

*Full Length Research Paper*

# Factors effecting longer term farm contracts in the frozen fries processing industry

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Prices are highly volatile in the South African potato industry and the marketing of potatoes are associated with high transaction costs. Most potatoes produced for the processing industry in South Africa are still under short-term contracts. The processors of frozen fries in South Africa want producers to enter into long-term contracts in order to reduce uncertainty and transaction cost. The aim of this paper was to investigate the factors that prevented South African potato producers to enter into long-term contracts. Producers identified advantages and disadvantages of the processing industry and consequently a price setting model was designed. Well established processing companies with large capacity were listed as an advantage. The main disadvantage was the high transaction cost due to uncertainty and asset specificity associated with producing potatoes for processing. The price setting model was used to convert some disadvantages into advantages and opportunities. Processors may use the information regarding perceived advantages and disadvantages, as well as, the price setting model to draw up long-term contracts that are more viable for producers. The model can also serve as a marketing tool since risk associated with different qualities of potatoes and premiums paid for higher qualities are evaluated.

**Key words:** Asset specificity, long-term contracts, potato industry, pricing model, transaction costs.

## INTRODUCTION

Risk and uncertainty induces high fluctuations in the yield and prices of agricultural products (Jordaan et al., 2007), which leads to high income fluctuations. Du Preez and Van Zyl (2010) states that since potato prices are determined by means of fresh produce markets, the price of potatoes is highly volatile. The increase in price variability has exposed South African producers' price risk management abilities. There are numerous ways in which risk can be managed. The use of a derivative market is one of the all-time favourites, however, in the potato industry this is not a viable option. A futures potato contract was listed on the South African Futures Exchange (SAFEX) in 1995. According to Blondin (Personal communication with R. Blondin of the South

African Futures Exchange (SAFEX) on 12<sup>th</sup> June, 2010; this futures contract was one of the best designed contracts ever listed on SAFEX, however, it was never traded. Blondin explained that the supply side (the producers) showed a high interest in this contract mainly because they could have managed their risk effectively in a free market environment. The problem was on the demand side. The demand side stated that they had no need for such a contract since they only transfer the risk to the consumer. Other methods to manage risk amongst others, entails the use of insurance, price-pooling (where farmers have the opportunity to reduce price risks through marketing arrangements) and lastly, management of available debt and savings. Forward contracting of produce, currently used by processing companies is a much more effective and relatively widely used form of risk management for farmers with the most common being a contract for the sale of a crop in the physical market (local market) (Varangis et al., 2002).

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A forward contract is an alternative hedging tool to a futures contract, but performance is usually not guaranteed. Trading is usually conducted informally and physical delivery of the precise quantity and quality of the specified commodity must take place for hedging to be achieved (SAFEX, 1995). Given unavailability of a futures contract and the levels of price variability and transaction cost associated with the production and processing of potatoes, one would expect that more long-term contracts should be used for the sales of potatoes and not just the spot market or short-term contracts.

Contracting may be regarded as a hybrid mode of governance; it is not a new phenomenon in agriculture and implies a form of safe-guarding. For a good number of years, farmers have used formal contracts to obtain agricultural inputs such as land, credit and equipment. According to Rhodes et al. (2007), agricultural contracts have three important characteristics, namely, the allocation of value, decision rights and risk.

There are two main types of contracts used for transactions in agricultural commodities. Firstly, a production contract that deals with a specific farmer and contractors who are responsible for production inputs and practices, as well as, a mechanism to determine the payment. This type of contract often specifies certain inputs to be used, production guidelines and allows the contractor to give technical advice and make field visits (MacDonald et al., 2004). The second type of contract is generally known as a marketing contract. Marketing contracts specify a price and an outlet for a certain commodity. This is usually done before the commodity is harvested and is ready to be marketed. The pricing mechanisms often limit a farmer's exposure to wide price fluctuations and the contract must be delivered within a certain period of time, and be of a specified quality and quantity (MacDonald et al., 2004). Potato processing companies in South Africa make use of both these contracts, but the main focus is on marketing contracts. A marketing contract can be broken down to more complex formats. Slangen (2005) and Peterson et al. (2001) identified classical contracts, neo-classical contracts and relationship contracts with the neo-classical, the most typical contract used in the potato industry.

Farmers (producers) are moving to agricultural contracts for a number of reasons. "Most importantly, it is a form of spreading risk (both price and production risk) between participants to the specific transaction and thus to reduce transaction cost" (Kirsten and Sartorius, 2002). Other benefits according to Kirsten and Sartorius (2002) are of producers' barriers to entry into the market, which are reduced and they have new methods of marketing and distribution channels (a combination of the spot and contract market). Normally, farmers have access to expertise provided by various input providers, but contracts give them the opportunity to access new levels of managerial skills and technical expertise of the buyers' field officers (Kirsten and Sartorius, 2002). Besides the contracts, processors may benefit from obtaining a product

of high quality and a reduced uncertainty of the supply of raw materials. Rhodes et al. (2007) explain that agribusiness use contracts in order to control product quality. Costs to processing companies are reduced as a result of production cost passed on to the producer without the loss of control of the product.

Various authors including Bogetoft and Olesen (2002), Singh (2008) and Chakraborty (2009) indicated that contracts are successful, but they need to be customised according to the commodity. Chakraborty (2009) indicated that each commodity/producer has different needs, which will have an impact on the structure of the contracts. Bogetoft and Olesen (2002) examined agricultural marketing contracts in Denmark that included commodities such as peas and potatoes and found that each commodity, and thus their evaluation, was unique. In order to enhance evaluation and the development of contracts, Bogetoft and Olesen (2002) identified ten rules listed in Table 1.

In South Africa, most potatoes produced for the processing industry are under short-term contracts. Therefore, contracting has an important role to play in the South African potato industry. The processors of frozen fries in South Africa are striving to get producers to enter into long-term contracts in order to reduce their uncertainty and hence also transaction cost. Potato producers are, however, reluctant to enter into long-term contracts. This means that within South Africa, various incentives need to be developed such as negotiating models and supply chain management for long-term contracting. Gereffi et al. (2005) indicated that producers could use the economies of scale to manipulate the supply chain in order to increase their profits. This economy of scale is achieved mainly by backward vertical integration into the supply chain. Potato processors in South Africa must develop these kinds of incentives in order to establish longer term contracts.

The aim of this paper was to provide companies with sufficient information regarding advantages and disadvantages of the processing industry and to develop a price setting model in order to reduce negotiating time. Potato processing companies can then use the information and model to set longer term contracts. In order to reach the aim, the advantages and disadvantages of potato processing companies in South African according to the potato producers was determined. A price setting model was also designed to be used as a tool to assist the negotiating process.

## METHODOLOGY

### Identifying the factors that prevent potato producers to enter into long-term contracts with processing companies

Factors that influence producers' decisions to sign contracts were examined. In order to quantify the factors, an analysis of the producers was done (Jooste et al., 2009). The advantages and disadvantages of the processors in the view of advantage/

**Table 1.** Ten rules of contract development.

Co-ordination	<ol style="list-style-type: none"> <li>1. Co-ordination production</li> <li>2. Balance the pros and cons of decentralization</li> <li>3. Minimize the costs of risk and uncertainty</li> </ol>
Motivation	<ol style="list-style-type: none"> <li>4. Reduce the costs of post-contractual opportunism</li> <li>5. Reduce the costs of pre-contractual opportunism</li> <li>6. Do not kill co-operation</li> <li>7. Motivate long-term concerns</li> <li>8. Balance the pros and cons of renegotiation</li> </ol>
Transaction cost	<ol style="list-style-type: none"> <li>9. Reduce direct cost of contracting</li> <li>10. Use transparent contracts</li> </ol>

Bogetoft and Olesen (2002).

disadvantage analysis was quantified by evaluating the magnitude (given by producers) and the importance (obtained from processing companies) of elements in the form of a matrix. The magnitude had a likert scale rating of 1 (very low), 2 (low), 3 (medium), 4 (high), 5 (very high) that were assigned to advantages and in the case of disadvantages the likert scale was the same just with negative values. The importance of each rating was also quantified by assigning a likert scale of 1 (not important), 2 (less important), 3 (important), 4 (more important), 5 (very important). Elements were ranked by multiplying the magnitude with the importance, a high score was positive and a low score negative. The data were collected using a structured questionnaire with open-ended questions and likert scales (Bryman and Bell, 2007).

South Africa has two prominent companies in the potato processing industry (Hanekom et al., 2009); one in the French fries industry and the other in the crisps industry. These companies' had 20 producers in the Eastern Free State region. The travelling constraints of the producers situated in different geographical areas resulted in the use of non-probability sampling in the form of a quota sample (Bryman and Bell, 2007). The producers were categorised according to farm size to reduce bias as small-scale producer, produced potatoes on 100 ha or less and a large-scale producer produced potatoes on 101 ha or more. Five small-scale and five large-scale producers' identified by the processing companies from their producer lists were included in the study. The data received from the producers were transformed into frequency tables which indicate the magnitude of the matrix.

### Development of a price setting model

Various production cost data were needed to develop a price setting model for procurement marketing. The enterprise budget data, specifically from the potato industry were used for the development of the model and was gathered using secondary data sources. The sources include co-operatives' production cost manuals, specifically Griqualand-West Co-operative (GWK) and Potato SA production cost manuals. Mechanical cost manuals developed by agricultural engineers were also used. The price setting model was developed to assist agricultural managers with the negotiating process and contract development between

producers and processors. Thus, the model had to assess the impact of a price premium paid by the processor as an incentive for producers to consistently produce potatoes of a high quality. This was done by constructing an enterprise budget for each producer up to direct allocated cost (variable cost). These budgets were then linked into a standardised budget from which a model was created to establish an equitable price model that could be used to calculate a price and minimised subjectivity in the determined price. Potential prices for potatoes could also be calculated in order to motivate a specific price to producers and the board members.

The aim of the tool is to determine the magnitude with which a price premium could reduce the risk that a potato producer will not be able to cover his/her direct allocated costs. In order to calculate this information, there is need to use the direct allocated cost and gross revenue (GR) associated with the production of potatoes for processing. Direct allocated cost was obtained from the focus group discussions and was estimated to be R66 038 per hectare for the Eastern Free State. The R66 038 direct allocated cost was for potatoes produced under irrigation in the Free State Province for the 2010/2011 production season. It is important to note that some costs normally not included in an enterprise budget were included in the budget for the purpose of evaluating the impact of the pricing model, such as depreciation. This was done because the interviewed producers argued that processing companies exclude such costs when negotiating for a price, which then results in a false estimate of the profitability of potato production at the offered price. The tool was designed that the user could use the direct allocated cost relevant to his/her personal situation. Once the direct allocated cost was calculated, the next step was to obtain a distribution of gross revenues to determine the probability that the gross revenue would not be sufficient to cover direct allocated costs.

By definition, gross revenue was calculated by multiplying yield with the price that was received for the product (Van Zyl et al., 1999). Since the aim of this tool was to measure the impact of a price premium on the probability not to cover production cost, a fixed price was used in the calculation. A distribution of potential yields was obtained by simulating a stochastic yield from a triangle distribution with specified minimum, maximum, and most likely yields using Simetar (Richardson et al., 2004). Again, for the purpose of this study, the respective yields were identified through discussions with potato producers. A distribution of gross revenues

**Table 2.** Summary of main calculations in model.

Name	Where	Calculation method
Rank	Matrix	Magnitude x Importance
Total Income	Enterprise budget	Contracted price x Yield x hectares
Total production costs	Enterprise budget	Sum of costs
Sensitivity analysis	Enterprise budget	(Price x yield) - total costs
Risk factor (simulated yield)	Price setting model	Simintar triangular distribution (min, max, most likely)
Risk factor	Price setting model	(Simulated yield x price) - production costs
Preferred contract price	Price setting model	(-production costs / (production cost margin-1)) / yield
CDF	Price setting model	Simintar CDF graph

was obtained by multiplying the simulated yields with the specified price. The specified price was taken as the average price that was received for potatoes for the 2010/2011 season. A cumulative probability distribution (CDF) graph of the gross revenue was used to determine the probability that the producer would not be able to cover his/her direct allocated costs. In the case of the Eastern Free State, the probability determined was that the gross revenue would be equal to or less than R66 038 per hectare and thus insufficient to cover direct allocated costs. The scenario where no premium was included in the price served as the base category (baseline) for further comparisons.

In order to determine the impact of a price premium, different scenarios were compiled where the specified price was replaced by a price plus a different premium for each scenario. For the purpose of this study, price premiums of 10 and 20% of the specified price were used to show the reduction in the probability of the producer not to cover his/her direct allocated cost. In practice, the processing company using the developed model can decide what percentage premium to add to the specified price. The gross revenue for the respective scenarios was calculated by multiplying the new prices with the simulated yields. Similar to the baseline, CDF graphs were drawn out of all the gross revenue distributions to determine the probability of the producer not to meet the direct allocated costs at each scenario. The magnitude of the decrease in the probability not to cover the direct allocated cost served as an indication of the impact of price premium implementation on risk. In the last section of the model, the producer could indicate the preferred gross margin and the model was designed to calculate the contract price to reflect the identified margin, given the production cost. This means that the producers can effectively determine the preferred contract price in order to pay the total cost including own remuneration. A summary of the main calculations in the model are given in Table 2.

## RESULTS AND DISCUSSION

### Perceptions of producers

The potato producers that sold to the processing industry in the Eastern Free State identified the following advantages and disadvantages:

The advantages are:

1. A well established global company in South Africa that would not experience growth pains and had sufficient experience was seen as strength. Producers indicated

that they would hesitate to sign a contract if the processing company was not well-known and trusted. A contract with a well-known processing company also helped with credit applications because the producer could use the contract (insurance of payment) to motivate the application of production credit to a financial institution.

2. Bulk transport was an advantage as it saved time and labour costs.

3. Logistics of the processors were of a high standard. The producers confirmed that they did not struggle with trucks being late or problems with the availability of trucks. This was an advantage because some of the transport companies delivering goods at the fresh market were expensive and not always available at a specific time. Own transport was also expensive because of high diesel prices, maintenance and opportunity costs (vehicles could be used for other commodities).

4. The processing plants of the processor had to have the capacity to process commodities. This was mainly because the quality of potatoes is very sensitive. Potatoes that are ready must be harvested and transported to the processing plant/factory as soon as possible in order to prevent quality penalties. A processing company with a high processing capacity had a competitive advantage.

5. The existing producer list comprised loyal and experienced producers. Some producers had delivered produce to a specific company for more than five years. This implied that the company had a reliable and loyal client/producer base and producers trusted the processor.

6. Some of the producers encountered problems with their potato yields, due to factors such as seed quality and diseases. The processing company supported these producers financially and with extension services. This was important for longer term contracts, mainly because the producer would have a little less risk.

7. The field agents (extension officers) were also seen as a positive factor for some of the smaller producers. They helped the producers intensively with the management of their crops, as well as managing delivery of their crops to the processing plants.

8. If there was a deficit in the supply of potatoes for

**Table 3.** Advantages of processing industry from the perspective of potato producers.

Advantages	Magnitude	Importance	Rank (%)
(h) Flat rate	2	1	13
(f) Compensation	2	2	27
(a) Established	2	4	53
(e) Loyal experienced producers	2	4	53
(c) Logistics	2	5	67
(g) Extension officers	2	5	67
(b) Bulk transport	3	4	80
(d) Processing	3	5	100

processors and the producer had already delivered his/her full contract, some of the processors were willing to buy the producers' redundant stock at a flat rate (specific price) without deductions. The advantages of processing companies from the perspective of producers are shown in a matrix in Table 3. The main advantage of a processor was the processing capacity, followed by bulk transport. The identified advantages should be used by processors when establishing long-term contracts with producers, because these factors would influence producers to commit.

The producers indicated the following disadvantages of processors:

- a) Grading systems became a problem, specifically, the human errors involved with the grading of products. The producers also indicated that the grading system was very strict on quality performance, requiring higher producer performance satisfies these standards. According to the producers this was not matched with higher prices. The producers also had a concern that at low market prices more cargos were rejected, implicating that processing companies then buy lower quality potatoes from the fresh produce market. Some of the larger producers indicated that the grading system was acceptable, and stated that it was the producer's responsibility to have high standards.
- b) The holdback fee and the payment period of some processors was a disadvantage. The holdback fee is a deposit that producers pay for each freight delivered, and if the producers do not deliver his/her contract quantity he/she loses this fee. According to the producers, some of the processors had a payment period within two weeks, whereas some of the larger processing companies had a payment period of a month. This was subsequently directly connected to a loss of interest and cash flow.
- c) The preferred cultivar for processors, such as the Pentland Dell, was not a popular potato on the market. Thus if the producer had a problem with his/her grading and the freight was rejected, the producer faced with economic losses. This was mainly because they had

added cost such as washing and packaging added to a low market price of an unpopular cultivar.

d) Some of the larger producers indicated that the extension officer appointed by the processing companies may imply extra cost for the processor, which would in turn reflect on the producer's price. The larger producers obtained information from their fertilizer provider specialists as well as from other specialists in the field. The conclusion was that the extension officers must be contracted.

e) Transport cost was an issue for some of the producers. They indicated that everyone paid the same transport cost. This was a problem for producers near the processing plant, because their transport cost would be lower and they felt that they subsidised the producers further from the processing plant.

f) The producers stated that harvesting teams must take more responsibility. Some of the producers hire harvesting teams from processors or contracted by processors. These teams are not always on time with harvesting and the producers are subsequently penalised. There are also cases where the harvesting team's equipment is faulty, which can lead to lower quality whereby the producer is penalised for these low qualities.

g) Some of the processors did not want producers to produce commodities for other processing companies (crisp vs. frozen fries). The producers found this a disadvantage, mainly because the different companies were used for risk management purposes. Companies in the crisp market process smaller potatoes, thus the potatoes rejected by the frozen fries companies (which prefer larger potatoes) can be sent to the crisp producers. This will improve the financial position of the producer since the producer would not have any rejections.

As with the advantages, the disadvantages of processing companies from the potato producer perspectives are shown in a matrix format in Table 4. The largest disadvantage of a processor was the grading system, cultivars and harvesting teams. The aforementioned disadvantages and the advantages of long-term contracts must be used by processors in order to develop tailor

**Table 4.** Disadvantages of the processing industry from the perspectives of potato producers.

Disadvantages	Magnitude	Importance	Rank(%)
(e) Transport costs	-1	3	-20.00
(b) Holdback	-2	2	-26.67
(g) Other companies	-2	2	-26.67
(d) Extension officer	-1	5	-33.33
(a) Grading system	-2	4	-53.33
(c) Cultivars	-2	4	-53.33
(f) Harvesting teams	-2	4	-53.33

made contracts. This means that the processing companies must have more emphasis on the advantages and in terms of the disadvantages they must ever exclude the disadvantage or convert it into an advantage. In order to establish long-term contracts with producers the processors must therefore focus on these elements and convert the disadvantages into advantages.

#### **Assessing the impact of using a price setting model on the risk faced by potato producers not to be able to cover direct allocated costs**

Price risk and negotiating time are important for producers, thus, it is important that farmers and processors manage this process together. This meant a model had to be developed to compliment these factors; a main problem in negotiating was that the agricultural manager struggles to satisfy both the producers and the board members of a processing company. The model was developed in order to reduce the negotiating time between (producer and processor) and to increase the efficiency of the negotiating process. Examples of the price setting model output are given in Figures 1 to 5 and are respectively, information page, production costs, CDF graph, calculations with graphical output and tabular output. In order to assess the impact of using a price setting model, the first step was to quantify the direct allocated costs associated with the production of potatoes for the processing industry. The demonstration of the model was based on an enterprise budget that was compiled after discussions with potato producers in the Eastern Free State region who supply to the processing industry. The direct allocated cost associated with the production of potatoes for processing under irrigation in the Eastern Free State was calculated to be R66 038/ha (yield of 40 t/ha) for the year 2011. A producer would need to obtain at least a price for the potatoes, which would cover the direct allocated cost of R66 038/ha. Thus, the producer would cover the variable costs in the short-term. The output of the model provided a graphical presentation of the results in the form of a Cumulative Distribution Function CDF graph, and also provided the user with an actual value (percentage), which indicated

the probability of not being able to cover the direct allocated costs for the year. The CDF was calculated from the simulated yields multiplied with the fixed price subtracting the fixed production costs

The distribution and GR represents the gross revenue that can be obtained at the initial price specified by the processor. Given that the direct allocated cost of R66 038/ha, the graph in Figure 4 indicates the probability for the producer not to be able to cover that cost is 21%. If the processor is willing to pay a premium of 10% more than the initial specified price (GR+10%) to a producer who is consistently producing a product of a high quality, the probability of that producer not being able to cover the direct allocated costs decreases substantially to 15%. In the case where the producer has built a good reputation and supplies a good quality product and the processor offers a premium of 20% higher than the initial specified price (GR+20%), the probability of the producer not being able to cover the direct allocated cost reduces even further to 12%.

The results are also presented in table format from which the producer can identify the probability of being unable to cover the direct allocated cost. From Table 5, it is evident that the probability of the producer who only receives the initial specified price for the potatoes unable to cover his/her direct allocated cost is 12, followed by 2 and 0% with the implementation of the premiums. Again the risk faced by the producer reduced is evident from Table 5.

One of the major disadvantages of the processing industry as indicated by the producers was that they carry most of the risk. Although, producers were not alone in bearing the risk, their perception that they are bearing all the risk may prevent participation in long-term contracts with processors. A price premium for consistently high quality production of potatoes may serve as an incentive for producers to aim for good quality potato production, since the risk of not being able to cover direct allocated cost is reduced. Producers may also be more willing to participate in long-term contracts with the processor who is willing to offer the premium for the consistent supply of high quality potatoes. Thus, the implementation of a quality premium may correct some of the disadvantages specified by producers and contribute to producers and

**Info sheet**

Farm name: **Piet Pompies Boerdery**

Total ha: **100**

Yield/ha: **40** (Expected Yield)

Do you sell some of your potatoes on the fresh produce markets as well? **Yes** (Yes or No)

If YES, what is the percentage of each size group sold, including processing? If NO, proceed to row 18

Processing	Large	Medium	Small	Baby
	5%	15%	5%	5%

This includes processing, thus the **total** distribution of crop

Expected prices on **fresh produce markets** for the following sizes:

	Large	Medium	Small	Baby
Rand per ton	R 3 000	R 2 500	R 2 000	R 1 800

Fill in the prices that you can obtain on the **fresh produce markets**, before any deductions

Average market price: R 2 383

Average table potato market price per ton, given the % filled in above (before deductions, like commission)

1 Income: R 1 950 (Expected contract price per ton for processing)

2 Type of land: **Irrigation** (Dry land or irrigation)

3 Diesel price: R 9,45 (Normal pump Diesel price)

4 Harvest: **Mechanical** (Hand or mechanical)

5 Labour: Price/worker/day

- Permanent: R 200
- Casual: R 65
- Drivers: R 130

6 Interest: Months: 5 (Months of production loan)

Interest: 12% (Interest rate on production loan)

**Calculate**    **Calculate Irrigation own farm**    **Calculate Dryland own farm**

Developed by: Dirk Strydom - UFS

*Only change data in the yellow blocks. First put in your own data and press the blue "Calculate" button at the bottom. Then go and put down your own costs by pressing either the pink or green button at the bottom, depending if you are doing irrigation or dry land potatoes.*

*This section is only completed if you selected "Yes" in row 7, which confirms that you sell potatoes on fresh produce markets as well.*

Figure 1. Example of the price setting model information page.

**Benchmark Calculator - Eastern Free State**

Jul-11 = model updated

Average for processing and fresh potatoes, if applicable

Hereby included the production costs for processing potatoes in the Eastern Free State, as conducted by the University of the Free State. Risk- and sensitivity analyses are done as well as a "target contract price" is calculated.

Budgeted income	Ha	Yield (ton/ha)	Price/unit	Income/ha
Potatoes	100	40	R 2 080	R 83 200
<b>Total income</b>				<b>R 83 200</b>

Inputs	Price/ha	%
Seed	R 21 435	35%
Fertilizer	R 9 920	16%
Insecticide, Fungicide, Herbicide	R 11 676	19%
Mechanization	R 5 899	10%
Running & Ownership costs	R 4 315	
Fuel	R 1 583	
Irrigation costs	R 2 118	3%
Labour costs	R 3 460	6%
Plant	R 2 020	
Harvest	R 1 440	
Rent of disease free land	R 2 000	3%
Crop insurance	R 2 200	4%
<b>Total direct cost</b>	<b>R 58 708</b>	
Interest	Months: 0,42	12,00%
		R 2 935
<b>Total production cost</b>	<b>R 61 643</b>	<b>100%</b>

<b>Margin above costs (Income minus Production costs)</b>	<b>R 21 557</b>	<b>26%</b>
<b>Production cost ratio (Production cost divided by Income)</b>	<b>74%</b>	

**Sensitivity analysis (Margin per hectare available for the payment of overhead costs & own remuneration):**

Yield Ton / Ha	Price / ton			
	1 680	1 880	2 080	2 480
25	-18 643	-14 643	-8 643	357
30	-11 243	-5 243	757	12 757
35	-2 843	4 157	11 157	25 157
40	5 557	13 557	21 557	37 557
45	13 957	22 957	31 957	49 957
50	22 357	32 357	42 357	62 357
55	30 757	41 757	52 757	74 757

Green = positive margin per ha  
Red = Negative margin per ha

Figure 2. Example of the price setting model production costs.

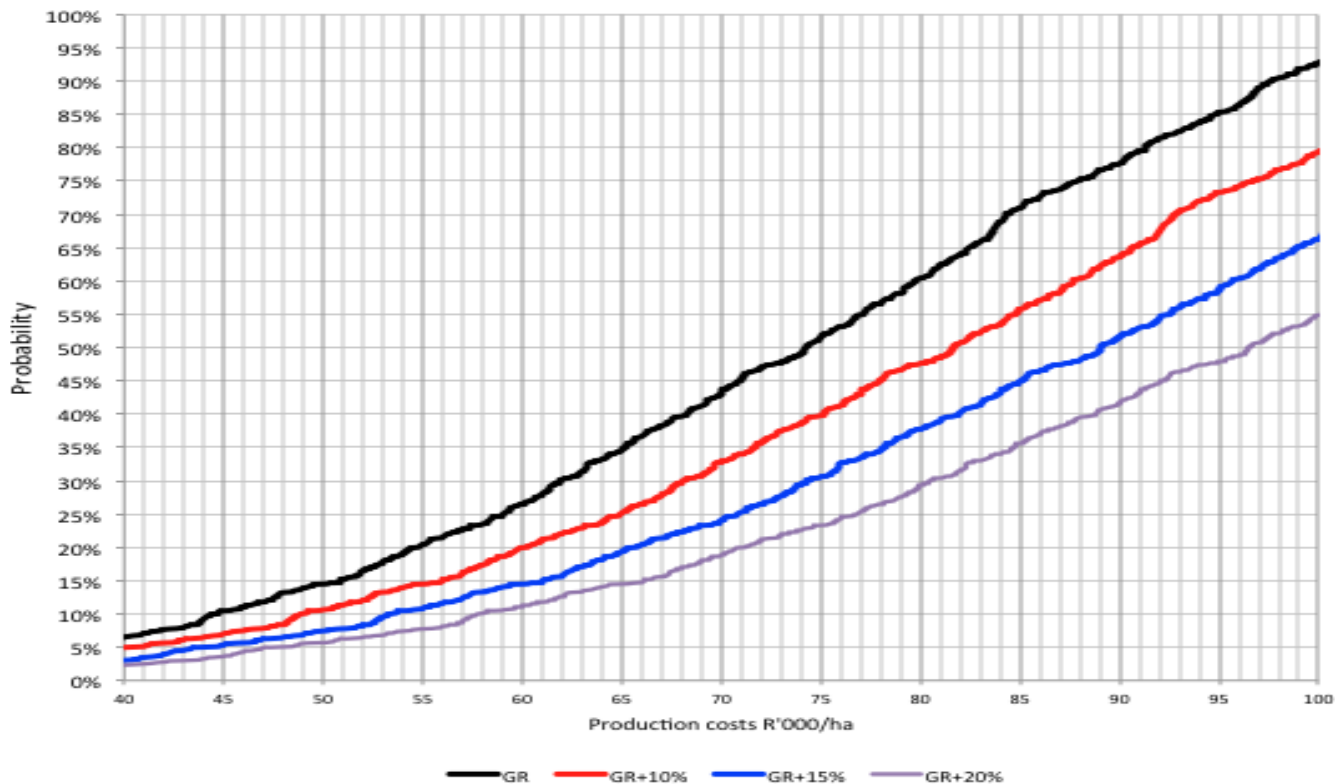
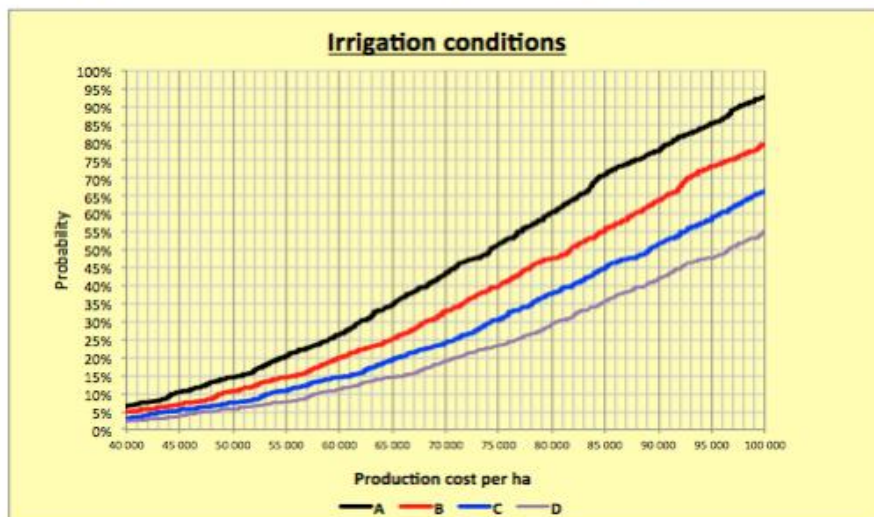


Figure 3. Example of the cumulative Distribution Function of different price premiums given production costs.

In the following section the risk of not paying back the production cost is calculated, given 4 price scenarios and the calculated production cost

Risk factor:	Different price scenarios			
	A	B	C	D
Price in R per ton	R 2 080	R 2 288	R 2 496	R 2 704
Production cost in R per ha	R 61 643	R 61 643	R 61 643	R 61 643
Probability of not paying back production costs	29%	22%	16%	12%
	Risk of not paying back production costs: Calculated by means of using risk simulations (see next 4 rows)			
	Irrigation		Dryland	
Minimum expected yield	10	ton/ha	8	This is the yields used in the simulation to calculate the above risk
Most likely expected yield	40	ton/ha	20	
Max expected yield	55	ton/ha	30	



Given a specific production cost per ha and price scenarios A to D, what is the probability that I will not have enough money to pay back my production costs ?

GRAPH EXPLANATION

This graph is only applicable if you indicated on the info sheet that you do irrigation.

Figure 4. Example of the price setting model calculations with graphical output.



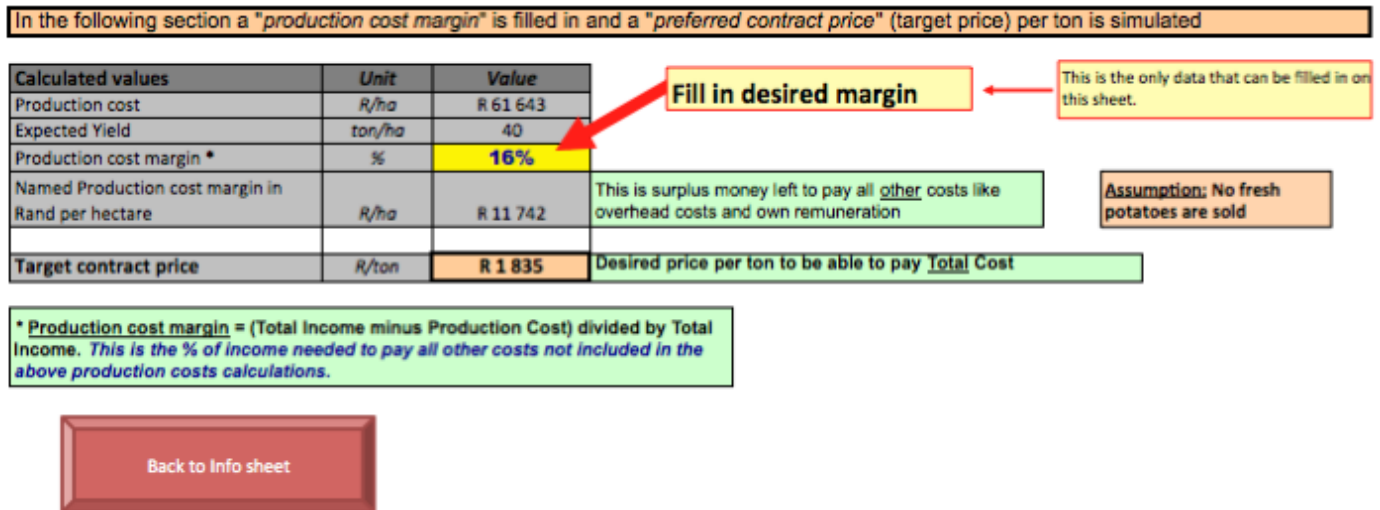


Figure 5. Example of the price setting model calculations with tabular output.

Table 5. Risk reduction by means of price premiums.

	R2000/ton	Given + 10%	Given + 20%
Production cost	R 66 038	R 66 038	R 66 038
Possibility to get production cost or less	26%	20%	15%

processors entering into long-term contracts. The following example summarises the working and importance of the model: The producer and agricultural manager will calculate production costs together. The producer can then indicate what is the preferred gross margin and the model will calculate a contract price. The model then uses the contracted price in order to calculate the risk of not covering the production costs (Given the fixed price, fixed production costs and simulated yields). If the risk is too high for the producer they can renegotiate a price. The agricultural manager of the processing company can also indicate to a producer that if better quality potatoes are produced the risk can be decreased by means of a premium; this method would be an incentive for better quality potato production/ procurement. The agricultural manager can also use the risk figure as a motivation for prices to the procurement manager, which will decrease negotiating time and reasoning.

## CONCLUSION AND RECOMMENDATIONS

The aim of this paper was to investigate the factors that prevent South African potato producers to enter into long-term contracts with potato processing companies. Various strengths of the industry were identified by means of an advantage/disadvantage analysis. Producers mentioned that major processing companies were

well established and had the capacity to process harvested potatoes when required as an advantage. There were also some perceived disadvantages in the processing industry. The producers listed the main disadvantages as high transaction cost being mainly due to uncertainty and asset specificity associated with producing potatoes for processing. In order for processors to get more producers to enter into long-term contracts, the aspects that the producers regarded as advantages of the industry should be considered and the specifications included in long-term contracts. Similarly, processors should concentrate on converting or excluding the specified disadvantages into either advantages or, at least, opportunities. The price setting model that was designed may contribute in converting some of the identified disadvantages into advantages or opportunities. The model can be used to determine price premiums that can serve as an incentive for the production of potatoes of a sufficiently high quality required for the purpose of processing. Thus, it may form part of a marketing model in order to establish longer term contracts. Producers can also benefit from using the model in decision making, since the model allows for risk consideration when calculating potential gross income at the proposed contract price. Processors need to think innovatively to get producers to engage into longer term contracts. They should focus on creating incentives in longer term contracts that are attractive to producers rather than only

regulating the quality through penalties. Higher quality potatoes and the increased attractiveness of long-term contracts can be created by means of making grading systems more transparent.

Further research on how to set up strategies regarding the advantages and disadvantages is needed. This can be done by means of using an experimental research method where one of the independent variables is manipulated. The accuracy of the analysis can be improved by constructing a structured questionnaire for all the producers and processors of the processing industry. This will increase the spread of producers and econometrical evaluations can be done in order to eliminate bias. Finally, it is important to realise that this paper did not assess the economic impact for processors of using the developed pricing model to calculate price premiums to serve as incentives for producers.

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