Asset specificity, relational governance, firm adaptability and supply chain integration

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Abstract

Purpose – This study investigates how asset specificity, relational governance and firm adaptability relate with supply chain integration (SCI), considering selected food processing firms (FPFs) in Uganda.

Design/methodology/approach – This study applies a quantitative research methodology. This research draws on a sample of 103 FPFs that have been selected from a population of 345 FPFs located in Kampala district. Hypothesis testing was done using Smart PLS version 3.

Findings – Asset specificity has a significant positive relationship with SCI, and firm adaptability partially mediates this relationship. Also, there is a full mediation impact of firm adaptability on the relationship between relational governance and SCI.

Research limitations/implications – This study focused on perceptual measures to get responses from managers on the level of integration with key suppliers and customers, yet firms deal with a number of suppliers and customers.

Originality/value – This study contributes to existing literature on SCI by applying the transaction cost theory. The study focuses on the influence of asset specificity, relational governance and firm adaptability on SCI in the food processing sector. Literature on relational governance in supply chain using the transaction cost theory remains scanty. Few studies have also focused on firm adaptability as a mediator in the FPS with specific focus on Uganda, yet the sector is highly faced with uncertain events. The uncertain events in the sector and in developing countries call for adaptive strategies. Additionally, this study is the first to use firm adaptability to mediate the influence of asset specificity and relational governance on SCI more so in a developing country like Uganda where the FPS is one of the most important in the economy.

Keywords Supply chain integration, Asset specificity, Relational governance and firm adaptability

Paper type Research paper

Introduction

The advent of the Corona Virus Disease pandemic in 2019 (COVID-19) that swept across the globe affected many firms whose operations depended on materials from China and India (Zhu *et al.*, 2020). Uganda and other Sub-Saharan countries were greatly affected because most of the companies depend on materials from countries that were greatly affected by the pandemic (Lakuma *et al.*, 2021; Kansiime *et al.*, 2021). However, some firms that worked with their suppliers and customers through integration survived the wave as they continued to harvest big in the business space (Marshall *et al.*, 2020; Gu *et al.*, 2020). Haier is one of those firms that integrated with its external partners through information technology (IT) to quickly respond and maintain a stable customer service (Gu *et al.*, 2020). During that phase, there was change in customers' tastes and preferences for innovative products with a shorter

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life cycle (Tiwari, 2021). This posed as a wakeup call to many firms that integrating with trading partners is strategic to achieve desired goals both at firm level and on the global scene (OECD, 2020; United Nations, 2017: SDG17).

Supply chain integration (SCI) is the firm's ability to align its internal supply chain functions to those of their external partners for purposes of achieving mutual objectives (Wei *et al.*, 2020). The aim is to reduce environmental and behavioral uncertainties (Jambulingam and Kathuria, 2020; Williamson, 1985). The outcome of SCI is partner's ability to share information, collaborate and coordination of tasks both internally and externally. In Uganda, the drive could be as a result of volatile market with increasing demand for most fast-moving consumer goods.

Globally, there is need for SCI studies to be conducted in developing countries due to an observed decline between 2019 and 2020 in a systematic literature review by Tiwari (2021) and Khanuja and Jain (2020). Tiwari (2021) recommends SCI to be studied focusing on the application of technology. It however appears like the small-scale nature of operations of most supply chain partners coupled with limited capital to invest in technology may be a major challenge to this move (Kalubanga and Namagembe, 2021). This means that firms in developing economies require a lot of effort to achieve SCI (Kanyoma *et al.*, 2020) since SCI has been viewed as an IT concept (Ganbold *et al.*, 2020; Tiwari, 2021). This study however believes that SCI can be studied as both a relationship-based concept (Agarwal and Narayana, 2020; Chenini *et al.*, 2020) and an IT concept to draw an understanding of which of the two is more suitable to Uganda in uncertain situations.

However, the existence of informal relationships among food processing firms (FPF) in Uganda could be a threat to SCI (Schipmann-Schwarz *et al.*, 2015). Informal arrangements are associated with incomplete and asymmetric information due to limited trust (Saka-Helmhout *et al.*, 2020; Nguyen *et al.*, 2019). The end result has been an emergency of costly transactions (Akidi *et al.*, 2022; Ouma *et al.*, 2016). In addition, the dairy sector remains underdeveloped with insufficient milk collections resulting in low-capacity utilization below the installed capacity. For instance, Sameer Agriculture Livestock Limited (SALL) which is the market leader in the dairy sector though with the highest capacity utilization continues to operate between 170,000 and 375,000 liters per day (30–68%) which is far below the installed capacity of 550,000 liters per day. This has been brought about by poor coordination and low information sharing between farmers and the processors (Abdulsamad and Gereffi, 2016). Ouma *et al.* (2016) further reported delayed payment and limited finances among pig farmers which hinder meaningful business relationships (Shevchuk and Strebkov, 2018). Such supply chain practices inhibit integration (Kanyoma *et al.*, 2018).

The location of most FPF in Uganda could also be a contributing factor limiting SCI. High transport costs have been noted due to geographical dispersion between most processors and farmers limiting access to market information and other resources (World Bank, 2018; Schipmann-Schwarze *et al.*, 2015). Limited investment has been noted in storage facilities, milk graders and transport facilities as milk continues to be transported in non-refrigerated trucks (Abdulsamad and Gereffi, 2016). Such aspects make supply chain operations costly (Ciliberti *et al.*, 2020).

The transactional cost theory (TCT) recommends investing in specific assets as a way to deal with costly transactions (Williamson, 1985, 1999) and also relational governance to handle conflicts that may arise (Galanter, 1981; Commons, 1932). This brings in the concept of vertical integration as firms try to manage processes end-to-end (Shukor *et al.*, 2021; Williamson, 1983). However, vertical integration creates a complex web of many supply chain partners leading to limited visibility and increased forecasting error (Christopher, 2011). For example, the dairy sector has a number of players ranging from farmers, middlemen, traders both retailers and wholesalers, bulking centers and processors thus making coordination difficult (Abdulsamad and Gereffi, 2016). Based on Mutebi *et al.* (2020), and Garrido-Vega *et al.*

(2021), this research assumes that in such uncertain situations, firms may develop adaptive strategies. Therefore, the study intends to focus on SCI in the food processing sector (FPS) through asset specificity, relational governance and firm adaptability which have not been sufficiently explored. This also follows recommendation that studies on food SCI be extended to other countries (Ramirez *et al.*, 2021).

The paper is structured as follows, the next section focuses on theoretical and literature reviews, followed by research methods and research findings, conclusions and areas of further research.

Theoretical review

Transaction cost theory

The TCT traces its development between 1930 and 1970 in the works of Commons (1932) and Coase (1937, 1991, and 1992). Williamson (1971) built on previous scholars and introduced the concept of vertical integration through asset specificity to deal with opportunistic behavior. This requires that the firm invests in resources that are specific to the transaction and can't be duplicated in the market by either competing firms or focal firm's immediate actors (Williamson, 1981). Investing in specific assets produces complex *ex ante* incentive responses and also gives rise to complex ex-post governance structures. This is the source of costs such as bargaining costs, measuring supplier's product, monitoring costs, performance and compliance standard and offering support to immediate actors at the expense of the focal firm (Williamson, 1985).

The TCT emphasizes that the ability to reduce costs is embedded in the use of relational governance mechanisms like applying business judgment rules, the law of forbearance, arbitration, and other cooperative arrangements (Williamson, 1996a, b). Commons (1932) and Coase (1937) advanced that relationships are important in any transaction. These should however be taken on with caution because they are associated with transaction disputes (Commons, 932). Conflicts are as a result of overlap in objectives (Ketokivi and Mahoney, 2020).

In line with the TCT, scholars have emphasized that the theory spells out how buyer–supplier conflicts can be addressed through building relationships (Ketokivi and Mahoney, 2020) based on problem solving techniques (Wacker *et al.*, 2016). These are referred to as idiosyncratic investment (Anderson and Weitz, 1992). Supply chain partners can employ collaborative mechanisms (Kumar *et al.*, 2017a, b; Nelson *et al.*, 2015, 2016). On the contrary, managing relationships is complex because every firm comes with different objectives and interests, increasing the transactional costs of monitoring and coordination (Williamson, 1985) calling for adaptive strategies.

The TCT is a theory of governance (Williamson, 1991). In this study, asset specificity and relational governance will be taken as governance mechanisms upon which firms can rely on to manage costly transactions.

Hypotheses development

Effect of asset specificity and supply chain integration

In predicting SCI using asset specificity, the focus has over the years been on human specificity, dedicated specificity and location specificity (Wang *et al.*, 2019). This study will also adopt the above measures to study asset specificity. Over the years, SCI has widely been studied using the resource-based view (RBV) with few studies using TCT (Khanuja and Jain, 2020). One of the reasons for using the RBV and not TCT in previous studies has been that; firms have always been viewed as bundles of resources that are distributed heterogeneously across making them competitive (Wang *et al.*, 2020). Secondly, it could

have been because the two theories are complementary (Rao, 2003; Silverman, 1999). However, much as the two theories are complementary, it's important to note that using TCT, firms are in position to understand that SCI goes beyond looking at the resources that are used in integration and also focuses at the costs related to the process like bargaining, contracting and monitoring their usage (Williamson, 1985; Wang *et al.*, 2020). The end result of understanding how firms interact with other external players is better explained if a firm is able to reduce cost. Gligor and Holcomb (2014) using relational view recommended that SCI be studied focusing on asset specificity to draw an understanding of how it reduces cost. When firms integrate, they achieve improved forecasts leading to low transactional cost (Huang and Huang, 2018; Mandal *et al.*, 2017). They do this by investing in specific assets that cannot easily be duplicated in the market by opportunistic partners (Williamson, 1985). Also, the use of TCT has been recommended in understanding the costs that come with SCI (Amoako *et al.*, 2020). In line with Amoako *et al.* (2020), it is for that reason that the RBV has been contested for failing to explain how it makes firms competitive in a dynamic market (Rajaguru and Matanda, 2019). Such findings and controversies have opened space for TCT in this study.

Investing in specific assets such as technology (dedicated specificity) is critical in sharing information (Yu *et al.*, 2021; Kanyoma *et al.*, 2020). These range from use of technology such as mobile computers, Internet devices, smartphones and tablets (Lakuma *et al.*, 2020). The challenge with the use of technology is if a trading partner operates a paper-based system leading to some information being shared outside the formal systems (Kanyoma *et al.*, 2020). The use of IT based integration has also been resisted by most small medium firms that cannot afford system installation (Wan *et al.*, 2020). However, to achieve acceptability, firms should ensure complementarity and compatibility of their internal resources to those of the external partners (Kanyoma *et al.*, 2020).

Though the use of technology has been the perception, SCI is also a behavioral concept (Kanyoma *et al.*, 2018, 2020). Therefore, physical interaction between firms is relevant in achieving integration (Chou *et al.*, 2018). Skills and competencies are acquired through training and are relevant in accomplishing tasks (Song and Song, 2021). Having the right skills and competencies aligned to your operations enhances collaboration through improved communication (Maltz, 2017; Al-bizri and Gray, 2014). These form a strong team that is necessary in structuring processes (Ataseven *et al.*, 2020). Because most partners cannot afford certain resources, inter firm sharing is vital (Davis and Cobb, 2010; Vaaland and Heide, 2007). This allows cheaper, faster and more reliable communication to be achieved.

In addition, through location specificity firms hold frequent face-to-face meetings, quickly introduce products to the market (Harland *et al.*, 2007; Huo *et al.*, 2014). Internally, when operations and interlinked functions are located in closer proximity, it reduces on unnecessary movements (Claassen *et al.*, 2007). This enhances sharing of market intelligence information about sales status (Statsenko *et al.*, 2018).

However, though assets have been found to have an influence on the level of integration, the issue of trust remains central in reducing opportunism where one partner is dealing with more than two competing firms (Li *et al.*, 2018; Hernández-Espallardo *et al.*, 2010). This is to ensure that any information given out does not end up with competitor firms (Kanyoma *et al.*, 2018). From this discussion, the first hypothesis has been developed as reflected below.

H1. Asset specificity has positive significant effect on SCI.

Relational governance and supply chain integration

Relational governance is operationalized using negotiation efficiency and joint problem solving (Wacker *et al.*, 2016). There has been an increase in literature on studies focusing on relational governance. However, few scholars have studied it using TCT (Wacker *et al.*, 2016;

Eckerd and Sweeney, 2018) despite recommendations by Geyskens *et al.* (2006). Many have used the resource-based view (Khanuja and Jain, 2020) and relational view (Zhu *et al.*, 2022). Their usage has been geared by how to involve partners' in order to tap into the scarce resources (Attia, 2018). The focus has also been on building cooperation and teamwork (Prajogo *et al.*, 2016; Cao and Zhang, 2011). However, this comes with a cost as it involves a lot of monitoring, negotiation and enforcement (Dyer, 1997). According to Williamson (1991, p. 278), although it is in the collective interest of exchange parties to fill gaps, correct error, and effect efficient realignments, it is also the case that the distribution of the resulting gain is indeterminate.

Furthermore, much as negotiation studies have been done in the supply chain field, their focus has not been on the effect of negotiation efficiency on shared outcomes (Chen *et al.*, 2020; Nagarajan and Bassok, 2008). This study addresses this void in literature by focusing on various scholars in the area of negotiation to draw an understanding of negotiation efficiency (Zhang *et al.*, 2021). Negotiation efficiency is where the parties to the negotiation exercise calmness, open minded attitude, care towards each other and agreeableness resulting in shared benefits (Shacham *et al.*, 2021).

For SCI to take place, negotiators must have empathy towards each other and avoid deadlocks in negotiations by adopting accommodative strategies (Nelson *et al.*, 2015, 2016). They should ensure emotional regulation, self-confidence, agreeableness, understanding each other's interest, giving in and being open minded which allows them to share information (Shacham *et al.*, 2021). Positive mindset results in sharing of information (Yao and Brett, 2021). Cost related information is shared which reduces haggling between firms during the integration process (Chen *et al.*, 2020). Trust, commitment and relationship value result into shared outcome (Thomas *et al.*, 2015). Trust acts as a base upon which partners open up to share information and coordinate processes (Wang *et al.*, 2020; Dietrichson and Bukh, 2020).

Negotiation will result in better outcomes when the issues are many (Thompson *et al.*, 1988). However, this position has been contested on grounds that it may drag the negotiation for SCI (Laubert and Geiger, 2018).

Furthermore, market uncertainties result into costly transactions (Williamson, 1975, 1985). The end result has been outbreak of conflicts (Ketokivi and Mahoney, 2020). In such situations, firms can adopt problem solving approaches (Grovera and Malhotra, 2003). Joint problem solving is a situation where parties to a transaction dispute communicate and share information (Clemons *et al.*, 2020). The ability to jointly solve problems results into collaborative practices that allow partners to share information with each other (Lewicki *et al.*, 2020; Fousiani *et al.*, 2021). From the above discussion, the hypothesis below has been developed.

H2. Relational governance has a positive significant effect on SCI.

Firm adaptability and supply chain integration

Increasing uncertainties in the supply chain has pushed many firms to adopt adaptive strategies (Jambulingam and Kathuria, 2020; Garrido-Vega, 2021). In this study, firm adaptability is measured by the ability of the partners to learn from each other and other events as they unfold and the level of flexibility exhibited by a partner in uncertain situations. Being adaptive requires that firms learn new ways of doing things (Lee *et al.*, 2019). Adaptability has been found to have an impact on the coordination practices (Mutebi *et al.*, 2020) and also flexibility (de Leeuw *et al.*, 2013). Therefore, firms quickly meet the market demands (Lisi *et al.*, 2020) by making adjustments (Despoudi *et al.*, 2018). Supply chain disruptions are avoided (Chen *et al.*, 2022) by sharing information (Lisi *et al.*, 2020; Selviaridis and Spring, 2018).

Adaptive supply chains are those that learn from other players through interactions by unlearning (Silvestre *et al.*, 2020; Matsuo, 2018). Learning is a critical driver of information sharing within a supply chain network (Kumar *et al.*, 2020; Lisi *et al.*, 2020). It reduces ambiguity and uncertainty leading to sharing of information (Yang *et al.*, 2001). It is however assumed that learning can happen at any stage. That is either before integration, during integration or after integration (Silvestre *et al.*, 2020).

The second measure of firm adaptability is flexibility. It refers to one's ability to make changes in production levels. Literature on flexibility in supply chain has been limited (Yi *et al.*, 2011). It has been more pronounced in the economics (Devereux and Engel, 2003) and organizational fields (Golden and Powell, 2000). It is therefore not surprising that its inclusion in supply chain literature has been recommended over the years (Sheel and Nath, 2019). This has been because SCI practices like cooperation inside the organization improve the way tasks are accomplished and enable machines to quickly switch production to different product lines as orders come in from different customers (Khalaf and El Mokadem, 2019). The ability of suppliers to reconfigure tasks in a supply chain is therefore critical in achieving linkages in the supply chain allowing coordinate and information sharing to take place (Soon and Udin, 2011). It should however be noted that when firms maintain high volumes (volume/product flexibility), it becomes difficult to integrate with their trading partners who chose to trade in a specific product (Rajaguru and Matanda, 2019). From the above discussion, our third hypothesis has been developed as shown below.

H3. Firm adaptability has a significant positive effect on SCI.

Asset specificity and firm adaptability

Investing in superior and rare assets makes members adaptive through their social interaction (Chen and Garg, 2017). Such assets include technology (Shukor *et al.*, 2021), firm location (Chen *et al.*, 2022) and human specificity (Palacios *et al.*, 2014; Ramish and Aslam, 2016).

The ability to respond to such changes is embedded in the firm's ability to invest in rare facilities. This allows individual firms to learn because they have the confidence that the information provided via the system is accurate and can be trusted (Yang *et al.*, 2001). It is however believed that individuals learn through observation and therefore, the use of the Internet limits learning to take place (Polanyi, 1966; Yang *et al.*, 2001). Uganda is characterized with poor transportation and network infrastructure and this could limit interaction and flexibility of firms to quickly make adjustments (Obwona *et al.*, 2014; Tukamuhabwa *et al.*, 2017).

Skills and competencies possessed by actors allow problem identification and avoidance of forecast errors (Palacios *et al.*, 2014; Ramish and Aslam, 2016). Learning new ways of doing things in an organization is embedded in the level of trust that individuals have developed and will not act opportunistically but rather share information (Hernández-Espallardo *et al.*, 2010). Most employees in Uganda however have inadequate skills that could affect the firm's responsiveness (Obwona *et al.*, 2014; Tukamuhabwa *et al.*, 2017). Training has not been greatly emphasized among FPF in Uganda and this has affected interaction and sharing market information (Rivera and Pfeiffer, 2018; Toye, 2012).

The location of a firm and its trading actors has an impact on the level of learning (Chen *et al.*, 2022). Accordingly, when suppliers and customers are located near the focal firm, they learn from the network. The above analysis of literature has resulted into the hypothesis below.

H4. Asset specificity has a significant positive effect on firm adaptability.

Relational governance and firm adaptability

Creating relationships with trading partners is one of the ways through which firms leverage on to be adaptive especially in situations of technology uncertainty. Firms are in position to adjust to the market dynamics by building relationships with their trading partners (Mak and Shen, 2021). Pulles and Loohuis (2020) posit that where the focal firm shows willingness to agree on certain interests of the trading partner, the trading partner is also willing to adapt and be flexible in their demands. Caputo *et al.* (2019) contends that the way negotiations are conducted between firms has an impact on flexibility. In an environment where partners have a positive attitude towards each other, confidence is built and this encourages learning to take place (Dietrichson and Bukh, 2020).

On the contrary, Mintu-Wimsatt and Calantone (1996) advances that the success of any negotiation depends on how flexible the negotiators are to the issues presented and their ability to accommodate each other's behaviors.

Joint problem solving as a collaborative strategy has been found to have an influence on the firm's flexibility because of its ability to resolve conflicts and to allow firms to plan ahead of time (Hopkins and Yonker, 2015). In supply chain literature, once firms jointly solve conflicts, the level and ability of learning from each other increases (Vollmer, 2015). According to Peters *et al.* (2010), firms collaborate by jointly solving problems to allow learning to take place. Besides, Liu *et al.* (2021) believes that the ability to learn new ways of doing things implies that partners are collaboratively working together. Pulles and Loohuis (2020) also posit that joint problem solving based on openness makes trading partners adaptive because of shared learning. The above contradictory discussion leads to the hypothesis below.

H5. Relational governance has a significant positive effect on firm adaptability.

The mediation effect of firm adaptability on the relationship between asset specificity and supply chain integration

Literature on adaptability is on the increase in the supply chain, though not necessarily as a mediator (Garrido-Vega *et al.*, 2021; Mutebi *et al.*, 2020). Those that have attempted to study it using flexibility dimension as a mediator have anchored their research in other sectors like the fashion industry where the sector is driven by emerging trends (Irfan *et al.*, 2020). The concept of flexibility in the supply chain traces its roots in manufacturing literature by Koste and Malhotra (1999).

Asset specificity has been found to have a positive effect on SCI through its synchronization abilities (Sheel and Nath, 2019; Maltz, 2017). Information technology is relevant in collaborating with trading partners through faster sharing of information and adaptability provides the flexibility needed (Ketchen and Hult, 2007). Such systems result in information sharing (Liao, 2020).

Firms can easily integrate with suppliers and customers by focusing on location specificity (Bennette and Klug, 2012). The firm's locations puts it in an adaptive position especially where a firm critically analyses the post SCI opportunities (Aslam *et al.*, 2018).

When trading partners are located very far from the focal company, the pressure to adapt and cope up with the market changing conditions is high (Jean *et al.*, 2021).

The use of assets like IT is relevant in creating flexible process to allow coordination take place (Sheel and Nath, 2019) and also improve communication across firms (Mandal *et al.*, 2017). However, with ever changing technologies on the market, firms need to quickly manage the transition (Wang and Wei, 2007). The above discussion resulted into the hypothesis below.

H6. Firm adaptability mediates the positive relationship between asset specificity and SCI.

The mediation effect of firm adaptability on the relationship between relational governance and supply chain integration

The best and most efficient supply chains are not only those that reduce costs through having quality relationships with trading partners but also those that are able to adjust to the changes in the market (Wang and Wei, 2007). Accordingly, firms must invest more in developing relationships with their trading partners because it enhances flexibility in their supply chains to handle uncertainties that arise with the absence of an integrated supply chain.

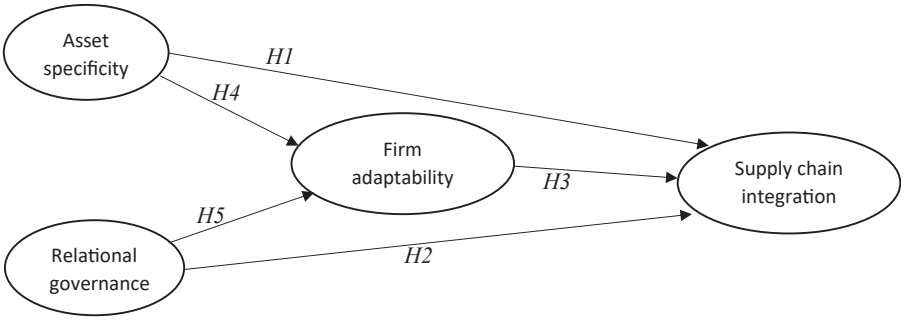
Negotiation efficiency assumes that trading partners who come to the negotiation with an open mind or encourages others to be open minded encourage flexibility and learning from each other. An open-minded negotiator learns and shares information with others (Zheng *et al.*, 2019). Smirnova *et al.* (2018) also emphasizes that learning is an ingredient in the process of interaction. Firm adaptability ensures that partners are flexible and ready to learn which results in sharing information without being influenced (Nifadkar *et al.*, 2019).

Negotiations are found to result into conflicts. However, after conflict resolution and learning, firms are able to interact by sharing information, resources and objectives (Kumar *et al.*, 2017a, b). Accordingly, joint problem solving provides firms with an environment through which they can adjust their process to allow sharing of information to thrive. External and internal partners will also be confident where they are involved in the operations of the firm like planning, decision making and implementation and this is the start of collaborative relationships (Ramanathan and Gunasekeran, 2014). This allows them to learn and identify areas where flexibility is needed. From the above discussion, the last hypothesis has been developed (see Figure 1).

H7. Firm adaptability mediates the positive relationship between relational governance and SCI.

Methodology

This section covers the study context, research design, population and sample, sampling frame, instrument and data collection, measurement of variables, validity and reliability and descriptive statistics.



Source(s): Williamson (1983, 1996a, b), Galanter (1981), Coase (1937), Ketokivi and Mahoney (2020), Shukor *et al.* (2020)

Figure 1.
Conceptual framework

Study context

The study was carried out among FPFs in Kampala District. Based on the UBOS statistics (2012), Kampala is the hub for most FPF in the country. The FPS comprises fish and meat processing, manufacturers of bakery products, vegetable and animal oil processing, processing and preserving of fruit and vegetables, manufacture of animal feeds, dairy processing, grain milling and coffee and tea processing. This sector is one of those in the economy that belong to the Agro-food processing employing over 70% of the country's population (UNCTAD, 2020). The sector feeds over 40.3 million Ugandans and this is expected to go beyond 80 million by 2040 (World Bank, 2018). In the global economy, the FPS is ranked as the largest manufacturing sector in the global economy calling for academics and practitioners' attention (Jose and Shanmugam, 2020).

Research design

A cross-sectional research design was used because it helps to collect data at a specific point in time (Sekeran, 2000). Using the quantitative study, respondents were bound within the questions provided through the structured questionnaire.

Population and sample

The study population was 345 FPFs giving a statistical sample size of 186 FPFs based on Krejcie and Morgan (1970) formula of sample size determination. However, this research draws on a sample of 103 FPFs that were selected from a population of 345 FPFs located in Kampala district to generate statistically sound results. This is because previous scholars found that a sample of 100 is sufficient for analysis (Ganbold *et al.*, 2020). A disproportionate stratified simple random sampling technique was used to choose the firms for inclusion in the study. This is because the FPS are in different categories dealing in different activities. Therefore, FPFs were stratified based on what they are engaged in to come up with different strata and later applied simple random sampling in selecting the desired sample from each stratum. The strata comprised of Fish and Meat processing (28), manufacturers of bakery products (104), vegetable and animal oil processing (5), manufacture of animal feeds (30), processing and preserving of fruit and vegetables (12), dairy processing (14), grain milling (128) and coffee and tea processing (24).

To avoid selection bias, a rand function in excel was used since rand automatically assigns random numbers. After identifying the representative firms in every strata, a letter was written and sent to the executive directors of the FPFs requesting them to nominate two employees that are more knowledgeable in SCI (Namagembe, 2021). They were required to give responses on the level of integration with their key supplier(s) and key customer(s) based on Ganbold *et al.* (2020) and Zhao *et al.* (2011). After responding to the questionnaire, data was aggregated at firm level which was the unit of analysis.

Sampling frame

A list of registered FPFs found in Kampala District with their contact addresses was obtained from UBOS. The contacts on the lists were used to contact management of the FPF through seeking appointments. The appointment was sought so as to request management to identify the right respondents for the study.

Instrument and data collection

The instrument had items that covered variables like asset specificity, relational governance, firm adaptability and SCI. Due to limited research on most of our study variables in developing countries, measurement items were adopted from previous studies with some

modification to suit the local context. After that, the questionnaire was Pre-tested by two senior managers in the FPS and two University Professors in the area of supply chain. These were requested to review the instrument for structure, readability, vagueness and completeness of questions. This ensured that the final instrument had well refined valid and reliable items. A final questionnaire was then designed and to ensure confidentiality and anonymity of respondents, they were exempted from providing their name and contact. Self-administered questionnaires with close-ended questions were then delivered physically to the identified respondents. Follow up calls were made to respondents to encourage them to complete the questionnaires and to find out if they had any challenges in responding to certain questions. Completed questionnaires were then picked and cross checked to ensure that all items were responded to.

Measurement of variables

Dependent variable. Though there are inconsistencies in literature on how to measure SCI, we followed findings by Khanuja and Jain (2020) to conceptualize it as an intra- and inter-firm construct. It was therefore measured by internal integration and external integration (supplier integration and customer integration).

Internal integration required that respondents indicate the extent to which their firm coordinated their internal processes to allow sharing of information and resources across departments. This was measured using 6 items adopted and modified from the works of Wong *et al.* (2011) and Delic *et al.* (2019). External integration was studied using ten items from the works of Wong *et al.* (2011), Ataseven *et al.* (2020) and Kanyoma *et al.* (2018). Respondents were requested to assess whether their organization had a close working relationship with key customer(s) and supplier(s) to achieve inventory coordination and quick order processing.

Independent variable. Asset specificity was operationalized using human specificity, location specificity, dedicated specificity and these were adopted from Wang *et al.* (2019) and Anderson and Weitz (1992). Human specificity aimed at investigating the level of human resource investment the organization had made for the sole purpose of working well with key trading partners. On location specificity, respondents were to indicate how the location of their organization was helpful during coordinating of processes. This was in relation to reduced transport costs, less delivery time and easy monitoring. Under dedicated specificity, respondents were to indicate whether their organization had made investments in specific equipment like customized warehouse, transport and IT to allow easy coordination.

Joint problem-solving and negotiation efficiency were used to study relational governance. Respondents were to indicate whether there was mutual agreement between their organization and its key actors in solving conflicts without involving a third party. Items were developed from the works of Wang *et al.* (2020).This was based on the fact that mutual agreement reduces costly litigations (Galanter (1981). Due to limited research on negotiation efficiency, items were developed from various negotiation studies from the works of Zhang *et al.* (2021), Ramirez-Marinz *et al.* (2022), Yao and Brett (2021). Items for negotiation efficiency aimed at revealing the things that the organization exhibited during negotiation with key actors that helped them to reach a concession.

Mediating variable. Firm adaptability mediated this study and was measured by learning and flexibility. Respondents were requested to indicate the level of learning that takes place within the organization and with their key actors in uncertainty situations. Learning items were adopted from studies by Bouncken and Fredrich (2016), Guo *et al.* (2020) and Kumar *et al.* (2020). Flexibility items were adopted from the works of Kumar *et al.* (2020). The intention was to find out whether the organization had the ability to adjust processes in changing market conditions.

All items were measured on a six-Likert point scale to avoid midpoint and to achieve reliability of the data (Fakfare and Sangpikul, 2022). These were anchored on very untrue (1) -extremely true (6) while relational governance was anchored on Strongly Disagree (1)-Strongly Agree (6). The six-point scale also encourages respondents to consider the statements more carefully and decide to give an answer that leans positively or negatively, though the reliability is acceptable (Chomeya, 2010).

Normality test. SPSS was used to test for normality using skewness and kurtosis (Table 1). Skewness values ranged between ±2.58 while kurtosis values were less than 7. According to Namagembe (2021) skewness values of less than 2 and kurtosis values less than 7 show that the data is normal. From our analysis, skewness and kurtosis values for all variables were close to 0 as recommended by Field (2018).

Construct reliability. To test for reliability of the data, composite reliability and Cronbach's alpha values were used (Table 2). We found that both composite reliability values and Cronbach's alpha values for all variables were all above the threshold of 0.70 (Hair *et al.*, 2017), implying that the indicators used in the study sufficiently measure the variables.

Construct validity. To test for construct validity, this research used convergent and discriminant validity.

Convergent validity. Following recommendation by Fornell and Larcker (1981), convergent validity was measured basing on; loading of items (Table 2), composite reliability (Table 2) and average variance extracted (AVE) as reflected in Table 2. The AVE values were above 0.50 and these confirmed the existence of convergent validity as recommended by Amora (2021) and Hair *et al.* (2019). Using item loadings, loadings above 0.4 were taken as cut-off for this study (Table 2). Previous literature recommends that loadings of 0.30–0.35 are good (Spector, 1992). However, a cut-off of 0.4 and above was considered in this study as recommended by Hair *et al.* (1995). Accordingly, indicator of 0.4 and above should be deleted only when their removal improves composite reliability or AVE. Hair *et al.* (2017) further recommend that only indicators with outer loadings below 0.4 should be removed because they have an effect on content validity.

Discriminant validity. The purpose of this test to find out whether the factors that measure the different variables are truly different from others (Hair *et al.*, 2014). This was assessed using the Fornell–Lacker criterion (Fornell and Larcker, 1981). The rule of thumb is that the square root of the AVE for each construct should be higher than inter-correlation values. Our results on Table 1 show that the square root of each study construct is higher than the study construct correlation. This is evidence that there exists discriminant validity (Ab Hamid *et al.*, 2017).

Findings

Factor analysis

The Kaiser–Meyer–Olkin (KMO) test and Bartlett's test were carried out to test for data sample adequacy and suitability respectively (Table 3). Kaiser (1981) recommends that KMO

Table 1. Discriminant validity using zero-order correlation amongst study variables and the square root of average variance extracted and normality test

Variable	AVE	1	2	3	4	Skewness	Std error	Kurtosis	Std error
Asset specificity(1)	0.598	*0.773*				−0.401	0.238	−0.614	0.472
Firm adaptability(2)	0.577	0.850	*0.759*			−0.258	0.238	−0.004	0.472
Relational governance(3)	0.555	0.721	0.828	*0.745*		−0.739	0.238	0.258	0.472
Supply chain integration(4)	0.531	0.763	0.826	0.600	*0.729*	−0.062	0.238	−0.045	0.472

Source(s): Authors' own creation

Dimension	Items	loadings
SCI (Cronbach's Alpha = 0.746; Composite reliability = 0.794; AVE = 0.531)		
Internal integration	. . . emphasizes sharing of materials across departments	0.635
	. . . has real time connection among all internal processes	0.686
External integration	. . . receives information about their inventory delivery status	0.477
	. . . receives information about their inventory status	0.522
	. . . has planned inventory delivery schedule	0.530
	. . .. shares strategic information	0.561
	. . . exchanges operational information	0.597
	. . . pursues relationships that go beyond daily transactions	0.507
	. . . has aligned internal processes so that it can work in a timely manner	0.547
Asset specificity (Cronbach's Alpha = 0.787; composite reliability = 0.843; AVE = 0.598)		
Human specificity	. . . has invested in employee training to serve them better	0.541
	. . . the staffs of this organization spend a lot of time coordinating inventory from them	0.541
Dedicated specificity	. . . it would take some time for both to bring the new partner up-to adapt	0.569
	. . . have made investment in facilities dedicated to coordinate our stock	0.519
	. . . have made investment in customized equipment for purposes of managing our order	0.554
	. . . have made invest in IT facilities	0.641
	. . . have made investment in transportation facilities like vehicles	0.556
	. . . have invested in customized warehouses	0.550
Location specificity	. . . spends less on monitoring orders	0.653
	. . . experiences reduced transport costs	0.574
	. . . easily coordination inventory deliveries	0.725
	. . . has experienced reduced delivery time	0.643
	. . . easily monitors inventory status	0.528
Relational governance (Cronbach's alpha = 0.785; composite reliability = 0.849; AVE = 0.555)		
Joint problem solving	. . . is always willing to maintain and develop the cooperative relationship based on mutual trust	0.705
	. . . is always willing to discuss any conflict(s) that may arise during a transaction	0.714
	. . . looks at differences in opinion as an opportunity to improve relationship	0.717
	. . . provides help when problems arise	0.653
Negotiation efficiency	. . . trusts our key partner(s) commitment to the negotiation	0.526
	. . . takes advantage of its strong negotiation position	0.519
	. . . commits a lot of time in to maintaining the relationship	0.652
Firm adaptability (Cronbach's alpha = 0.833; composite reliability = 0.811; AVE = 0.577)		
Learning	. . . ensures that key supplier(s) learn better ways of managing orders	0.531
	. . . ensures that employees change their attitudes about the market situation as they gain new knowledge from key partner(s)	0.492
Flexibility	. . . finds itself in a situation where production schedules have to be triggered based on delivery capabilities from key partner(s)	0.719
	. . . adjusts its production processes to meet the changing schedules on short notice from key partner(s)	0.667
	. . . regularly reviews orders to key partner(s) based on market situation	0.704
	. . . changes the quantity mix by utilizing IT	0.678
	. . . quickly adjust its production mix by using our IT systems	0.606

Source(s): Authors' own creation

Table 2. Standardized loadings for all variable items

values between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great and values above 0.9 are questionable. From our analysis, KMO values were found to be above 0.7 which shows that the values are good. Bartlett's test was significant at 0.000 which is below the

recommended threshold of 0.05 (Field, 2009). These tests indicated that the sample size used was adequate and data was suitable for a factor analysis.

Exploratory factor analysis findings showed that items were loading high on the construct they measured. Factor loadings that were below 0.4 were dropped. The factor loadings were within the range of *0.414-0.872*.

Later, confirmatory factor analysis (CFA) (Table 4) was carried out using Smart PLS to determine whether the measurement indicators that measured the different variables were distinctive and reflected the study variables.

SCI with its measure of internal integration had all items retained while nine out of the ten items that measured external integration were retained. These had loadings between 0.487–0.778 and 0.478–0.631 and $\beta = 0.528$; $p = 0.000$ and $\beta = 0.609$; $p = 0.000$, respectively.

Under asset specificity, all the items for dedicated specificity loaded above 0.5 with loadings between *0.505–0.816* and $\beta = 0.611$; $p = 0.000$. All the six items for human specificity were retained with loadings between *0.476–0.751* and $\beta = 0.204$; $p = 0.000$. All the five location specificity items loaded above 0.5 and were therefore retained with loadings between 0.656 and 0.808 with $\beta = 0.391$; $p = 0.000$. Of all the indicators, dedicated specificity explained asset specificity better.

Two factors (Joint problem solving and negotiation efficiency) were used to study relational governance. Out of the items that were used to study joint problem solving, eight were retained with loadings between 0.513–0.714 with $\beta = 0.570$; $p = 0.000$. Negotiation efficiency was itemized by twenty items and out of those, seven items were retained with loadings between 0.541–0.776 with $\beta = 0.557$; $p = 0.000$. Our results reveal that all constructs fairly measured relational governance.

Table 3.
Table showing sample adequacy and sample suitability

		SCI	Relational governance	Asset specificity	Firm adaptability
Kaiser-Meyer-Olkin measure of sampling adequacy		0.724	0.719	0.771	0.724
Bartlett's test of sphericity	Approx. chi-square	112.321	1212.218	634.072	112.321
	Df	15	496	171	28
	Sig	0.000	0.000	0.000	0.000

Source(s): Authors' own creation

Table 4.
CFA bootstrapped measurement model at construct level

	B	*p*-values
Dedicated specificity → asset specificity	0.611	*0.000*
Human specificity → asset specificity	0.204	*0.000*
Location specificity → asset specificity	0.391	*0.000*
Joint problem solving → relational governance	0.570	*0.000*
Negotiation efficiency → relational governance	0.557	*0.000*
Flexibility → firm adaptability	0.569	*0.000*
Learning → firm adaptability	0.476	*0.000*
External integration → SCI	0.609	0.000
Internal integration → SCI	0.528	0.000

Source(s): Authors' own creation

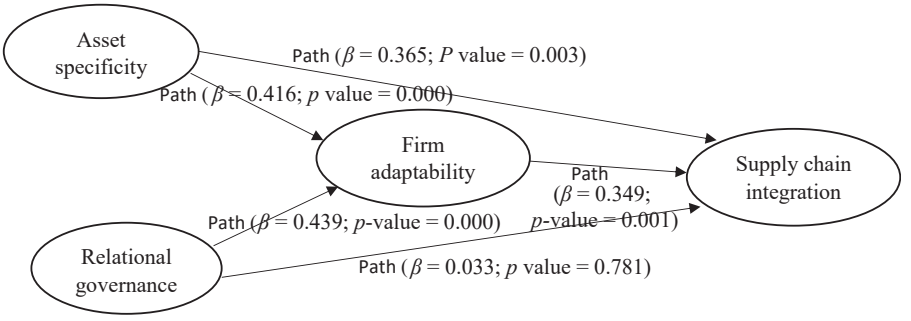
Firm adaptability was measured by two factors. Flexibility and learning items loaded between *0.609–0.740* and *0.483–0.633* respectively. All flexibility items were retained with loadings between 0.609 and 0.740 and $\beta = 0.569; p = 0.000$. Learning had fourteen items and seven items loaded above 0.5 with loadings between 0.494–0.612 and $\beta = 0.476\ t = 9.883; p = 0.000$. Flexibility was found to explain firm adaptability 56.9%. This implies that in uncertain situations, firms are more likely to adjust their processes than learning new ways of doing things.

Hypothesis testing

From the model (Figure 2), it was revealed that asset specificity had a positive effect on SCI ($\beta = 0.365;$ *p-value* $= 0.003$); relational governance and SCI were found to have insignificant relationship ($\beta = 0.033;$ *p-value* $= 0.781$); a positive significant influence was noted between asset specificity and firm adaptability ($\beta = 0.416;$ *p-value* $= 0.000$). Firm adaptability and SCI also registered a positive effect ($\beta = 0.349;$ *p-value* $= 0.001$) while relational governance and firm adaptability revealed insignificant association ($\beta = 0.439$ *p-value* $= 0.000$). A mediation test was carried out following Barron and Kenny's four stage procedure (Baron and Kenny, 1986). First, the independent variables were regressed on the mediator variable. The second step was to regress the mediator variable on the dependent variable. This was followed by regressing the independent variables on the dependent variable. The last step was to run a mediation analysis with all the variables included in the analysis. All paths were found significant and therefore, firm adaptability was found to mediate as per the model. Its mediation on asset specificity and SCI was partial because the influence of asset specificity on SCI remained significant ($\beta = 0.101;$ *p-value* $= 0.038$) while a full mediation effect was found in relational governance and SCI because the influence of relational governance on SCI ceased with the introduction of a mediator ($\beta = 0.094;$ *p-value* $= 0.011$).

Discussion of research findings

This paper makes important contribution to the existing literature. The paper focuses on asset specificity, relational governance mediated by firm adaptability to study SCI. These have been given little attention in supply chain literature yet relevant to managers and future researchers.



Source(s): Authors' own elaboration

Figure 2.
Structural model

Direct effects

H1 revealed that asset specificity has a significant influence on SCI (β = 0.365; *p-value* = 0.003). This implies that some firms in the FPS have invested in specialized facilities and also aligned operations making it possible to share materials and information both internally and externally with trading partners. Supported by some local studies, Lakuma *et al.* (2020) revealed that there has been an increase in the level of investment in technological facilities among firms from 13% point increment to 24% in the use of digital hardware especially after the pandemic. In the coffee sector, suppliers (farmers) use mobile phones to access information about good agricultural practices (World Bank, 2018). Ramirez *et al.* (2021) also noted that investing in technology and other facilities enhances SCI. The existence of such facilities allows firms to coordinate, align and introduce products quickly to the market (Huo *et al.*, 2014). However, the fishing sector suffers from costly transactions (losses) due to limited fish drying technologies like indoor solar dryers especially during the rainy season (Lakuma *et al.*, 2021).

The study found that a significant number of firms have invested in improving employee skills to improve sharing of both strategic and operational information with actors ($\beta = 0.611$; $p = 0.000$). In line with our findings, Kyagalanyi Coffee Ltd through its qualified team provides the necessary knowledge and training to its suppliers (farmers) in coffee husbandry and access to inputs (World Bank, 2018). The national Small Business Survey of Uganda (2015) revealed that most firm owner managers had formal education. Such initiatives imply that they have the skills to align their business operations, share relevant and timely information. On the contrary, micro and small agro-processing firms in Uganda are believed to have less human resources (Kane *et al.*, 2015). Anderson *et al.* (2016) revealed that 64% of smallholder (suppliers) in the FPS have only basic certificates in primary education.

The controversies in local literature on the level of human specificity exhibited by $\beta = 0.204$; $p = 0.000$ imply that much as firms are investing in specific assets, their focus on human specificity is low compared to the other factors. This contradicts with Song and Song (2021) who recommended that improving the skills, capabilities and competencies of trading partners is vital in achieving task completion.

In addition, some firms are located near their trading partners ($\beta = 0.391$; $p = 0.000$). It is assumed that this minimizes transport costs and also enhances easy inventory monitoring. This finding is in line with Statsenko *et al.* (2018) who posit that when firms are located in closer proximity, they share market information about price and product demand. Our findings however contradict with Nguyen *et al.* (2019) who advanced that in developing countries, it is the level of trust that determine the sharing of information in a supply chain not necessarily the location of the actors. Bingi and Tondel (2015) also noted that the dairy sector is characterized with high operational costs resulting from collecting milk from geographically dispersed farmers.

Despite that, the significant relationship is anchored on the fact that most customers (66%) and suppliers are located closer to their trading partners leading to better information sharing across all processes in relation to delivery schedules (National Small Business Survey of Uganda, 2015).

Based on TCT scholars, it is evident that a positive influence implies that firms are sharing information and this lowers transaction costs (Dyer, 1997). On the contrary, though some firms have lowered their coordination costs brought about by closer proximity, it is evident that most firms in the FPS could be incurring higher costs of operation due to increased investment in specific assets (Williamson, 1985). The TCT assumes that the more the investment in specific assets, the more the costs of curbing against opportunism (Klein *et al.*, 1978; Williamson, 1985). This is in line with Williamson (1991) who posit that investment in specific assets comes with increased costs of monitoring and enforcement.

H2 contradicts with previous scholars on the factors that drive relational governance to trigger SCI (β = 0.033; *p-value* = 0.781). To achieve efficiency during negotiations, parties focus on real issues and aim at reaching a concession (Crump, 2020). They develop trust in each other and take time to prepare (Yao and Brett, 2021). Laubert and Geiger (2018) emphasized that the issues should be few to reduce haggling and quicken the process of integration. Negotiation efficiency is also possible where players are accommodative (Charoensap-Kelly (2021). From our findings, some players in the FPS were found to have low trust centered transactions with little attachment to each other's interest. This limited information sharing and resulted into insignificant findings. This is a common practice among developing and transitional economies that are characterized with limited trust (Nguyen *et al.*, 2019). In developing economies, most partners are not committed to developing relationships because they focus on short-term benefits (Kanyoma *et al.*, 2020; Eyaa *et al.*, 2010). This limits sharing of information and collaboration (Yao and Brett, 2021; Thomas *et al.*, 2015).

The factors that downplay the existence of joint problem solving in this study are: failure to work together to achieve unified resolution when problems arise and failure to acknowledge the fact that differences in opinion is an opportunity to improve their relationship. Because of such incidents, it calls for strong monitoring systems which are inadequate among Ugandan firms (Eyaa *et al.*, 2010). In Uganda, it has been noted that there is limited sharing of information between players in the FPS due to informal arrangements (Odongo *et al.*, 2017; Ouma *et al.*, 2016). Odongo *et al.* (2017) reveals that there is also limited mutual agreement due to use of threats. In the dairy sector, it's only JESA farm that runs a business model based on trust with its milk supplier.

From a TCT perspective, the non-significant effect of relational governance on SCI is due to existence of opportunism (Williamson, 1985). Ghoshal and Moran (1996) argue that TCT fails to recognize that hierarchical control could foster opportunistic behavior rather than constrain it. Rational controls in firms can enhance feelings of bias, inequity and unfairness, which in turn can create more subtle forms of opportunism. It can also be concluded that in this study firms are experiencing increased costs of operation because of absence of trust and shared outcomes brought about by opportunism. The existence of transactional relationships in the FPS leads to increased transactional cost as firms produce below capacity (Abdulsamad and Gereffi, 2016). Focusing on relationships results into reduced transactional costs especially where goodwill trust is built (Dyer, 1997).

H3 revealed that the influence of firm adaptability on SCI was positive (β = 0.349; *p-value* = 0.001). This supplements existing literature that found that when participating firms adjust their operations, coordination can be achieved (Mutebi *et al.*, 2020) and are able to quickly respond to the market pressures (Despoudi *et al.*, 2018). This helps them to take advantage of the external opportunities (Novais, 2019). Firms have also learned new ways of managing operations especially in the current situation characterized with COVID-19 effects (Lee *et al.*, 2019). This reduces disruptions (Chen *et al.*, 2022). However, Lisi *et al.* (2020) and Selviaridis and Spring (2018) found that learning was a critical driver of information sharing. It is revealed that during the COVID-19 pandemic, firms had to adjust their ordering system, production lines and distribution due to fluctuations in demand for goods (Kansiime *et al.*, 2021) allow them to align their processes.

H4 predicted a positive influence between asset specificity and firm adaptability in uncertain conditions. This hypothesis was found positive and significant. It is revealed that firms are making efforts to invest in specific assets in uncertain situations (β = 0.416; *p-value* = 0.000). This enhances their delivery capability of introducing a variety of products to the market. These findings are consistent with Shukor *et al.* (2021) who posit that investment in technology allows production and quantity mix. Gu *et al.* (2020) reveals that such facilities make firms responsive in uncertain situations that require adjusting routine processes.

In addition, our findings reveal that interactions happen during training and partners acquire knowledge necessary for handling any adjustment in delivery processing quickly. In line with our findings, having the right human resources with the right knowledge and competencies acts as a coping strategy (World Bank, 2018). JESA (milk processor) is one of those firms in the sector that have empowered their supply chain partners with training. This research further finds that the location of the firm has an impact on the level of responsiveness. Firms quickly introduce products to the market because of closer working relationships (Huo *et al.*, 2014). These findings are in contradiction with previous scholars who found that most processing firms in the FPS are incurring extra costs in transportation because they are located far from their trading partners (Rivera and Pfeiffer, 2018; Kataike, 2019).

H5 revealed that relational governance has a positive effect on firm adaptability ($\beta = 0.439$ *p-value* = 0.000). From our findings, learning from each other is as a result of willingness to jointly solve conflicts that may arise during a transaction. During such interactions, the knowledge acquired is used to adjust delivery schedules from suppliers and to customers. This is in line with Mak and Shen (2021) who contend that firms make adjustments in response to the market dynamics by building relationships with their trading partners. Being concerned about each other's interests and making sacrifices during negotiations creates an environment where partners willingly adjust their individual interests to accommodate those of the other actor (Ramirez-Marin *et al.*, 2022; Caputo *et al.*, 2019).

Joint problem-solving influences the firm's flexibility allowing it to plan ahead of time (Kumar *et al.*, 2017a). In the same line, the ability to jointly workout conflicts increases interactions that result into learning (Pulles and Loohuis, 2020). Our results are consistent with previous literature in Uganda that revealed that some firms have informal working arrangements with their partners (Schipmann-Schwarz *et al.*, 2015). Accordingly, this makes partners to take less time and effort to negotiate a transaction leading to reduced transaction costs because suppliers deliver the raw materials at factory gates.

Mediation effects

H6 found that the mediating role of firm adaptability on the relationship between asset specificity and SCI was found significant ($\beta = 0.172$; *p-value* = 0.007). This hypothesis revealed a partial mediation since initially H1 was significant ($\beta = 0.365$; *p-value* = 0.003). In line with the findings, when firms invest in training to improve the skills and competencies of actors, they develop an understanding of their requirements (Murfield *et al.*, 2017; Marchet *et al.*, 2018). Such assets enhance the firm's ability to review production schedules, learn better ways of handling inventory based on their interactions with more experienced partners and also change their attitude towards customer inventory changes. This allows firms to align their processes and also share materials.

Lastly, interaction with experienced and skilled partners allows learning to take place and change of attitude resulting into better coordination. This is supported by Singh and Rao (2016) who revealed that learning is an outcome of interaction between individuals or firms. Lakuma *et al.* (2020) revealed that most firms (85.7%) during the pandemic invested in technologies that enhanced their adaptive capability amidst the travel restrictions. They also adjusted the source of raw materials from importing to domestic sources (Lakuma *et al.*, 2021). This allowed them to quickly share information and coordinate processes remotely which is in line with our findings.

H7 reveals a full mediation between variables. The insignificant relationship between relational governance and SCI ($\beta = 0.012$; *p-value* = 0.912) as earlier revealed is strengthened by the introduction of firm adaptability as a mediator ($\beta = 0.140$; $p = 0.003$). This implies that though partners in the FPS discussed conflicts, they were not willing to let go of previous

mistakes and were more focused on individual interests which affected their ability to align tasks, share knowledge and also adjust their process. The ability to work out challenges is an evidence of an adaptive supply chain (Wang and Wei, 2007). Kumar *et al.* (2017a) posits that flexibility is created because firms accept to resolve conflicts. This allows them to plan ahead of time (Hopkins and Yonker, 2015). During the negotiation process, an open-minded partner learns and shares information with others (Zheng *et al.*, 2019).

Further, Schipmann-Schwarz *et al.* (2015) argue that training partners and investing in transport facilities makes firms adaptive because as demand increases, they are in a better position to increase their production.

The above hypothesis suggests that investing in specific assets enhances the level of information sharing and coordination within and outside the firm. However, the relationship is weakened when mediated. Relational governance has insignificant association with SCI though significant when mediated. When firms understand how to thrive in uncertain situations, they are in position to integrate their operations.

Theoretical implications

This study makes important contributions to the body of literature in SCI.

First, asset specific has mostly been used to study supply chain performance (Amoako *et al.*, 2020; Khanuja and Jain, 2020). Using the TCT, the more firms invest in the necessary resources in uncertain conditions, the more are able to integrate with the market. This increases costs in the short run but in a long run, they are able to lower costs through improved coordination. This study bridges this gap by revealing that the assets of the firm determine its efficiency through cost minimization. Secondly, this study contributes to a handful of research that has examined relational governance using TCT. From the TCT, relational governance can increase or lower transaction costs depending on the level of trust among players. However, much as previous literature puts trust as a key aspect in SCI, local firms in our context don't take trust as a major factor in achieving SCI.

Managerial implications

Our results reveal that despite the fact that firms are investing in specific assets to achieve SCI in uncertain situations, most firms are interested in building relationships (97.2%). This implies that managers should focus more on building relationships with their trading partners to reduce opportunism that comes with asset specificity. This makes SCI more of a relational variable and better explained by the TCT though it which has over the years been ignored.

Conclusion

The study aimed at investigating the influence of asset specificity, relational governance, firm adaptability on SCI. Seven hypotheses were developed and from our data; asset specificity influences SCI positively directly and indirectly through firm adaptability. Relational governance was found to have insignificant influence on SCI but the introduction of firm adaptability as mediator improves its influence. Firm adaptability was found to influence SCI positively. Lastly, of the three variables, asset specificity was found to have the biggest influence on SCI compared to other variables. Based on the above findings, this study also provides policy recommendations aimed at making improvements to the industry.

Policy recommendations

There is a need for the government to invest in some general facilities like warehouses and transport facilities that are used in the sector. There is a need for strong policies to ensure that

the FPS is effectively regulated, especially regarding the price given to suppliers. We add our voice to previous scholars by calling upon the government of Uganda to invest in affordable techniques to enhance standards. Government should also come up and supplement processors' efforts and offer training to sector players.

Areas for future research

Being adaptive during the COVID-19 pandemic was necessary in order to survive and this may have had an impact on firms' decision to invest more in dedicated specificity and less in other forms of specificity to achieve access to the market. Therefore, future researchers should rely on our results with caution as firms may have made investment in assets during the pandemic as a response strategy.

Literature has emphasized the role of technology in ensuring that firms integrate. First, future studies may consider the role of IT to achieve positive outcomes out of the integration process not only in the FPS but in the entire manufacturing industry. Secondly, the research focused on perceptual measures to understand the nature and level of SCI between the firm and their external partners. Future researchers may consider using dyads to get a clear picture of the entire supply chain. Thirdly, opportunism may have an influence on the results if taken as a moderator. Controlling for opportunism is relevant in increasing the confidence to invest in specific assets. This was not considered and therefore future researchers can focus on it. Lastly, the study focused on the FPS yet the sector has got many firms with varying characteristics that may have had an influence on the results. Future studies can do comparative studies.

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