The effects of the degree of produce perishability and the choice of procurement channel on supplier opportunism: empirical evidence from the food processing industry

Renger Kanani*
Department of General Management, University of Dar es salaam Business School, P.O. Box 35046, Dar es salaam, Tanzania
Fax: +255-22-2410510
Email: kananranger@gmail.com
*Corresponding author

Arnt Buvik
Department of Economics, Molde University College, Service Box 2110, 6402 Molde, Norway
Fax: +473814100
Email: arnt.buvik@himolde.no

Abstract: Opportunism is an important topic in supply chain management and distribution channels. The emergence of this behaviour in buyer-supplier relationships tends to reduce performance while diminishing value creation in the affected relations. Different transactions call for different control levels depending on the gravity of opportunism in the transaction, with the need for control being higher as opportunism increases. In this regard, it is important to understand the factors that give rise to opportunism to apply appropriate control mechanisms. This study, therefore, explores the effect of the degree of the perishability of the transacted produce on supplier opportunism. Additionally, this study treated the choice of procurement channel as a control mechanism; therefore, we compared the effect of perishability on opportunism in direct and indirect procurement channels. In this study, cross-sectional survey data collected from 239 food processor-produce supplier relationships served as source of empirical evidence. The empirical findings support our hypotheses, and demonstrate that perishability is positively associated with supplier opportunism, with the effect being significantly lower in the direct procurement channels than in the indirect procurement channel.

Keywords: transaction cost theory; TCT; perishability; opportunism; procurement channels; buyer-supplier relationships.

Reference to this paper should be made as follows: Kanani, R. and Buvik, A. (2018) ‘The effects of the degree of produce perishability and the choice of procurement channel on supplier opportunism: empirical evidence from the food processing industry’, Int. J. Procurement Management, Vol. 11, No. 1, pp.113–133.

Copyright © 2018 Inderscience Enterprises Ltd.
Biographical notes: Renger Kanani is a Lecturer at the Department of General Management in the University of Dar es Salaam Business School in Tanzania. He has received his Bachelor of Commerce in Management Sciences from the University of Dar es Salaam Business, MSc in Logistics (Supply Chain Management) and PhD in Logistics, both from the Molde University College in Norway. His current research interest includes supply chain management strategies, purchasing and buyer-supplier relationship issues.

Arnt Buvik is a Professor of Purchasing Management and Business Logistics at the Molde University College in Norway. He received his PhD from the Norwegian School of Economics and Business Administration (NHH). He is the author of several research publications in leading journals, including Journal of Marketing, Journal of Business Research, Journal of International Marketing, International Journal of Procurement Management and Journal of Business to Business Marketing. He has presented a number of research papers at leading international conferences and has supervised a number of master and PhD students.

1 Introduction

Opportunism is an important topic in supply chain management and distribution channels (Ferrell et al., 2013), and is inherent in any inter-firm exchange (Liu et al., 2010). This behaviour can degrade a firm’s performance (Liu et al., 2010; Wang et al., 2013), eroding competitiveness (Wang et al., 2013) and gains that could otherwise have accrued for both parties in the relationship (Brown et al., 2000). Consequently, the risks of opportunistic behaviours tend to heighten governance costs (Luo et al., 2015).

Because of its negative consequences in business relationships, opportunism has attracted research attention for decades (John, 1984; Stump and Heide, 1996). In fact, interest in exploring opportunistic behaviours has increased considerably in the recent past (e.g., Bhattacharya et al., 2015; Crosno et al., 2013; Heide et al., 2007; Wang et al., 2013).

Current literature on opportunism demonstrates that many of the scholars associate opportunistic behaviours with a problem of implementing appropriate control mechanisms. As such, many studies have concentrated on different control mechanisms that can be deployed in economic transactions to reduce or curb opportunistic behaviours (e.g., Brown et al., 2000; Dahlstrom and Nygaard, 1999; Heide et al., 2007; Rokkan et al., 2003; Stump and Heide, 1996). For example, Rokkan et al. (2003) focused on the ability of solidarity norms and relationship extendedness to reduce opportunism in the presence of specific asset investments and small number conditions. Similarly, Heide et al. (2007) investigated how output monitoring, behavioural monitoring and social contracts interact to counteract supplier opportunism. In similar vein, Liu et al. (2009) investigated the effect of informal control mechanisms in reducing opportunism.

Despite the slant of research towards control of opportunism, establishing control in a transaction is associated with some operational costs of controlling supplier’s processes, and of monitoring and verifying performance (Tsai et al., 2012). In this regard, firms should enhance control in transactions with high opportunism levels and reduce control in the transactions with low opportunism levels (Wang et al., 2013). To apply control in such a discriminatory fashion, it is necessary to understand the factors that increase the
The effects of the degree of produce perishability

likelihood of opportunism. Research contributions in transaction cost theory (TCT) have focused mainly on the influence of specific investments (Bhattacharya et al., 2015; Handley and Benton, 2012; Rokkan et al., 2003) and behavioural uncertainty (Bhattacharya et al., 2015; Wang et al., 2013) on opportunism in different research settings.

However, the drivers of opportunistic behaviours are not only limited to the abovementioned characteristics of transaction as proposed by the TCT. In fact, the available literature tends to emphasise contextual variables such as characteristics of the transacted products as another potential area for extending the knowledge on opportunism in inter-firm relationships and governance (Chen et al., 2016; Rindfleisch et al., 2010). In agricultural transactions, perishability is the most conspicuous characteristic that impacts on the quality uncertainty (Hobbs and Young, 2000) and transaction specific investments (Masten, 2000). Thus, the first objective of this study examines the effect of this characteristic on supplier opportunistic behaviours. Moreover, in the agricultural supply chains, the involvement of a large number of intermediaries between the farmers and consumers or food processors tends to raise concern for food safety and quality and exposes the risks of information deficiency and opportunistic behaviours. Reducing the number of these intermediaries appears to be one possible way of reducing these risks (Wang et al., 2014). Thus, the second objective of this study examines whether trimming the number of intermediaries by buying directly from the farmers can reduce the effect of perishability on opportunism.

Based on our research objectives, this study provides two important contributions. First, it extends the TCT theory by introducing the degree of perishability as an important determinant of opportunistic behaviours. Second, it contributes to the literature on control mechanism by examining how the choice of procurement channel can be used as control mechanism.

The next section reviews related literature in addition to developing hypotheses that the study tested, which is followed by the research methodology section. The subsequent sections present the model estimation and tests of hypotheses. Finally, the paper discusses the empirical findings, implications, limitations and offers some suggestions for further research.

2 Literature review and hypotheses

Figure 1 describes the relationships between the variables investigated in this study. The degree of the perishability of the transacted produce is hypothesised to have a positive influence on the potential for supplier opportunism. In this regard, less perishable produce such as grains are expected to have low influence on supplier opportunism than more perishability produce such as fruits and vegetables. In addition, the interaction between the degree of perishability and procurement channel is investigated by grouping all off-farm transactions as indirect procurement and all on-farm transactions as direct procurement and examine the effect of the degree of perishability on supplier opportunism across two groups. To increase robustness of our analysis, we introduced the duration of relationships between the food processor and their main source of produce, purchase frequency from the main source and purchase volume as control variables.
2.1 Degree of perishability and supplier opportunism

Over the last few years, characteristics of transacted products have become a topical research agenda in buyer-supplier relationships. In fact, several studies have investigated and confirmed the effect of product characteristics on different buyer-supplier relationship variables such as buyer satisfaction (Luo et al., 2012), transaction costs (Stevens et al., 2015; Yen et al., 2013), product fit uncertainty (Hong and Pavlou, 2015) and vertical coordination (Lo, 2010; Rouvière and Latouche, 2014). In this study, we concentrate on the relationship between product characteristics and opportunism.

Opportunism constitutes one of the main assumptions of TCT, which postulates that in some cases one or all parts to a transaction may serve their own self-interest and act with guile (Rindell et al., 2013; Buvik and Andersen, 2015). Moreover, opportunism includes behaviours such as deception, cheating, stealing, misrepresentation, withholding or distorting information, failing to fulfil promises or obligations, shirking, obfuscation issues, and misrepresentation of information (Hawkins et al., 2008; Hutchinson et al., 2012; Williamson, 1985). Self-interest seeking behaviour in which the transacting actors are not acting with guile is not regarded as opportunistic behaviour, and the examples of such behaviour include hard bargaining, charging high market prices, and intense and frequent disagreement between partners (John, 1984).

As hinted in the introduction, TCT treats the level specific investments in a transaction (Brown et al., 2000; Buvik et al., 2015; Cadeaux and Ng, 2012; Buvik and Andersen, 2016) and behavioural uncertainty (Bhattacharya et al., 2015; Wang et al., 2013) as the main drivers of opportunistic behaviours. Other factors that are likely to fuel these behaviours include information asymmetry (Huo et al., 2016; Tong and Crosno, 2016; Sharma, 2016), environmental uncertainty (Cadeaux and Ng, 2012) and performance ambiguity (Stump and Heide, 1996).

On the whole, several studies (e.g., Lo, 2010; Sachdev and Bello, 2014) have acknowledged product characteristics as drivers of opportunistic behaviours because of their impact on TCT related variables such as asset specificity, quality uncertainty and performance ambiguity. Sachdev and Bello (2014), for example, have suggested that when the product is so customised, complex or sophisticated that the manufacturer is forced to share proprietary information such as manufacturing processes, after-sale services and replacement parts, and to provide necessary training to their intermediaries. Thus, the intermediaries become irreplaceable. In addition, they may behave
opportunistically by sharing the manufacturer’s trade secrets with competitors and seeking more concessions from manufacturers.

In agricultural transactions, scholars have largely focused on the perishability characteristic and have used opportunism as pivotal argument to explain its influence on vertical coordination and control (Knoeber, 1983; Lo, 2010). Lo (2010) argues that in the transactions of perishable products, buyers (food processors) might engage in strategic delaying tactics to seek more concessions from the supplier knowing that the supplier cannot find an alternative buyer within short notice without loss in value and, therefore, motivating suppliers of perishable products to seek safeguarding mechanisms.

Moreover, perishability fosters quality uncertainty (Hobbs and Young, 2000) and performance ambiguity (Pitt and Foreman, 1999) as it increases variations in quality across produce units when it comes to quality factors such as moisture content, sugar content, level of damage, taste, colour, maturity, weight and time of delivery (Grosh, 1994; Jaffee, 1992). Consequently, it compounds difficulties in quality evaluation. Thus, the potential for supplier opportunistic behaviours such as mixing produce of good and bad quality, supplying produce of poor quality, or over declaring the quality of produce are expected to increase (Poulton et al., 2010).

Although the influence of perishability characteristic on opportunism from both buyer and supplier perspective is widely discussed in the existing literature (e.g., Knoeber, 1983; Lo, 2010), empirical evidence remains largely absent. In this regard, our study intends to contribute knowledge to the relationship between perishability and opportunism by examining the following hypothesis.

**H1** The degree of perishability of transacted produce is positively associated with supplier opportunism.

### 2.2 Choice of procurement channel

As noted in the introduction, a fair amount of prior empirical research on opportunistic behaviours has focused on control mechanisms. Much more specifically, many of these research contributions have concentrated on the mechanisms aimed at curbing opportunistic behaviours in the relationships between the buyer/supplier and a specific upstream/downstream member of the supply chain. In this regard, Zhou et al. (2015), for example examined the mechanisms for reducing opportunism in the manufacturer-distributor relationships. Ju et al. (2011), on the other hand, concentrated on opportunism and monitoring mechanisms in exporter-distributor relationships. Furthermore, Wang et al. (2013) investigated the drivers and deterrents of opportunism in manufacturer-supplier relationships. To the best of our knowledge, the research on whether the potential for opportunistic behaviours varies across different supply chain members remains largely absent. Thus, this study considered different upstream supply chain members together and delved into examining whether the procurement of produce through intermediaries or from the primary source affect the level of opportunistic behaviours.

Generally, supply chain intermediaries such as collectors, wholesalers and retailers play a crucial role in moving produce from the source to the ultimate buyers (Jangwe, 2011). Their role becomes even more pronounced when perishable products are involved due to their limited marketing alternatives (Fischer and Qaim, 2012). However, it has been observed that intermediaries tend to pay modest attention to the quality and the
intended use of farm produce in the pursuit of opportunistic profits (Zaharieva et al., 2003). In addition, the presence of intermediaries in a transaction can block the flow of information from the farmers to the buyers (Balaji and Arshinder, 2016), increase quality uncertainty (Zaharieva et al., 2003) and the level of information asymmetry by accessing product information, which the buyers of the product do not have access to or have to incur considerable costs to obtain them from the supplier. Thus, the intermediaries information advantage create the potential for opportunistic behaviour when opportunity arises (Lu et al., 2015).

Accordingly, when a food processor sources perishable produce through intermediaries, the likelihood of opportunistic behaviours increases primarily because of the information asymmetry caused by the presence of intermediaries, quality uncertainty and performance ambiguity associated with perishable produce. On the other hand, when the food processor moves away from the intermediaries and sources perishable produce directly from the farmer, the level of information asymmetry pertaining to quality attributes such as harvest time, harvest condition and the state of deterioration are expected to decrease. Likewise, the performance ambiguity and quality uncertainty are expected to decrease and, consequently, the potential for opportunistic behaviour diminishes significantly. The sourcing of produce directly from farmers is conceptualised in this study as direct procurement channel, whereas sourcing of a produce through intermediaries is conceptualised as indirect procurement channel; therefore, the following hypothesis is proposed.

H2. There is a weaker positive relationship between the degree of perishability and supplier opportunism in the direct procurement channel than in the indirect procurement channel.

3 Research methodology

3.1 Sampling and data collection

The sampling frame for this study was formed by 380 small food processors from the lists of food processors obtained from the Tanzania Small Industries Development Organisation (SIDO) and ‘Let’s Improve Food’ Project. These processors are characterised by poor production and quality screening technology (Mushobozi, 2010). Conversely, opportunism among suppliers of agricultural produce is common particularly in developing countries. Therefore, the aforementioned characteristics of food processors and suppliers make this context relevant to testing both of our research hypotheses.

Our relevant unit of analysis is the relationships formed by the food processors (buyers) and their suppliers such as farmers, retailers and wholesalers. The owner-managers and employees involved in the day-to-day operations of the food processing firms were selected as key informants. Because of the smallness of their food-processing firms and their knowledge in business operations, the key informants were considered to be capable of providing valid and reliable responses to our questionnaires.

Prior to the main data collection, we conducted a thorough literature review and developed an interview guide that was used to conduct five face-to-face interviews and one telephone interview with food processors (buyers). Additionally, the interviews were
followed by a focus group discussion with 11 food processors. This process enriched our understanding of the food processing industry and provided valuable input to the development of the first version of our close-ended questionnaire.

By using a think-loud technique (Campanelli, 1997; Ruane, 2005), the first version of close-ended questionnaire was discussed with academicians and experts in the food processing industry. The comments and recommendations from these discussions enabled us to develop the second version of close-ended questionnaire, which was translated into Kiswahili language using parallel translation strategy (Douglas and Craig, 2007) and piloted with key informants from the 72 food processors obtained from farmers’ exhibitions in three different regions in Tanzania. The pilot study provided us with an opportunity to correct ambiguous questions and poor wording (Bryman and Bell, 2011) and to assess the performance of our questionnaire in the actual conditions of data collection (Churchill and Brown, 2004).

The third and final close-ended questionnaire was then distributed physically to key informants from 358 food-processing firms. In all, 284 questionnaires were successfully returned, hence, representing a 79% response rate. Prior to data analysis, the questionnaires that were returned were examined to determine whether they were fit for analysis. As result, 45 questionnaires (16% of the returned questionnaires) were dropped due to reasons such as high level of incompleteness, respondent’s failure to name the reference produce and respondent’s disengagement. The remaining 239 questionnaires qualified for analysis.

3.2 Measurement of variables

The degree of perishability and supplier opportunism was operationalised by using multi-item reflective scales. The relationship duration, purchase volume and purchase frequency were operationalised by single items, and the procurement channel was measured as dichotomy variable. The survey items, response format and the validity statistics are presented in Appendix 1.

- **The degree of perishability (PERISH).** The definition of perishability is based on previous studies (e.g., Amorim et al., 2013; Cloninger and Oviatt, 2006; Varadarajan and Yadav, 2002; Wang and Li, 2012). We conceptualised perishability in this study as the decline in quality of the produce over time due to transportation and processing delays, temperature conditions and damage due to poor handling. Six items were used to capture this construct based on adaptations with adjustments of items from existing studies (Cloninger and Oviatt, 2006; Lievens and Moenaert, 2001; Wansink, 1994).

- **Supplier opportunism (OPPORT).** This construct captures the extent to which suppliers of a produce are engaged in self-interesting seeking behaviours with guile. This construct was measured by four items developed for this study. The measurement items used are in line with measurements of opportunism in current literature (see Carson et al., 2006; Liu et al., 2009; Rokkan et al, 2003; Zhou et al., 2015).

- **Duration of the relationship (DURAT).** The duration of business relationships tends to affect the behaviours, attitudes of exchanging partners (Liu et al., 2014), and difficulties faced by the exchanging partners (Burki and Buvik, 2010). As the
duration of relationship increases, the supplier becomes more certain of serving the buyer over a long period, and this, in turn, promotes supplier commitment to the quality level expected by the buyer. Long relationship duration also reduces moral hazard that can arise when suppliers skimp on quality assurance and improvement efforts (Zu and Kaynak, 2012). Thus, several previous studies (e.g., Carson et al., 2006; Liu et al., 2014) have used the duration of relationship as a control variable for examining factors influencing opportunism. Similarly, this variable was introduced as control variable in this study, and measured as the number of years the food processor has been doing business with the focal supplier. Finally, the duration of relationship was transformed by using the natural logarithm of numbers of years to indicate that its effect increases at a decreasing rate.

- **Purchase volume (PURCHVOL).** Purchase volume reflects the amount of economic stake involved in a transaction (Buvik and Andersen, 2002, 2011). When the processing firm purchases in large quantities, the measurement of produce quality will not only be more demanding, but will also enforce the prospects of supplier opportunism. Thus, purchase volume was introduced as a control variable, and measured in congruence with other studies (e.g., Buvik and John, 2000; Buvik et al., 2014, 2015; Buvik and Andersen, 2015) as the value of annual purchases from the focal supplier, and was later transformed into a logarithmic scale to reflect the decreasing rate of this effect.

- **Frequency of purchase (FREQ).** This variable measures the number of times food processors purchased from their main supplier during the previous year. Purchase frequency is associated with control options and, hence, the prospect of opportunistic behaviour. Thus, we incorporated this factor into the model to control for such effects.

- **Procurement channel (PROCHANNEL).** The procurement channel has to do with the inbound flow of produce from famers, wholesalers and retailers. This variable was introduced as a relevant moderator for the association between the degree of perishability and supplier opportunism, and measured as a dichotomy with the value of zero representing all indirect procurement channels, that is, all off-farm purchases from the wholesaler and retailers, and the value of one representing direct procurement channels, that is, all purchases from the farm.

### 3.3 Validation of constructs

First, we conducted an exploratory factor analysis for the measurement items of perishability (PERISH) and supplier opportunism (OPPORT). We used maximum likelihood extraction and the varimax rotation method. This procedure generated two factors with eigenvalues greater than one. Then, item-to-total correlation values were used to examine the internal consistency of the items, and the values of this statistic for the measured items of all factors ranged from 0.568 to 0.917, and are above 0.33 threshold recommended by Ho (2006) for acceptable internal consistency.

The pool of measurement items was then subjected to confirmatory factor analysis to examine the unidimensionality, and the resulted chi-square goodness of fit index (GFI) was statistically significant ($X^2 = 56.96; \ p < 0.01$). It is generally accepted that the chi-square statistic tends to reject the well-fitting hypothesis in large samples (cf. Heide
The effects of the degree of produce perishability et al., 2007). Thus, we based our further assessments on other fit indices, including GFI, Tucker-Lewis index (TLI), comparative fit index (CFI) and root mean square error of approximation index (RMSEA). All these indices exceed the thresholds recommended in the literature for model fit adequacy (GFI = 0.96; TLI = 0.99; CFI = 0.99; RMSEA = 0.053) (cf. Schreiber et al., 2006; Hoe, 2008).

The reliability of individual measurement items were further examined using critical ratios and the squares of the standardised loadings (Segars, 1997). All the critical ratios were significant and above the recommended threshold of 2.00 for acceptable item reliability as Table 1 illustrates. Furthermore, with the exception of one item of supplier opportunism (Opport1), which had squared standardised loading 0.34, the squared standardised loadings of the remaining items ranged from 0.55 to 0.94, which is above the recommended threshold of 0.5 (see Table 1) suggested by Segars (1997).

Table 1  

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Items</th>
<th>Unstandardised loadings (λ)</th>
<th>Standardised loadings (λ̂)</th>
<th>Squared standardised loadings (λ̂²)</th>
<th>Standard error(SE)</th>
<th>Critical ratios (λ̂/SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERISH</td>
<td>Perish1</td>
<td>1</td>
<td>0.94</td>
<td>0.88</td>
<td>0.04</td>
<td>23.25***</td>
</tr>
<tr>
<td></td>
<td>Perish2</td>
<td>0.93</td>
<td>0.91</td>
<td>0.83</td>
<td>0.03</td>
<td>31.67***</td>
</tr>
<tr>
<td></td>
<td>Perish3</td>
<td>0.95</td>
<td>0.93</td>
<td>0.87</td>
<td>0.03</td>
<td>31.33***</td>
</tr>
<tr>
<td></td>
<td>Perish4</td>
<td>0.85</td>
<td>0.87</td>
<td>0.76</td>
<td>0.04</td>
<td>21.25***</td>
</tr>
<tr>
<td></td>
<td>Perish5</td>
<td>0.94</td>
<td>0.93</td>
<td>0.87</td>
<td>0.03</td>
<td>31.33***</td>
</tr>
<tr>
<td></td>
<td>Perish6</td>
<td>0.74</td>
<td>0.74</td>
<td>0.55</td>
<td>0.05</td>
<td>14.8***</td>
</tr>
<tr>
<td>OPPORT</td>
<td>Opport1</td>
<td>1</td>
<td>0.58</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Opport2</td>
<td>1.58</td>
<td>0.89</td>
<td>0.79</td>
<td>0.16</td>
<td>9.88***</td>
</tr>
<tr>
<td></td>
<td>Opport3</td>
<td>1.73</td>
<td>0.97</td>
<td>0.94</td>
<td>0.16</td>
<td>10.81***</td>
</tr>
<tr>
<td></td>
<td>Opport4</td>
<td>1.71</td>
<td>0.96</td>
<td>0.92</td>
<td>0.16</td>
<td>10.69***</td>
</tr>
</tbody>
</table>

Note: ***Indicates t-values are significant at p < 0.001.

Next, we examined the reliability of the constructs using measures of composite reliability (CR) and average variance extracted (AVE) as described by the Fornell and Larcker (1981). CR is calculated as \( \left( \sum \lambda_i \right)^2 / \left( \sum \lambda_i \right)^2 + \sum \varepsilon_i \), where \( \lambda_i \) is the standardised loading for measurement item \( i \), and \( \varepsilon_i \) is the error term of the measurement of item \( i \), and we calculated AVE as \( \sum (\lambda_i)^2 / \left( \sum (\lambda_i)^2 + \sum \varepsilon_i \right) \). As Table 2 illustrates, the CR of the degree of perishability and supplier opportunism were 0.96 and 0.92, respectively; they are above the recommended threshold of 0.7 (Segars, 1997). The AVE measures were 0.79 and 0.75 respectively, and are above the recommended threshold of 0.5 (Segars, 1997).

Finally, we assessed the discriminant validity by calculating the shared variance between the degree of perishability and supplier opportunism, and verified that this value is lower than the AVE values of these two constructs. The shared variance of these two construct calculated by squaring their covariance was 0.12, and is lower than the AVE values of each construct, Taken together, the statistics provide strong evidence for acceptable discriminant validity of these constructs.
Table 2  Correlation matrix, descriptive, reliability and validity statistics

<table>
<thead>
<tr>
<th>Variables and statistics</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 OPPORT</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 DURAT</td>
<td>-0.12</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 FREQ</td>
<td>0.02</td>
<td>-0.12</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 PURCHVOL</td>
<td>-0.37**</td>
<td>0.16*</td>
<td>0.02</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 PERISH</td>
<td>0.37**</td>
<td>0.02</td>
<td>-0.05</td>
<td>-0.44**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 PROCHANNEL</td>
<td>0.03</td>
<td>-0.02</td>
<td>-0.05</td>
<td>-0.01</td>
<td>-0.06</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7 PERISH X PROCHANNEL</td>
<td>0.20**</td>
<td>0.06</td>
<td>-0.04</td>
<td>-0.29**</td>
<td>0.72**</td>
<td>-0.03</td>
<td>1</td>
</tr>
</tbody>
</table>

Mean  
3.78  1.06  3.12  16  0.00  0.57  -0.05

Standard deviation  
1.44  0.69  0.92  1.56  1.88  0.50  1.36

CR  
0.92  -  -  -  0.96  -  -

AVE  
0.75  -  -  -  0.79  -  -

Note: *p < 0.05 (two-tailed); **p < 0.01 (two-tailed).

4 Model estimation and tests of hypotheses

4.1 Model estimation and model fit

Our hypotheses specify that the degree of perishability has a positive effect on supplier opportunism, and that this effect will decrease as one moves from indirect to direct procurement channel. To test these hypotheses, we estimated an ordinary least square (OLS) moderated multiple regression (MMR) model in the following way.

\[
\text{OPPORT} = b_0 + b_1 \text{DURAT} + b_2 \text{FREQ} + b_3 \text{PURCHVOL} + b_4 \text{PERISH} + b_5 \text{PROCHANNEL} + b_6 \text{PERISH \times PROCHANNEL} + \epsilon_i
\]  

Prior to the estimation of the MMR model, we examined the correlations of all variables in the analysis, and the interaction between the degree of perishability and procurement channel. The results reveal a high level of correlation between the interaction term and the procurement channel variable (r = 0.77), and this signals a possible multicollinearity problem. Therefore, the degree of perishability was mean centred before forming the interaction terms, and this operation reduced the multicollinearity problem substantially. The correlations between variables are presented in Table 2.

The estimated MMR model is presented in Table 3. It includes the estimated coefficients and their associated statistics. All variance inflated factors (VIF) are lower than 3.00, indicating no multicollinearity problems. The model was estimated in three steps and the effects of the variables added in a particular step were assessed by the incremental effect they account on the dependent variable (Paunonen and Jackson, 1988).

In the first step (model 1), we added the control variables: relationship duration, purchase frequency and purchase volume. The cumulative effect of the control variables explains 22% of the variance of supplier opportunism (R^2\text{adj} = 0.22; P < 0.001), and provides support for a substantial effect of the selected control variables on the dependent variable. In the second step, we added the independent and moderating variables
The effects of the degree of produce perishability

( favourites) This model explained 29% of the variance in the supplier opportunism ($R^2_{adj} = 0.29; p < 0.001$), and the change in explanatory power between model 2 and model 1 was significant ($R^2$ change = 0.08; $F(2,221) = 13.09; p < 0.001$).

In the final step (model 3), we added the interaction term between the degree of perishability and procurement. The resulting model was significant and accounts for 30% of the variance in the supplier opportunism ($R^2_{adj} = 0.30; p < 0.001$). Furthermore, the change in explanatory power between models 3 and 2 was also significant ($R^2$ change = 0.012; $F(1,220) = 3.74; p < 0.1$), and demonstrates that the effect of this interaction term on supplier opportunism is significant.

Table 3 Ordinary least squares MMR model with supplier opportunism as dependent variable

<table>
<thead>
<tr>
<th>Models</th>
<th>Estimates of variables and statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Variables Unstandardised coefficients (b) t-values VIF</td>
</tr>
<tr>
<td>Model 1: Control variables</td>
<td>(Constant) 10.79 12.02***</td>
</tr>
<tr>
<td>$R^2_{adj} = 0.22$</td>
<td>Relation duration $-0.02$ $-0.12$*** $1.06$</td>
</tr>
<tr>
<td>$F(3, 223) = 21.58***$</td>
<td>Purchase frequency $-0.05$ $-0.56$*** $1.02$</td>
</tr>
<tr>
<td></td>
<td>Purchase volume $-0.42$ $-7.85$*** $1.04$</td>
</tr>
<tr>
<td>$R^2_{adj} = 0.29$</td>
<td>Purchase volume $-0.30$ $-5.16$*** $1.30$</td>
</tr>
<tr>
<td>$R^2$ change = 0.08</td>
<td>Perishability $0.24$ $4.99$*** $1.26$</td>
</tr>
<tr>
<td>$F_{change(2,221)} = 13.09$***</td>
<td>Procurement channel $0.23$ $1.46$* $1.01$</td>
</tr>
<tr>
<td>Model 2: Independent and</td>
<td>(Constant) 8.62 9.05***</td>
</tr>
<tr>
<td>added</td>
<td>Relation duration $-0.07$ $-0.58$*** $1.07$</td>
</tr>
<tr>
<td>$R^2_{adj} = 0.29$</td>
<td>Purchase frequency $-0.03$ $-0.33$*** $1.02$</td>
</tr>
<tr>
<td>$R^2$ change = 0.08</td>
<td>Purchase volume $-0.30$ $-5.16$*** $1.30$</td>
</tr>
<tr>
<td>$F_{change(2,221)} = 13.09$***</td>
<td>Perishability $0.24$ $4.99$*** $1.26$</td>
</tr>
<tr>
<td>Model 3: Interaction effect</td>
<td>(Constant) 8.55 9.02***</td>
</tr>
<tr>
<td>Added</td>
<td>Relation duration $-0.06$ $-0.48$*** $1.07$</td>
</tr>
<tr>
<td>$R^2_{adj} = 0.30$</td>
<td>Purchase frequency $-0.03$ $-0.37$*** $1.02$</td>
</tr>
<tr>
<td>$R^2$ change = 0.012</td>
<td>Purchase volume $-0.29$ $-5.12$*** $1.31$</td>
</tr>
<tr>
<td>$F_{change(1,220)} = 3.74$*</td>
<td>Perishability $0.33$ $5.00$*** $2.34$</td>
</tr>
<tr>
<td></td>
<td>Procurement channel $0.22$ $1.41$* $1.01$</td>
</tr>
<tr>
<td></td>
<td>Perishability X $-0.17$ $-1.94$* $2.06$</td>
</tr>
</tbody>
</table>

Notes: Dependent variable: supplier opportunism (OPPORT); ns not significant; mean centred variable; * significant at p < 0.05; ** significant at p < 0.001.

4.2 Hypotheses testing

As hypothesised in H1, the results demonstrate that there is a significant and positive association between the degree of perishability and supplier opportunism ($b = 0.33$, $t = 5.00, p < 0.001$) and, hence validates H1.

The objective of the second hypothesis (H2) was to examine whether the choice of procurement channel would modify the effect of perishability on supplier opportunism. The empirical findings from the estimated MMR model (model 3) show that the effect of the interaction term (PERISHXPROCHANNEL) on supplier opportunism (OPPORT) is
significant and negative \((b = -0.17, p < 0.05)\). This finding demonstrates that there is a significant difference in the effect of perishability on supplier opportunism across food processors that procure their produce from the farm (direct procurement channel) and those who procure their produce from wholesalers and retailers (indirect procurement channel).

The moderating effect of the choice of procurement channel was further probed by running the partial derivative of the estimated MMR model (model 3 in Table 3) and obtained equation (2). This partial derivative equation was then used to examine the effect of the degree of perishability on supplier opportunism among the food processor that use direct procurement channel and those who use indirect procurement channel.

\[
\frac{\partial \text{OPPORT}}{\partial \text{PERISH}} = 0.33 - 0.17 \times \text{PROCHANNEL}
\]  

(2)

In the analysis of moderating variables, the main effect of a variable entering an interaction term express the effect of this variable on the dependent variable when the value of the variable in the interaction term is zero. Hence, the effect of perishability on supplier opportunism is 0.33 when the value of procurement channel is zero \((\text{PROCHANNEL} = 0)\) in equation 2, and this corresponds to the indirect procurement channel situation. When we consider direct procurement channel \((\text{PROCHANNEL} = 1.00)\), the association between perishability and supplier opportunism \((\text{OPPORT})\) becomes:

\[
\frac{\partial \text{OPPORT}}{\partial \text{PERISH}} = 0.33 - 0.17 \times 1 = 0.16
\]

This finding strongly supports H2, and demonstrates that the effect of perishability on supplier opportunism is significantly reduced by 0.17 \((t = 1.94, p < 0.05)\) and holds a value of 0.16 when we consider direct procurement cases (confer the slope analysis in Table 4).

Table 4  Slope analysis with procurement channel \((\text{PROCHANNEL})\) as a moderator

<table>
<thead>
<tr>
<th>Procurement channels</th>
<th>(\frac{\partial \text{OPPORT}}{\partial \text{PERISH}} = 0.33 - 0.17 \times \text{PROCHANNEL})</th>
<th>Indirect procurement channel = 0</th>
<th>Direct procurement channel = 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>The effect of PERISH ((b)) ((t)-values)</td>
<td>0.33 ((t = 5.22)***)</td>
<td>0.16 ((t = 2.92)**)</td>
<td></td>
</tr>
</tbody>
</table>

Notes: **Significant at \(p < 0.01\); ***significant at \(p < 0.001\).

In line with the slope analysis and using the same control variables, we ran two independent regression models, one for direct procurement \((\text{PROCHANNEL} = 1)\) and the other for indirect procurement \((\text{PROCHANNEL} = 0)\) as indicated in Table 5. The results of this analysis coincide completely with the interaction effect analysis above, and show that the effect of perishability on supplier opportunism is more positive and significant in indirect procurement \((b = 0.30, t = 4.94, p > 0.001)\) than in direct procurement \((b = 0.18, t = 2.46, p < 0.01)\), providing further support for the moderating effect of procurement channel.
The effects of the degree of produce perishability

Table 5  Separate regression analysis of direct and indirect procurement channels

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Direct procurement channel (n = 130)</th>
<th></th>
<th>Indirect procurement channel (n = 97)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unstandardised coefficients (b)</td>
<td>t-values</td>
<td>Unstandardised coefficient (b)</td>
<td>t-values</td>
</tr>
<tr>
<td>Constant</td>
<td>8.20</td>
<td>6.02***</td>
<td>9.60</td>
<td>7.51***</td>
</tr>
<tr>
<td>Perishability</td>
<td>0.18</td>
<td>2.46**</td>
<td>0.31</td>
<td>4.94***</td>
</tr>
</tbody>
</table>

Control variables:
- Relation duration: –0.14 –0.76 0.05 0.34
- Purchase frequency: 0.00 0.01 –0.11 –0.84
- Purchase volume: –0.26 –3.13*** –0.35 –4.53***

Model summary:
- Sample size: 130 97
- F-values: 6.73*** 23.31***
- R²Adjusted: 0.15 0.48

Notes: Dependent variable: Opport, **p < 0.01 (one-tailed), ***p < 0.001 (one-tailed).

4.2.1 The effect of control variables

The MMR model (model 3 in Table 3) reveals no significant effects of relationship duration (b = –0.06, t = –0.48) and purchase frequency (b = –0.03, t = –0.37) on supplier opportunism. Purchasing volume shows a significant negative association with supplier opportunism (b = –0.29, t = –5.12, p < 0.01) and this demonstrates that the purchase of large volume from the same source reduces the supplier’s inclination to opportunistic behaviours.

5 Discussion, implications and conclusions

5.1 Theoretical implications

The objective of this study was to investigate the effect of product perishability on supplier opportunism. Moreover, we have investigated the interplay between perishability and the choice of procurement channel. The study provides valuable extension to the TCT by considering the characteristics of transacted products.

The risk of opportunism is generally present in any exchange relationship and, therefore, cannot be ignored (Hutchinson et al., 2012), and when opportunism arises tend to cause a number of negative consequences such as eroding firm’s competitiveness, performance and potential gains. Thus, to increase the understanding of this behaviour, some researchers have explored possible antecedents to opportunism and proposed several factors, including specific investments (Rokkan et al., 2003; Wang et al., 2013), behavioural uncertainty (Wang et al., 2013), technological uncertainty (Handley and Benton, 2012), and unresolved conflicts among transacting partners (Kang and Jindal, 2015). However, the aforementioned factors are not exhaustive, hence the need for more research in this area, particularly on the contextual variables such as characteristics of
transacted products (Chen et al., 2016; Rindfleisch et al., 2010). In this regard, our study has extended knowledge on the antecedents of opportunism by considering the perishability characteristic of produce.

Although several studies have long used the argument of opportunism in building argument for the influence of the degree perishability on vertical coordination and control (Knoeber, 1983; Lo, 2010; Masten, 2000), our study has contributed knowledge to these studies by demonstrating empirically that the degree of perishability increases the likelihood of supplier opportunism.

The drivers that influence opportunism and the means of controlling such behaviour are two opposing forces that exist simultaneously; That is, when the level of factors that drive opportunism increases, the control of such behaviour becomes relevant. In this regard, the drivers and control of opportunism need to be studied simultaneously (Wang et al., 2013).

As a matter of fact, several research contributions have considered possible drivers of opportunism and control mechanisms concurrently (e.g., Rokkan et al., 2003; Wang et al., 2013), and suggested several means of controlling such behaviour, including different kinds of relational norms such as the norm of solidarity and relationship extendedness (Rokkan et al., 2003), social interaction, trust and shared values (Wang et al., 2013), and monitoring.

Our study contributes, on the other hand, unique knowledge on the mechanisms for controlling opportunism by demonstrating that the choice of procurement channel can be used as a mean for controlling supplier opportunism. In other words, as the degree of perishability increases, food processors can reduce the level of information asymmetry, quality uncertainty and performance ambiguity which increase the likelihood of supplier opportunism by sourcing their produce directly from the farm. Moreover, direct procurement from the farm enables food processors to make in-farm control of products, production processes and logistics in order to attenuate opportunistic behaviour.

5.2 Methodological implications

The main methodological contribution of this study concerns the operationalisation of the perishability concept. Although a number of studies have discussed the effect of perishability in economic transactions (e.g., Knoeber, 1983; Lo, 2010; Masten, 2000), generally limited efforts have been directed to the measurement of this concept. Some studies from the service industry (e.g., Cloninger and Oviatt, 2006; Lievens and Moenaert, 2001), and some contributions from the food industry (e.g., Wansink, 1994) have tried to measure this concept. However, those operationalisations are rather industry-specific, and less applicable to the manufacturing industry. In this regard, our study has conceptualised perishability more universally, and as a multi-dimensional construct with a rather comprehensive scale (see Appendix 1) that needs to be tested further in future studies.

5.3 Managerial implications

The managerial implication of this study concerns the perishability of agricultural produce and possible control mechanisms of opportunism. First, the study serves as a precaution to practitioners and other buyers in the food industry by stating that when
The effects of the degree of produce perishability

Dealing with highly perishable produce, the likelihood of supplier opportunism increases considerably because of measurement difficulties.

Second, food processors might deal with the problem of supplier opportunism by the choice of procurement channel. In the transaction of produce with low degree of perishability such as grains, purchasing of produce outside the farm should not pose opportunism problems to food processors because performance ambiguities and measurement problems are rather limited. Thus, as demonstrated in Figure 2 (see Appendix 2), when the degree of perishability of produce is low, the food processor is better off by purchasing the produce off the farm, from wholesaler or retailers. Moreover, the competition among sellers could serve as a safeguarding mechanism against possible supplier opportunism.

On the contrary, when the degree of perishability of produce is high, the competition among supplier becomes inefficient in limiting opportunism because of the measurement difficulties associated with such produce. In this regard, food processor may limit the likelihood of opportunism by purchasing the produce directly from the farm. At the same time, within-farm buyer monitoring and control of produce, production processes and logistics can be implemented.

In the developing countries’ context, opportunistic behaviours such as concealment or over-declaring the quality of produce are widely reported among suppliers of agricultural produce, particularly perishable produce (Poulton et al., 2010). Nevertheless, most of the food processors are small (nearly 74% fall under this category), and have inadequate skilled labour and poor food processing and quality screening technology (Mushobozi, 2010). Therefore, controlling opportunism by buying directly from the farm becomes even more relevant in this environment. Also, the decision to use direct procurement channel may reduce the likelihood of opportunism to small firms without investing considerable amounts of resources in quality screening technologies.

5.4 Conclusions and limitations

The findings of our analysis have resulted into two unique theoretical contributions. First, this study has provided empirical evidence regarding the influence of the degree of perishability on supplier opportunism. Second, this study has demonstrated that the choice of procurement channel can be used as a control mechanism as it reduces the effect of perishability on supplier opportunism in direct procurement channel than in indirect procurement channel. In terms of methodological implications, our study has provided the measurements for perishability in the manufacturing industry.

In the managerial aspect, our paper has raised a precaution about the potential for opportunism in the transactions involving perishable produce, and has suggested choosing an appropriate procurement channel as a possible control mechanism, particularly for food processors, who lack appropriate resources to control quality of produce before they buy.

This study has several limitations, some of which affect generalisability whereas others represent avenues for further research in this area. First, this study has focused on small food processors in Tanzania, most of which lack technologies for screening the quality of the produce prior to buying them. Therefore, the use of direct procurement channel as means for reducing opportunism in the transactions of perishable produce appear appropriate for these small firms. However, this finding cannot be generalised to
firms with technology capability to screen the quality of produce before they purchase them as they can determine the quality of produce beforehand even when they depend on indirect procurement channels and, therefore, reduce the potential for opportunism.

Second, the degree of perishability exaggerates hold-up problems for both suppliers and buyers (Knoeber, 1983; Masten, 2000). As this study has considered only supplier opportunism, further research can consider both buyer opportunism and supplier opportunism to explore this issue further.

Lastly, there are number of means, which might be used to reduce the likelihood of opportunism. This study has considered only the choice of procurement channel. Further research on the possible contingent effects of other mechanisms for reducing opportunism is desirable. For instance, future research can consider the moderating effect of quality screening technology, relational norms, process control, output control and the duration of relationship between food processor and their suppliers.

References


The effects of the degree of produce perishability


The effects of the degree of produce perishability


Appendix 1

Measurement items and some validity assessment

<table>
<thead>
<tr>
<th>Scales</th>
<th>Sample of items: Response format: 7 points Likert scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of perishability:</td>
<td>PERISH1: It is very difficult to store this produce for later processing (0.94).</td>
</tr>
<tr>
<td>PERISH: 6 items</td>
<td>PERISH2: This produce is easily damaged by overloading of vehicles during transportation from the farm to the processing facility (0.90).</td>
</tr>
<tr>
<td>$\chi^2(9) = 6.285, $</td>
<td>PERISH3: The quality of this produce is significantly affected by transport delays from the farm to the processing facility (0.92).</td>
</tr>
<tr>
<td>$p = 7.1,$</td>
<td>PERISH4: The taste of this produce is significantly affected by processing delays (0.87).</td>
</tr>
<tr>
<td>GFI = 0.99</td>
<td>PERISH5: This produce become stale quickly (0.92).</td>
</tr>
<tr>
<td>CFI = 1.00</td>
<td>PERISH6: The quality of this produce is significantly affected by variations in temperature (0.72).</td>
</tr>
<tr>
<td>RMSEA = 0.000</td>
<td></td>
</tr>
<tr>
<td>Supplier opportunism:</td>
<td>OPPORT1: We are susceptible to deceitfulness about the quality of this produce when we buy from this seller/farmer (0.54).</td>
</tr>
<tr>
<td>OPPORT: 4 items</td>
<td>OPPORT2: Sometimes this seller/farmer lies about quality of this produce for his/her interest (0.89).</td>
</tr>
<tr>
<td>$\chi^2(2) = 3.05, $</td>
<td>OPPORT3: Sometimes this seller/farmer does everything within his/her means to gain more from the sale of this produce (0.97).</td>
</tr>
<tr>
<td>$p = 0.22,$</td>
<td>OPPORT4: Sometimes this seller/farmer exaggerates the quality of this produce in order to gain more from the sale of this produce (0.96).</td>
</tr>
<tr>
<td>GFI = 0.993</td>
<td></td>
</tr>
<tr>
<td>TLI = 0.996</td>
<td></td>
</tr>
<tr>
<td>CFI = 0.999</td>
<td></td>
</tr>
<tr>
<td>RMSEA = 0.048</td>
<td></td>
</tr>
</tbody>
</table>

Procurement channels
Your most important source of produce

Duration of relationship
How long have you been buying this produce from this seller/farmer?
Years:__________
**The effects of the degree of produce perishability**

**Purchase frequency**
How often do you buy the produce you have mentioned in this questionnaire from the seller/farmer that accounts for the largest proportion of your purchase?

- Per month: _____________________
- Per year: _____________________

**Purchase volume**
How much of the produce you have mentioned in this questionnaire do you buy on average?

- Per month: ___________ Tsh
- Per year: ___________ Tsh

---

**Appendix 2**

**Supplier opportunism for different levels of perishability**

**Figure 2** Contingent effect of procurement channel (see online version for colours)

Note: Line AB stands for direct procurement channel and line CD stands for indirect procurement channels.