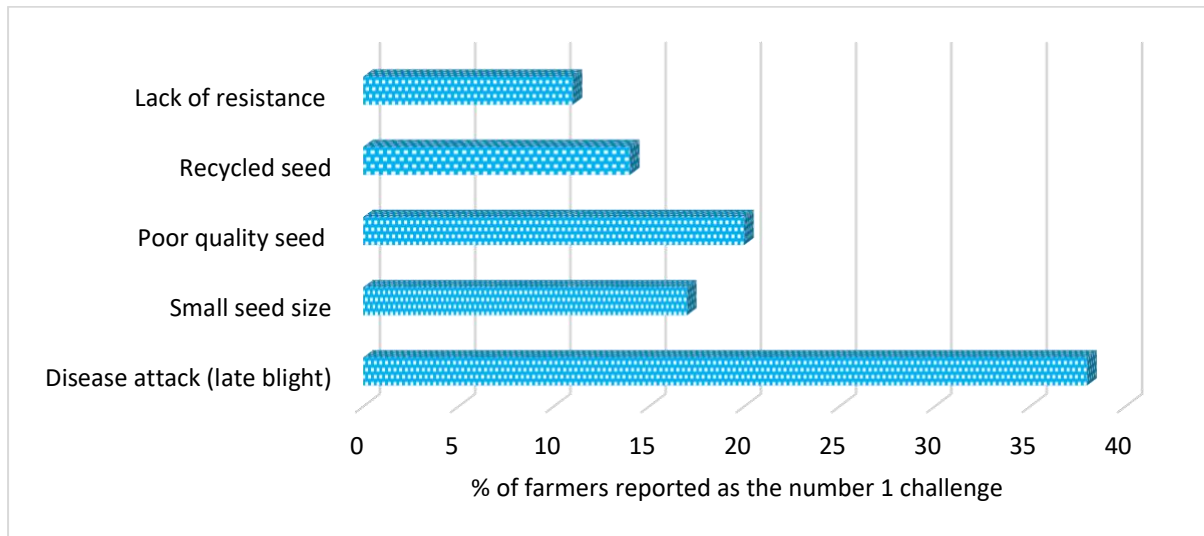


Figure 9: Major challenges associated with potato seed multiplication reported by farmers in the study areas

7 SWOT ANALYSIS OF THE POTATO VALUE CHAIN

Strength, Weakness, Opportunities and Threat (SWOT) is a powerful tool used in developing strategies for intervention. The tool provides a framework for understanding controllable and non-controllable factors that the interventions should address for the entire value chain (Kotler and Keller, 2006). The critical issues of the SWOT are generally categorized into the following four broad categories:

- S – What are the VC’s internal strength?
- W – What are the VC’s internal weaknesses?
- O – What external opportunities might move the VC forward?
- T – What external threats might hold the VC back?

While designing the interventions, the focus is generally given on the exploitation of strengths rather than simply addressing on the weaknesses. In other works, the interventions are not only about addressing the constraints, but also nurturing the strength of the value chain. Similarly, the opportunities and threats – the external trends that influence the value chain are also analyzed. The external opportunities and threats are usually categorized into political, economic, social, technological, demographic, and legal forces. These external forces include such circumstances as changing business trends, increased competition, changing regulations, and so on. They can either help the value chain move forward (opportunities) or hold the value chain back (threats) opportunities that are ignored can become threats, and threats that are dealt with appropriately can be turned into opportunities. The non-controllable factors are generally dealt through advocacy and networking to bring about changes in the policy framework.

The following SWOT analysis of the potato value chain show several strengths and opportunities for boosting value adding interventions. During the designing of interventions adequate provisions needs to be created for addressing the weaknesses and threats for the growth of the value chain.

Table 21: SWOT analysis

strengths	Weaknesses
<ul style="list-style-type: none"> • Farmers have experience in potato production • CIP disseminated information on production technologies • Extension service structures are already operational and capacity building on potato production has been on going • The crop still has a share on the market as it is consumed by a good proportion of the population 	<ul style="list-style-type: none"> • Undeveloped potato seed system • Low adoption of improved management practices • Undeveloped potato marketing system • Lack of well-established potato seed system • High incidence of diseases and pest attack • Use un recommended of inputs and rates • Unavailable Post harvest technologies • Weak support by Government initiatives and mainstream extension services
Opportunities	Threats
<ul style="list-style-type: none"> • Big potential for import substitution • There is high possibility of increasing the area of production for the crop in the short run due to better income realized by producers • Government has identified the crop as one of high value crops and it is being promoted • There is potential for irrigation • There is a ready market available and the current production falls below the requirement of this market 	<ul style="list-style-type: none"> • Potato is highly perishable and if not handled properly may result in heavy losses due to rotting • Late Bright disease if left unchecked may seriously hinder production • Poor quality of potato produced by farmers in Malawi pushes domestic demand to other countries and if quality do not improve producers may not get the best out of their production

8 CONCLUSIONS AND RECOMMENDATIONS

Potato is one of the key crops that need to be supported and promoted not only because it is a food crop that can address the challenge of food insecurity but more so because the income from the crop is very attractive. Although the crop has potential both at household and national level the sector remains underdeveloped right from the production side to marketing. This study was conducted to understand the marketing of potato and identify possible bottlenecks along the value chain as the crop exchange hands from producers to consumers. Evidence gathered in this study shows that if properly managed potato can compete seriously with other well promoted cash crops like tobacco, soybean and groundnuts just to mention a few.

The basis for this argument is coming from several findings noted in the study. Firstly, the study found out that there is a huge demand for fresh potato within the domestic market and even in the neighboring countries like Zambia and Mozambique and this translates to a ready market for the crop.

Secondly the study noted that although the country producer large volume of potato there is still an increase in the imports of the crop from other countries especially South Africa mainly by supermarkets and hotels. One of the reasons contributing to the increase in potato imports is that quality of imported potatoes is much better compared to that produced locally by all quality attributes and this calls for intervention in the promotion and maintenance of quality attributes required by different market players.

Importation of potatoes from other countries is negatively impacting on the welfare of local producers because by exporting the market to other countries farmers lose revenue which they could get if they had produced and supplied to these supermarkets and hotels. On the other hand, the country is losing out the much-needed forex that could have been used to procure other necessities that cannot be locally produced. On this basis, the study recommends that farmers should be encouraged to adopt the newly released potato varieties to produce quality potatoes as required by different markets. It is also important to highlight that by just planting improved varieties farmers may not get the potential yields but rather they should also be encouraged to use right inputs like pesticides and fertilizer to get the best harvest and compete with imported potatoes.

The study also found out that one of the reasons why potatoes from Malawi are highly demanded by consumers in the neighboring countries is because they have some unique qualities like not breaking down easily when boiled; not taking too much oil when fried and the taste is very good. However, although potatoes produced in Malawi find its way to other countries there is a lot that must be done to improve the exportation system. Firstly, government is losing out in terms of revenue as most traders export the crop through porous routes and in return there is no revenue that goes to government from such exports.

Secondly the study noted that the terms of export are not well clarified between Malawi producers and other countries traders which in the end results in disagreements on the prices. Investigation into the reasons why potato producers and Malawian traders prefer to export the crop through illegal channels revealed that most traders run away from the bureaucratic and complex stages that are followed when exporting crops to other countries and as such traders feel that by the time the paper work is completed and the export permit is issued potato will have started changing form because they do not have trucks with cooling systems that could maintain the quality of the crop. Based on this finding the study recommends that government should intervene into the export processes of potatoes by making sure that the system is set up that will be faster and timely to avoid spoilage of the crop in transit and in so doing it will start getting revenue from such exports. There is also a lot of work that must be done on the improvement of quality if the export market is to be seriously

target so that locally produced potatoes can compete at an international level. The study also found out that domestic producers can benefit a lot from potato production if they could be linked directly to markets.

In terms of prices, despite putting in much effort to the production, producers do not get the desired profit from potato. Losses are made due to the post-harvest related challenges or low prices. According to farmers, traders who are easily available to buy the potato offer low prices and farmers are left with not much of a choice to avoid losing more due to potato perishing. Therefore, farmers suggested that, if possible, government should intervene and start regulating price of potato just like it does with tobacco and maize. Recommendations have also been made to make available different kinds of varieties to farmers, seed that is different and has not worn out.

Inexistence of a well-functioning potato seed system has heavily contributed to the low productivity of potato and therefore the study recommends that with the coming in of the newly released varieties there is a need to set up a formal seed system within the local communities and even at national level. There is also a great need to encourage private traders to invest in the production of improved potato seed because the study observed that there is a huge demand for seed from producers that cannot be met by CIP and DARS alone.

The study established that there are other districts that are equally doing well in production of potato. These need further mapping to establish their contribution and promotion. Seasonality remains one of the challenges hindering growth of the potato sector as mentioned by a number of players along the value chain. The direct impacts of seasonality include unstable market prices that directly affect production costs, inconsistent supply of potatoes that also affect value addition. Although seasonality comes with its own negative impacts there are better opportunities that are associated with it like better prices which translates to better income for producers and as such for farmers to tap on these benefits the study recommends that farmers should be encouraged to intensify small scale irrigation and private producers should be encouraged to invest in irrigation production in order to ensure that production is smooth throughout the year.

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