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Is It All About the Money? Extent, Reasons and Triggers for Side-selling in Malawi's Paprika Supply Chain

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ABSTRACT

The purpose of this paper is to advance the knowledge on side-selling. The case study of the paprika supply chain in Central Malawi showed that 36.9% of small-scale farmers engaged in side-selling. It was projected that the focal company lost between 19.9% to 44.6% of paprika due to side-selling. The main reason for side-selling was the higher price offered by local vendors. Binary logit regression indicated that the geographical location, education and income levels, distance to the collection point, a negative impact of contracting on livelihoods, membership in farmers' association and assistance from the Government significantly influenced small-scale farmers' side-selling.

Keywords: Binary logit regression; chain management; food supply contracts; Malawi; opportunism

1 Introduction

The agri-food industry is undergoing a significant transformation spurred by globalisation, climate change, fast-changing trends and scarce resources (Hubeau et al., 2017). The transformation especially reflects the way food is produced, processed and traded. Farmers are no longer producing without having an idea when, where, to whom or at what price they will sell their produce and whether the market would be able to absorb produced quantities (Shepherd, 2007). Rather, the coordination between farmers and processors, retailers and other players in the supply chains has increased, encouraging farmers to specialise their production and target customers' requirements (Reardon et al., 2009; Lee et al., 2012). Therefore, an overarching trend in modern agri-food supply chains involves closer coordination among production, processing, transporting and trading units (Kühne et al., 2015; Jonkman et al., 2017).

The transformation of the agri-food industry affects both developed and developing countries. For the latter, the importance of the small-scale sector is significant. Particularly in Sub-Saharan Africa, small-scale farmers represent the majority of the rural population and have a crucial role in countries' economic development, but at the same time show high levels of poverty (Handley et al., 2009; World Bank-WB, 2016a). Once integrated into the supply chain, small-scale farmers can increase their income and mitigate poverty (Dedehouanou et al., 2013). Moreover, participating small-scale farmers may improve their productivity due to access to quality inputs, credits and technology (Vorley et al., 2008; Barrett et al., 2012). Despite the fact that small-scale farmers use their land and labour more efficiently, agribusiness companies are more keen to supply raw materials from larger farmers (Hazell et al., 2010; Lee et al., 2012). Thus, small-scale farmers can easily become marginalised and excluded from modern supply chains due to market barriers such as private standards and requirements for a consistent supply (Gachukia, 2016; Kariuki and Loy, 2016).

Contract farming (CF) is an institutional arrangement used to link small-scale farmers with potential buyers and overcome market inefficiencies regarding access to inputs, extension, technology and information (Jia and Bijman, 2013). Contract farming helps to include small-scale farmers into high-value food markets. Ample literature explores the impact of contract farming on farmers' livelihood and income distribution (Briones, 2015; Girma and Gardebroek, 2015), determinants of participation in contracting (Woldie and Nuppenau, 2011; Barrett et al., 2012; Franken et al., 2012), preferences for contract characteristics (Abebe et al., 2013; Vessalos et al., 2016) and the legal side of contracting (Huh et al., 2012; Pultrone, 2012). One of the most serious challenges in contractual relations that impact on both small-scale farmers and companies is side-selling. Often called extra-contractual marketing, side-selling involves selling the contracted commodity to a third party, which is not part of the contract and did not provide any services to the farmer (e.g. input provision or extension services) or selling directly on the open market due to more attractive prices (Glover and Kusterer, 1990; Eaton and Shepherd, 2001; Echánove and Steffen, 2005; Pultrone, 2012). Shepherd (2007) provided a valuable insight into the logic behind side-selling: small-scale farmers have limited opportunities for earning income and often urgently need cash to meet the food needs of their households. The attitude of a small-scale farmer is to obtain the highest possible price for scarce volumes produced, and if the contract does not offer this option, a small-scale farmer will search and sell outside of the contract (Shepherd, 2007). Although some studies have addressed the problem of side-selling (see for example Bingen et al., 2003; Minten et al., 2009; Gallacher, 2013; Goel, 2013; Mujawamariya et al., 2013), there is still not enough documented empirical evidence on what triggers side-selling and to what extent it actually occurs within contractual agreements.

This study bridges the existing knowledge gap by focusing on the extent, reasons and triggers for side-selling. In this study, side-selling (also called 'leakage' or 'extra-contractual marketing') refers to circumstances where the small-scale farmer, under contract, sells the contracted crop to another buyer (Bellemare, 2012). Therefore, side-selling represents one of the major challenges in contract farming operations since it may breach the trust between parties, increase transaction costs for the buyer and result in contract termination. The purpose of this paper is to contribute to the knowledge on the mechanism of side-selling by exploring reasons for side-selling, quantifying its possible proportions and estimating determinants of side-selling. The study answers the following research questions in the case of Malawi's paprika supply chain: (1) What are the extent and economic implications of side-selling, (2) What are the key reasons for side-selling, and (3) What factors are likely to trigger side-selling? In addressing these research questions, the study employed both qualitative and quantitative methods in two districts of Central Malawi.

2 Background of the study

2.1 Theoretical and analytical framework of side-selling

The theoretical aspect of this study is grounded in New Institutional Economics, more specifically in the concept of opportunistic behaviour. Opportunism reflects in a dishonest behaviour when one or both parties to the contract shirk or disguise true conditions related to the contract performance (Sykuta and Parcell, 2002; Williamson, 2000). Opportunistic acts in the case of contracting include: (i) using received credit intended for the inputs to buy other materials or not buying anything at all; (ii) loan default; (iii) low selling prices offered by the company; (iv) tampering scales; and (v) selling poor quality inputs (Dorward et al., 2004; Dries et al., 2014). Opportunism also refers to strategic manipulation of the information and actions. One of the most frequent expressions of opportunistic behaviour is moral hazard. Moral hazard is likely to occur whenever the objectives of the involved parties differ and the principal (contractor) is not able to control the agent's (farmer's) actions (Salanié, 2005). In the case of contract farming, the contracting company may aim to obtain a certain amount of raw material while small-scale farmers desire to receive a premium price for their crop. Since the company is unable to observe and influence all small-scale farmer's actions, it is likely that the small-scale farmers will optimise their gains by choosing to sell paprika to the channel offering better price conditions. Small-scale farmers are likely to engage in side-selling if the utility derived from selling the crop outside of the contract is greater than selling to the contractor and this case is known as a binary choice problem.

The logit model for small-scale farmers' engagement in side-selling in this study is written as:

$$SS_i = \frac{\exp(x_i'\beta)}{1+\exp(x_i'\beta)} = x_i'\beta + u_i \quad (1)$$

The parameters (β_j) are computed using the maximum likelihood estimation (MLE) approach, following Hosmer and Lemeshow (2000) as:

$$\log L(\beta)\sum_{i=1}^{n}\{SS_i \ln[\pi(x_i)] + (1-SS_i)\ln[1-\pi(x_i)]\}. \quad (2)$$

Empirically, the logit regression model used to estimate the probability of small-scale farmers' engagement in side-selling is specified as follows:

$$\begin{aligned} Side\text{-}selling = {} & \beta_0 + \beta_1 District_Nkh_i + \beta_2 Primary_edu_i + \beta_3 Secondary_edu_i + \beta_4 Low_income_i \\ & + \beta_5 High_income_i + \beta_6 Low_foodexp_i + \beta_7 High_foodexp_i + \beta_8 Close\ distance_i \\ & + \beta_9 Large_distance_i + \beta_{10} Positive_infl_i + \beta_{11} Negative_infl_i + \\ & + \beta_{12} Membership_FUM_i + \beta_{13} Government_assist_i + \varepsilon_i \end{aligned} \quad (3)$$

where β_0 is the constant term, $\beta_1, \beta_2 \ldots \beta_{13}$ are the parameters to be estimated, *District* is the location of the household's farm, *Primary_edu* and *Secondary_edu* represent the level of education of the household head, *Low_income* and *High_income* are the typology categories of households' monthly incomes which are measured as dummies, *Low_foodexp* and *High_foodexp* denote the level of a household's expenses for food per month, *Close* and *Large_distance* mark the proximity from the household farm to the collection point, *Positive_infl* and *Negative_infl* is the self-reported influence of contract farming on small-scale farmer's livelihood, *Membership_FUM* signifies the affiliation to the Farmers Union of Malawi (FUM), *Government_assist* represents the extension service received from Malawi's Government and ε_i is the error term.

The selection of predictor variables in the analysis was influenced in particular by the work of Wang et al. (2014) on the empirics of contracting. The choice of the set of variables for this study was based on the objective to determine the engagement in side-selling. Although price is considered as a highly important factor in determining side-selling, it was excluded from the model since all the small-scale farmers received the same price under the company's contract and no variations were recorded.

It was hypothesised that a long distance to the collection point, low monthly income, low expenses for food/month and the negative influence of CF on livelihoods increase small-scale farmers' probability to engage in side-selling. On the other hand, primary and secondary education, high monthly income, high expenses for food/month, closeness to the collection point, the positive influence of CF on livelihoods, membership of FUM and received Government assistance were expected to reduce the likelihood of small-scale farmers' engagement in side-selling.

2.2 The paprika sector in Malawi

Malawi is a low-income, landlocked country located in south-east Africa with 118,480 square kilometres of surface area and surrounded by the United Republic of Tanzania, Mozambique and Zambia (WB, 2016b). In 2015, Malawi had a population of 17.22 million and 83.7% of that population lived in rural areas (WB, 2016c). Malawian small-scale farmers have limited access to credit and agricultural inputs, face high food prices, struggle with crop and livestock disease outbreaks and are exposed to various weather shocks, such as flooding and dry spells (FAO, 2016). While larger farmers produce significant export commodities such as tobacco, sugar and tea, small-scale farmers in Malawi cultivate mainly staple food crops (especially maize) and are highly marginalised in the case of cash crop production (National Agricultural Policy, 2011). With such characteristics, it is unrealistic to expect that Malawian small-scale farmers will be able to transform their subsistence farming into commercialised business activity in the foreseeable future. However, some indications of progress are on the way. Studies done in Malawi explored the significance of paprika sector, which has the potential to contribute to an increased share of Malawi's trade (Agar and Chiligo, 2008; Makoka et al., 2010). Growing international demand for paprika makes it a valuable export commodity, while Malawi's comparative economic advantage in low input technology presents opportunities for small-scale farmers (Makoka et al., 2010).

Paprika was first introduced to Malawian small-scale farmers in 1996 and is mostly grown in the Northern and Central Region (Agar and Chiligo, 2008; CYE Report, 2009; Makoka et al., 2010). The land area under paprika in Malawi covered 3,299 hectares in 2013, which represented a slight growth compared to 2011 and 2012 (CountrySTAT Malawi, 2016). In the 2012/2013 season, Malawi produced 1,472 tonnes of paprika (World Trade Organization-WTO, 2016). The export value of paprika was US$ 1.18 million in 2015

(National Statistical Office of Malawi-NSOM, 2016). Most of paprika grown in Malawi is exported to South Africa where it is processed into oleoresin and powder, and further to United Kingdom, France and Spain, while the lesser amount is used domestically for hot sauces (CYE Report, 2009; Malawi Revenue Authority-MRA, 2014; NSOM, 2016).

3 Methodology

3.1 Study setting

The data for the study were collected between November 2014 and March 2015 from two districts of Central Malawi: Nkhotakota and Lilongwe. The study focused on two key supply chain players: the focal company[*] and small-scale farmers.[†] The focal company was located in Malawi's capital and obtained dried paprika from local small-scale farmers. The company did not process paprika upon delivery but exported the crop to a processor in South Africa. The final product from Malawi's paprika supply chain was paprika oleoresin for food colouring intended for German and South African B2B markets.

In Nkhotakota and Lilongwe districts, the focal company established out-grower contracts with small-scale farmers. The company provided quality seeds for cash and free extension services in exchange for exclusive right to buy the entire paprika production from small-scale farmers. The company had 10,000-15,000 small-scale suppliers per season.

3.2 Sampling technique

The collected data included both quantitative and qualitative material. A total of 428 household questionnaires were completed from contracted small-scale farmers in Nkhotakota and Lilongwe districts. To better understand side-selling, six semi-structured interviews were conducted: with company's representatives (positions: CEO, Project Manager and extension field officers) and three independent vendors in the capital Lilongwe.

For the quantitative data, the study used cluster-sampling where the population of interest is first organised into geographical clusters and individuals are subsequently randomly selected from chosen clusters (Buckingham and Saunders, 2008). The population represented all the small-scale farmers in Central Malawi with the company's contract for paprika production during the 2014/15 season. The small-scale farmers were first divided according to nine districts in the Central Region.

The two districts were then selected according to the existing number of small suppliers present and the representativeness of the district[‡]. Each district was further divided into villages and the list of all contracted small-scale farmers in each village was retrieved from the company. Seven villages in Nkhotakota area and five villages in Lilongwe area were selected for the study. From each village, small-scale farmers were randomly selected from the list depending on the size of the village (approximately 35 small-scale farmers per village). Teddlie and Tashakkori (2009) posit that for the 'infinite' population size, the sample of 384 would give the confidence limit of 0.05, i.e. there is 95% of chance that the sample will represent the population. Considering the population size of small-scale farmers under company's contracts for paprika in Malawi, the sample size of 428 was deemed appropriate. The company did not participate in sampling procedure.

For collecting the qualitative data, interviewees were selected using purposive stakeholder sampling method where participants who have a distinct role in the observed phenomenon are interviewed (Palys, 2008). For the study's purpose, it was essential to gather the qualitative data on side-selling from two parties: the company and vendors.

[*] Focal company is the company managing key operations in a supply chain (Kühne et al., 2015). In the study, the name of the company offering the contract for paprika production to small-scale farmers is not revealed due to confidentiality. The terms 'focal company' and 'company' are used instead.

[†] Other participants in the chain included: input dealers and vendors (direct link) and NGOs, farmers' associations, aid organisations, research units and Malawi's Government (indirect link).

[‡] Since previous research (e.g. Miyata et al., 2009 and Wainaina et al., 2012) showed that the distance might affect participation in contract farming, two districts were selected to assess whether the distance to the company's headquarters would have any impact on the occurrence of side-selling. Lilongwe district surrounds the capital Lilongwe and due to the closeness to the urban area, it was considered as a representative to explore side-selling. Nkhotakota district is located over 160 km from the company's headquarters and because of its remoteness it was selected to investigate side-selling. See further the discussion (section 4.3).

3.3 Data collection instruments

3.3.1 Survey

The household questionnaire used for this study was part of a more comprehensive research project on food supply chain management and contracting in Central Malawi. The entire household questionnaire consisted of 78 questions divided into 11 sections. The sections used for the purpose of this study were: (i) socio-demographics; (ii) household and farm characteristics; (iii) contract influence; (iv) institutional support; (v) side-selling and its extent; and (vi) reasons for side-selling. The majority of the questions in the survey were closed questions with a single choice or multiple choice answers. A smaller proportion of questions used the Likert scale. The key dependent variable in this study (side-selling) was measured by two questions asking the respondents whether they sold any of their paprika to anyone else other than the contractor and what proportion of the paprika did they sell to the contractor. The household questionnaire was written and administered to small-scale farmers in the local language. The quantitative data were organised in SPSS® 21.0 software and analysed through cross-tabulation and binary logistic regression.

3.3.2 Interview protocol

The interviews followed after the household questionnaires were completed. The purpose of the interviews was to clarify and advance the understanding of processes and patterns in side-selling practices. The interviews were conducted using the interview guide with a set of pre-determined questions related to side-selling. The interview questions focused on the most important reasons for side-selling (with an emphasis on pricing mechanisms). Additional issues and different perspectives of side-selling were also discussed during the interview (semi-structured type of the interview). To enable analysis of the qualitative textual data, all semi-structured interviews were audio recorded with prior informed consent from each participant and then transcribed and prepared for the thematic analysis[§] using NVivo™ 10 software. Structural coding was employed, which represents the first cycle coding procedure where a question from the interview serves to develop a specific code (Miles et al., 2014). This study focused on developing themes labelled as 'Pricing' and 'Losses', which were constituted from the following codes: 'Price formula', 'Price comparison' and 'Expected volumes'.

4 Results and discussion

4.1 Extent and economic implications of side-selling

Table 1 shows that in total 36.9% of households were engaged in side-selling practices. Medium-income households were the ones with the highest percentage of side-sellers among household types. The most loyal were households with small land allocated to CF crop who sold large proportions of their CF crop to the company.

The data generated from the household questionnaire and interviews with company's representatives were used to investigate the issue of side-selling further. In particular, the information on potential losses for the company that occur due to side-selling was relevant for assessing consequences of such opportunistic behaviour. For the calculation of potential losses in one season, the following scenario was considered: 10,000 small-scale farmers, 35 kg per small-scale farmer,[**] total expected volumes 350,000 kg of dried paprika.

[§]This study followed Braun and Clarke's (2006) detailed description of six phases in doing a thematic analysis.

[**]The company requested from the authors not to reveal the exact operative volumes in any written form. The authors determined the average kg/small-scale farmer. The decision was informed based on information received and shaped to provide as accurate overall frame as possible.

Table 1.
Side-selling extent in two studied districts based on the household survey

Variable	**Pooled sample (n=428)**						
	Total n	***Income levels, %***			***CF land allocated, %***		
	%	Low (n=208)	Medium (n=143)	High (n=77)	Small (n=181)	Medium (n=175)	Large (n=71)
Household side-selling paprika:							
Yes	36.9	26.4	47.6	45.5	38.7	34.9	38
No	63.1	73.6	52.4	54.5	61.3	65.1	62
Proportion of paprika sold to the contractor[††]:							
Low (Up to 30%)	15.6	18.3	9	21	13.8	18.9	12.7
Medium (31-70%)	13.8	9.7	23	7.8	8.8	19.4	12.7
Large (71-100%)	67.1	69.1	62.3	70	74.6	60.6	63.3
Unknown	3.5	2.9	5.7	1.2	2.8	1.1	11.3

Source: Authors' survey in Malawi 2014/15.

Table 2 used the information from the household survey to calculate how many small-scale farmers sold different proportions of paprika to the contractor. The recorded percentages of different proportions of paprika sold to the company in two districts were translated into numbers for the scenario with 10,000 small-scale farmers. Table 2 indicates that 25% of small-scale farmers sold only up to 50% of paprika to the focal company. Table 7 (Appendix) shows the calculation of minimum, average and maximum quantities sold for each range. The maximum quantity sold (100% value) is 35 kg of dried paprika and all other percentages were calculated in relation to this value[‡‡].

Table 2.
Proportion of small-scale farmers selling different volumes to the contractor based on the household survey

Percentage sold to the company, %	**Small-scale farmers selling indicated proportions,** % from total n (428)	**Number of small-scale farmers** (scenario with 10,000 small-scale farmers)
<10	4.9	490
10-30	10.7	1,070
31-50	9.8	980
51-70	4	400
71-100	67.1	6,710
Unknown	3.5	350
TOTAL	**100**	**10,000**

Source: Authors' survey in Malawi 2014/15.

Table 3 shows that the potential loss of volumes for the company was estimated between 19.9% and 44.6%. Regarding profits, Table 3 indicates that the company might be losing between US$ 5,228 and US$ 11,714 per season due to side-selling practices.

[††]Table 2 summarises proportions of paprika sold to the contractor. The full information is displayed in Table 3.
[‡‡]Quantities sold are calculated as a number of small-scale farmers for each range x minimum/average/maximum quantity for that range (see Table 7 in Appendix for quantities).

The contracted small-scale farmers argued that the focal company had cheated them because prices offered were lower compared to the price on the informal market. The implication is that the company incurred quantifiable losses. Estimated losses of volumes ranging from 19.9% to 44.6% could cause substantial negative consequences for the company due to shortages in delivered quantities and increased transaction costs. Bingen et al. (2003) in a similar study concluded that, in the case of side-selling, contracting companies face a double problem: poor loan repayment and the inability to meet marketing targets. Thus, the production via contract farming does not necessarily entail loyalty and guaranteed supply, as suggested by de Almeida and Zylbersztajn (2017). Lost profits for the focal company might not appear high, but that amount could have been used, for instance, for investing into better extension services by hiring additional staff, renting another vehicle or appointing an expert to provide training on legal aspects of CF for small-scale farmers. This example is used to illustrate that side-selling weakens not only the company but also limits its services to small-scale farmers; thus, in the end, side-selling poses a threat to small-scale farmers.

Table 3.
Estimation of potentially lost volumes, revenue and profit in one season by the company due to side-selling based on the data in household survey

Percentage sold to the company, %	**Minimum quantities sold,** kg	**Average quantities sold,** kg	**Maximum quantities sold,** kg
<10	490	980	1,666
10-30	3,745	7,490	10,700
31-50	10,780	13,720	17,150
51-70	7,200	8,400	9,800
71-100	167,750	201,300	234,850
Unknown	3,850	4,900	6,125
Reported volumes, kg	193,815	236,790	280,291
Expected volumes, kg	350,000	350,000	350,000
Potential losses, kg	156,185	113,210	69,709
Potential losses	**44.6%**	**32.3%**	**19.9%**
Missing revenue (average 0.30$ per kg)	**US$ 46,855**	**US$ 33,963**	**US$ 20,913**
Missing profit (average 0.075$ per kg)	**US$ 11,714**	**US$ 8,491**	**US$ 5,228**

Source: Authors' survey in Malawi 2014/15.

4.2 Reasons for side-selling

The most prevailing reason for side-selling among small-scale farmers who sold their paprika outside the contract was the belief that other buyers offered higher prices (Table 4). Although the differences were small within groups, the medium-income households and households with small CF land quoted the higher price as the reason for side-selling to the least extent. This was contrary to study's initial assumption that households with lower income and smaller CF land would have higher side-selling incidence because of perceived higher price and scarce income sources. The surveyed households also engaged in side-selling because they needed money quickly or/and they were not satisfied with the treatment under CF.

Table 4.
Results from the household survey: Reasons for side-selling (side-sellers only)

Variable	***Total n***	***Income levels*** *(% within the type)*			***CF land allocated*** *(% within the type)*		
	%	Low (n=55)	Medium (n=68)	High (n=35)	Small (n=70)	Medium (n=61)	Large (n=27)
Reasons for side-selling:							
Lack of trust towards the contractor	3.2	0	1.5	11.4	4.3	1.6	3.7
Money needed quickly	36	38.2	39.7	25.7	41.4	36.1	22.2
Offered higher price	87.3	87.2	85.3	91.4	84.3	88.5	92.6
Household does not care to whom it sells	8.9	1.81	19.1	0	11.4	8.2	3.7
Not satisfied with the treatment	12.6	10.9	14.7	11.4	12.9	1.6	37
Household has the right to decide to whom to sell	12	3.6	20.6	8.6	12.9	13.1	7.4

Source: Authors' survey in Malawi 2014/15.

The argument about higher price offered by other buyers was further explored within paprika supply chain through interviews and observations. First, the company representatives were confronted with the argument. Second, vendors were interviewed to capture the difference in offered price.

The focal company justified its pricing mechanism by stating that the costs of providing seeds and extension services are included in the final price. Hence, the main counter-argument provided by the company was that, due to costs of investments, the company was not able to compete with vendor's price:

'[…] if [company] said we are not [...] selling seed - there'll be no seed this year, who would then give the seed? There would be no paprika in Malawi! Actually, for your information, there's nobody else who sells paprika seed in Malawi, apart from [company]. It's a cost! It's a big cost! Big, big cost.'

Semi-structured interview with two extension officers from the company, Lilongwe, 2015

Based on the interview data, the company stated that the final price for 1 kg of dried paprika pods was influenced by the international price, exchange rate, overhead costs and outcomes of negotiation.

Table 5 compares the price offered by the company and three vendors during the 2014/2015 season. It is shown that two vendors were able to offer considerably higher price compared to the company, while one of the vendors used company's price as a benchmark to formulate the price. Since the main reason for side-selling on farmers' part was the argument that other buyers offered a higher price, there are two points to reflect on. First, contracted small-scale farmers mostly had low incomes, meaning they were at times struggling to secure decent livelihoods for their households. Thus, gaining a higher price for the same volume might seem as economically justified and even necessary decision due to limited opportunities available for income generation. This is in accordance with Mujawamariya et al. (2013) and especially Goel (2013) who described the case of PepsiCo in India where contracted farmers, supported by government regulations, could choose whether they want to sell their rice to the contractor or another company offering a higher price.

Second, vendors offered a higher price to small-scale farmers since vendors did not share production and marketing costs with farmers. The company established the price in the contract mostly without previous consultations with the small-scale farmers. Also, the company did not take into consideration farmers' production costs, which aggravated the pricing issue. Minten et al. (2009) argued that in cases where the company sets the price above the local market price, the occurrence of side-selling is likely to reduce, which supports the argument that the main reason for side-selling is the price offered. In the studied example, the price was partially determined on the international market, and the company had limited

influence because the crop was intended for the export market. In addition, due to the absence of an official local market for dried paprika, the company was the first one to announce the price and then encountered the competition from vendors' end. One of the ways to avoid side-selling in described situation is to negotiate the price with small-scale farmers.

Table 5.
Difference in price offered by the company and vendors based on the interview data

The price	Company MKW/kg	Vendor 1 MKW/kg	Vendor 2 MKW/kg	Vendor 3 MKW/kg
Grade A	550; can reach 650 (US$ 1.17-1.38)	900-1,000 (US$ 1.91-2.12)	Based on the company's price, the vendor always offers a higher price.	600-1,500 (US$ 1.28-3.12)
Grade B	450 (US$ 0.96)	900-1,000		600-1,500

Note: Based on OANDA (2016) exchange rate. Source: Authors' survey in Malawi 2014/15.

Nevertheless, there is no guarantee that negotiated price would reduce side-selling as vendors pointed that they will always add to the price that the company offers. This finding challenges the argument from Boulay (2013, p. 212) who suggested that the competition between buyers '*is probably important in enhancing the fairness of CF schemes because the increasing rivalry for raw materials among buyers has been an incentive for companies to enhance their efforts to promote and improve their services to contract [...] growers*'. In Malawian example, the competition between the company and vendors had quite different outcome: the company reduced the input provision to the minimum (the contract provided only the seed for immediate cash) to protect its investments and reduce the losses in case of side-selling.

4.3 Estimating determinants of side-selling

The binary logit regression model was used to estimate determinants of engaging in side-selling practices. The information on which variables are more likely to increase the likelihood of engagement in side-selling has implications for both the company and enabling environment (namely the Government, NGOs and farmers' representatives). By understanding the potential triggers for side-selling, stakeholders have the opportunity to address existing gaps and act to reduce side-selling.

The test for multicollinearity preceded the regression to explore if predictor variables are correlated to each other. High levels of multicollinearity could influence model's results by increasing the standard error of coefficients and making some of the independent variables statistically non-significant (Gujarati and Porter, 2009). Table 8 (see Appendix) indicates results from the multicollinearity test. There was no strong multicollinearity among variables as the mean VIF (variance inflation factor) was 1.78 and all VIF values were considerably less than 5, while all tolerance values (1/VIF) were greater than 0.1 which is accepted rule of thumb when determining existence and severity of multicollinearity (Gujarati and Porter, 2009).

Table 6 shows the results of the binary logistic regression. The chi-square value of the model ($\chi^2 = 94.16$) was statistically significant at 1%, suggesting that the predictor variables included in the model jointly affect side-selling. The model explained 28.6% (Nagelkerke R^2) and 20.8% (Cox and Snell R^2) of the variance in engagement in side-selling, and it correctly classified 73% of cases. Table 6 outlines that out of 13 predictor variables included in the model, the coefficients of eight variables were statistically significant. The district, secondary education, long distance to the collection point, membership in FUM and Government assistance received were statistically significant at 1%. The primary education, low monthly income, and negative CF influence on livelihood were statistically significant at 1%.

Table 6.
Results from Binary Logistic Regression Estimating Determinants of Side-selling based on household survey

Variables	Coefficient	S.E.	Wald	*p*-value	Odds Ratio
District	0.838***	0.280	8.957	0.003	2.311
Socio-economic variables					
Primary education	-0.924**	0.419	4.871	0.027	0.397
Secondary education	-1.322***	0.496	7.117	0.008	0.267
Low monthly income	-0.609**	0.276	4.850	0.028	0.544
High monthly income	-0.156	0.344	0.205	0.650	0.856
Food security variables					
Low expenses for food/month	-0.383	0.279	1.892	0.169	0.682
High expenses for food/month	0.145	0.319	0.206	0.650	1.156
Household farm characteristics variables					
Close to the collection point	0.331	0.335	0.975	0.323	1.392
Long distance to the collection point	0.954***	0.354	7.259	0.007	2.596
Contract influence variables					
Positive CF influence on livelihood	0.104	0.808	0.017	0.897	1.110
Negative CF influence on livelihood	3.034**	1.391	4.757	0.029	20.776
Institutional support variables					
Membership in FUM	0.707***	0.248	8.113	0.004	2.027
Government assistance received	1.660***	0.413	16.171	0.000	5.261
Constant	-0.627	0.978	0.412	0.521	0.534
χ^2 (df)	94.16 (13)***				
Nagelkerke R^2			0.286		
Cox and Snell R^2			0.208		
% of cases predicted correctly			73		
N			403		

** Significant at 5%, *** significant at 1%. Source: Authors' survey in Malawi 2014/15.

The strongest positive and significant predictor variable of engagement in side-selling was negative CF influence on household's livelihood with the odds ratio of 20.77, implying that households who reported negative CF influence on their livelihood were over 20 times more likely to engage in side-selling compared to households reporting that CF had no influence on their livelihood. There are not many solutions for this issue except to either terminate contracts with unsatisfied farmers or improve the communication to better understand why contracting did not result in a positive outcome for small-scale farmers.

Concerning the socio-economic variables, both primary and secondary education and low monthly income showed significant negative effects on engagement in side-selling. Households with an educated household head were less likely to practice side-selling compared to households led by an uneducated head.

Therefore, it is suggested that educated household heads can better understand contract terms and conditions as well as the legal consequences of the contract breach and that education will lessen the possibility of side-selling. This result corroborates with the studies from Gallacher (2013), Mwambi et al. (2016) and Kumar et al. (2016) who found that education promotes farmers' participation in contract farming.

It was expected that low-income households would have a higher probability to engage in side-selling. Households with low monthly income were less likely to side-sell compared to households with medium monthly income. The explanation is that low-income households were less prone to risk their relationship with the contractor as the contract is one of their scarce regular source of income. A similar observation

was made by Wainaina et al. (2012) indicating that the rise in farm income increased the likelihood of farmers' participation in CF. Since one of the main motives to join CF is the income, the study results suggest that farmer's initial pursuit for stable income sources might evolve over time into the strategy for higher income generation, and this is where the vendors play a role. Indeed, Table 1 outlined that medium- and high-income households were side-selling their paprika to a greater extent compared to low-income households.

Food security variables showed to be non-significant in determining farmers' engagement in side-selling. This result implies that food expenses did not influence farmers' decision to side-sell paprika.

Regarding the household farm characteristics, households located at a longer distance from the collection point were more likely to side-sell compared to households at the medium distance. In addition, households in Nkhotakota district were two times more likely to engage in side-selling than households in Lilongwe district (odds ratio of 2.31), which is considerably closer to the company's headquarters. This suggests that the distance has a positive effect on side-selling, so more remote households are more likely to side-sell their crop since they might incur higher transaction costs of delivering paprika to the assigned collection point (e.g. increased costs for hiring the transport and fuel). These results are consistent with previous studies (Miyata et al., 2009; Wainaina et al., 2012) which showed that the distance had a negative impact on farmers' participation in CF.

Both institutional support variables (membership in FUM and Government assistance) displayed significant and positive effect on side-selling. Members of FUM were two times more likely to engage in side-selling than non-members (odds ratio of 2.02). This result is in sharp contrast with the assumption that the participation in farmers' organisation will decrease members' opportunism, as proposed by Swinnen et al. (2007). Bellemare (2012) and Kariuki and Loy (2016) found that membership in cooperative had a positive impact on participation in CF. Still, Mujawamariya et al. (2013) warned that vendors are often able to offer better payment conditions than farmers' organisations, which attracts farmers. An explanation of the positive effect of FUM on side-selling might be in a potential to obtain needed inputs at reduced price through FUM. Cheaper inputs may result in more crop produced and more income gained by selling larger quantities of paprika to vendors.

Finally, households who received Government assistance were over five times more likely to side-sell paprika compared to households that did not receive Government assistance (odds ratio of 5.26). While Government support might positively impact farmers' participation in CF, as found by Guo et al. (2005), the study results indicate that the Government assistance (in production practices) did not consequently increase small-scale farmers' awareness of importance to find and retain a secure market outlet by, for instance, complying with the contract.

5 Conclusions and implications

This paper studies the challenge of side-selling, which often occurs in contract farming relations within agri-food supply chains. The study particularly focuses on exploring the reasons and triggers for side-selling and also quantifies the extent of side-selling. The study's key findings are summarised in three points.

First, over one third of surveyed small-scale farmers engaged in side-selling. The majority of small-scale farmers that engaged in side-selling were located at a large distance from the collection point, with medium-income and small land size allocated to the contracted crop. Based on different proportions of paprika sold by small suppliers, the contractor was potentially experiencing between 19% and 44% losses in volumes of paprika.

Second, small-scale farmers stated that the key reasons for side selling were: higher prices offered through other sources, the need to get money quickly and dissatisfaction with the treatment under the contract. The contractor did not take into consideration small-scale farmer's average cost of production when formulating the price. Since vendors offer higher price than the contractor almost under any condition, it remains challenging to fight side-selling in Malawi's paprika supply chain.

Third, the estimates of the binary logit regression model indicated that the key triggers for side-selling were: the great distance from the collection point, negative experience with contract farming, membership in farmers' organisation and assistance received from the Government.

Specific findings from this study can be applied as learned lessons and generalised beyond the context of Malawi as they deepen the understanding of side-selling mechanisms. For example, side-selling will inevitably cause some losses for the contracting company and reduce the efficiency of product supply within the chain. In addition, the highest price offered for the contracted product is most likely to

determine to whom the product will be sold, so the binding nature of the contract might not play a role in securing supply. Finally, triggers for side-selling might not just be related to the pricing mechanism, but could also include some external factors that influence the farmers, such as the available locations, previous experience with contracting and embeddedness in local community networks.

In conclusion, this study suggests some recommendations to decrease the levels of side-selling; however, these recommendations are limited to cases that are similar to the conditions found in the Malawian paprika supply chain. The company could allow small-scale farmers to actively participate in price formulation since the negotiation of the price might sensitise small-scale farmers to comply better with the contract terms and avoid side-selling. Also, one of the solutions to reduce side-selling might be to increase the frequency of field visits by the company to renew small-scale farmers' sense of being contracted which could perish because of the distance.

Small-scale farmers should form and strengthen farmers' cooperatives to enable successful price negotiation with the company and secure more volumes of paprika. The Government might promote the education of small-scale farmers through targeted training to increase their understanding of long-term negative consequences of side-selling and encourage practising loyalty to the company. These recommendations are in accordance with the recent study from Chaka et al. (2016) and Dondé et al. (2016), who recommended increased collaboration between players, better information sharing system and governmental involvement as the key steps to establish more sustainable supply chains. Further research should focus on determining the effect of risk proneness on the likelihood of engaging in side-selling and what efficient public, private and community-driven enforcing mechanisms might contribute to lessening the extent of side-selling.

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Appendices

Table 7.

Scenario for potential losses occurring due to side-selling: minimum, average and maximum quantities sold[§§]

Percentage sold to the company (the range)	**A) Minimum quantities**	**B) Average quantities**	**C) Maximum quantities**
<10%	1 kg	2 kg	3.4 kg
10-30%	3.5 kg	7 kg	10 kg
31-50%	11 kg	14 kg	17.5 kg
51-70%	18 kg	21 kg	24.5 kg
71-100%	25 kg	30 kg	35 kg
Unknown[***]	11 kg	14 kg	17.5 kg

Source: Author's analysis of survey results

Table 8.

Test for multicollinearity for variables used in binary logistic regression model

Variable	**VIF**	**1/VIF**
District	1.30	0.770751
Primary education	2.90	0.345169
Secondary education	3.03	0.330414
Low monthly income	1.49	0.672767
High monthly income	1.35	0.738302
Low expenses for food/month	1.29	0.773841
High expenses for food/month	1.40	0.712783
Close to the collection point	1.88	0.532314
Large distance to the collection point	1.98	0.504765
Positive CF influence on the livelihood	1.91	0.523899
Negative CF influence on the livelihood	1.91	0.523099
Membership in FUM	1.11	0.901518
Government assistance received	1.09	0.916784
Mean VIF	**1.78**	

Source: Authors' analysis of survey results.

[§§] There are in total 6 ranges considered: (1) <10%, (2) 10-30%, (3) 31-50%, (4) 51-70%, (5) 71-100%, (6) Unknown. Each range has minimum, average and maximum value. The minimum value represents the lower value of the range (e.g. minimum value for the range 31-50% is 31%.). The maximum value represents the highest value of the range (e.g. maximum value for the range 31-50% is 50%). Finally, the average value represents the medium value of the range (e.g. average value for the range 31-50% is calculated as a mean of 31 and 50, i.e. 40.5%). Each of this percentage is then assigned to the value of 35 kg. Therefore, for the range 31-50%, the minimum value is 31% of 35 kg, which is ~11 kg. This procedure was followed throughout Table 8.

[***] For the unknown category, an average amount (31-50%) was assumed.