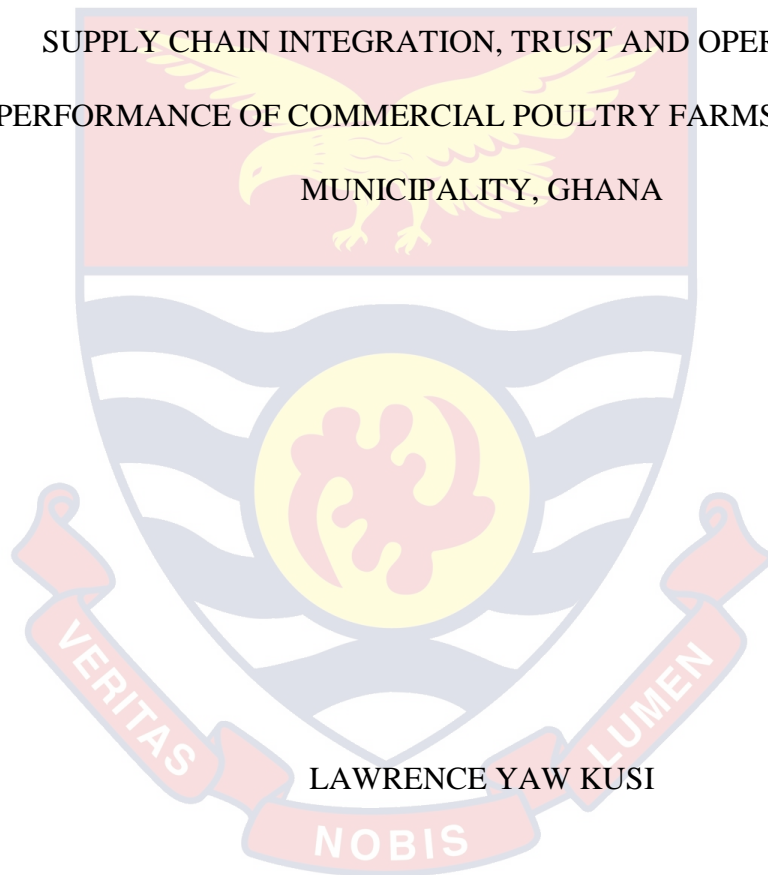UNIVERSITY OF CAPE COAST

SUPPLY CHAIN INTEGRATION, TRUST AND OPERATIONAL

PERFORMANCE OF COMMERCIAL POULTRY FARMS IN DORMAA
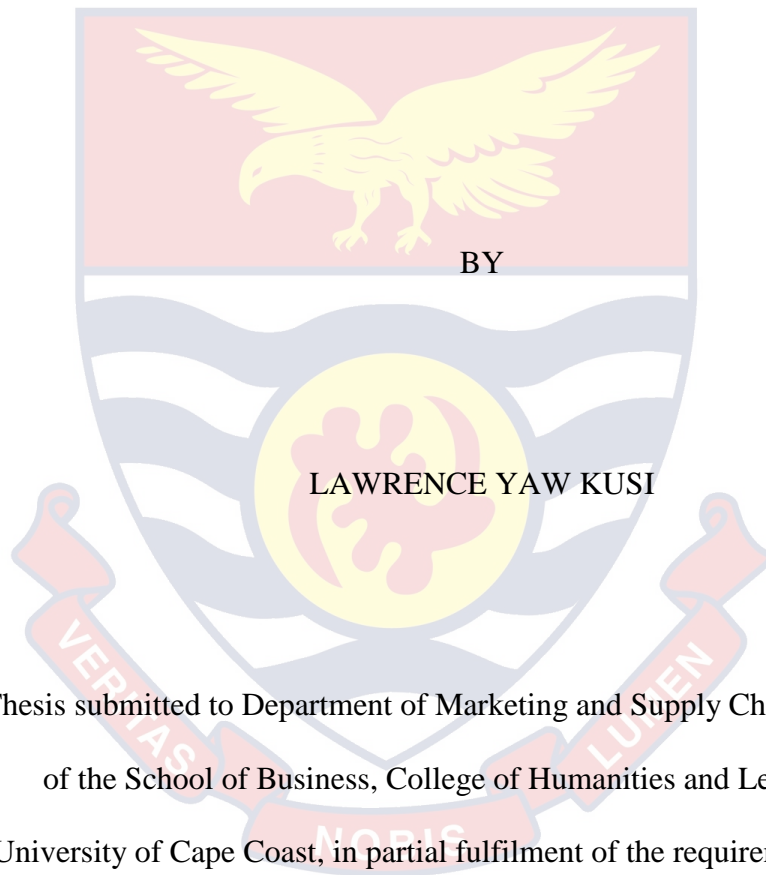
MUNICIPALITY, GHANA

LAWRENCE YAW KUSI

2020

UNIVERSITY OF CAPE COAST

SUPPLY CHAIN INTEGRATION, TRUST AND OPERATIONAL

PERFORMANCE OF COMMERCIAL POULTRY FARMS IN DORMAA

MUNICIPALITY, GHANA

BY

LAWRENCE YAW KUSI

Thesis submitted to Department of Marketing and Supply Chain Management

of the School of Business, College of Humanities and Legal Studies,

University of Cape Coast, in partial fulfilment of the requirements for award

of Master of Commerce degree in Procurement and Supply Chain

Management

MAY 2020

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature …………………………. Date……………………

Name: Lawrence Yaw Kusi

Supervisor's Declaration

I hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Supervisor's signature …………………………. Date ………………….

Name: Dr (Mrs.) Gloria K. Q. Agyapong

ABSTRACT

The study examined the effect of supply chain integration on operational performance of commercial poultry farms in Ghana. Trust and firm size were statistically controlled for as intervening variables. Four hundred and thirteen commercial poultry farms in Dormaa Municipality in the Bono Region were targeted. Explanatory researched design was adopted. Although 262 farms were initially approached, 248 questionnaires were however retrieved. Proportional stratified sampling technique was used for the selection of the respondents. Adoption of the quantitative research approach made it easy for the application of statistical techniques for analysing the primary data. SMART pls application was used for the configuration of the structural models and the multigroup analysis given the nature of the specific research objectives. The unit of analysis include commercial poultry farms. Supply chain integration accounted for 67.8% significant change operational performance. Financial flow integration and internal integration were significant positive predictors of operational performance. Logistics integration and supplier integration negatively related significantly with operational performance. Trust mediated the predictive relationship between supply chain integration and operational performance. Commercial poultry farms should continue to rely on supply chain integration strategies such as financial flow integration and internal integration to improve their operational performance. Compared to small-scale and medium-scale commercial farms, supply chain integration is more efficient at improving the operational performance of large-scale commercial poultry farms, hence large-scale commercial farms are encouraged to integrate more with their supply chain actors than small-scale and medium-scale commercial enterprises.

KEY WORDS

Supply chain integration

Trust

Firm size

Operational performance
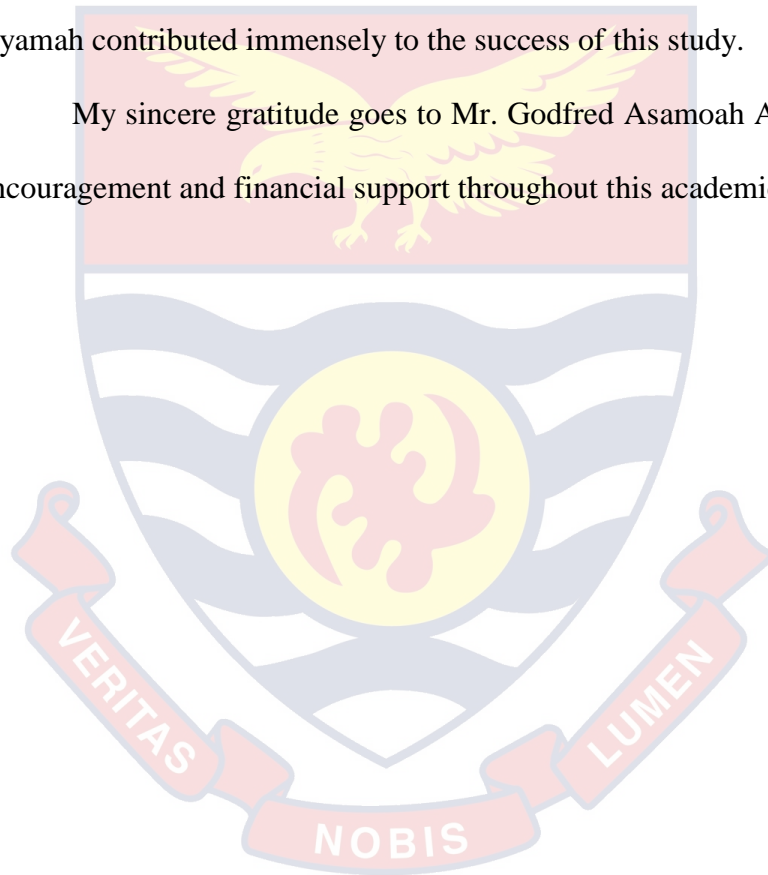
Commercial poultry farms

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DEDICATION

To my lovely wife, Rosemary Agbeko and the entire family

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LIST OF ACRONYMS

AVE	Average variance extracted
HTMT	Heterotrait-Monotrait ratio
OP	Operational performance
PLS-SEM	Partial least square-Structural equation modelling
SC	Supply chain
SCI	Supply chain integration
SCM	Supply chain management
SDGs	Sustainable development goals
VIF	Variance inflation factor
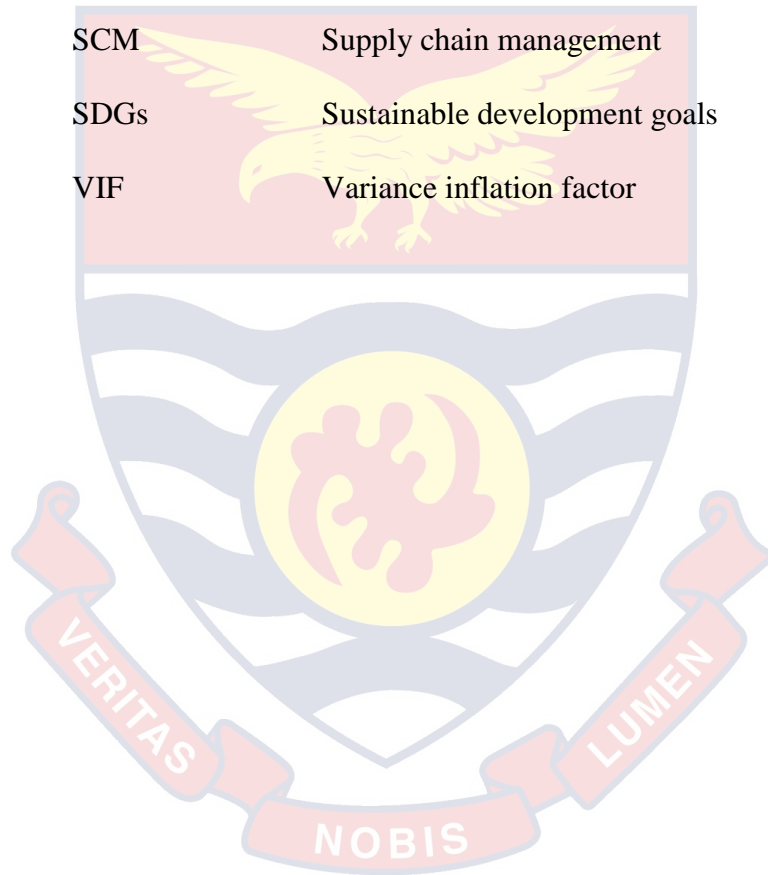
CHAPTER ONE

INTRODUCTION

Supply chain integration [SCI] is much pronounced in commercial poultry industry where several SC disruptions and challenges are frequent, given cognizance to the high level of interdependency among supply chain partners (Nyoni, Grab & Archer, 2019). Contextually, the study examined how changes on SCI affect changes in operational performance [OP] of commercial poultry farms in Ghana, by targeting those located in Bono Region. The study also factored certain conditions such as firm size and level of trust as intervening variable in the supposedly SCI-OP relation.

Background of the Study

There is expanded demand for livestock products, particularly, poultry products because of increased population growth in West Africa (Nti, 2018) and increased per capita income (From $403 to $1,362) in Ghana (Amanor-Boadu, Nti & Ross, 2016; Nti, 2018). In the case of Ghana, trend of livestock populations shows poultry topped from 2007 to 2016 comparative to cattle, sheep, goats, and pigs though the sector grew by only 8.4% in 2017 (Ahiale, Abunyuwah & Yenibehit, 2019). Despite this development, Ghana's production capacity of chicken meat over the past 20 years had to be supplemented with imports almost as much as twice of what is produced in order to meet domestic consumption demands (Etuah, Ohene-Yankyera, Liu, Mensah & Lan, 2019).

Commercial poultry production in Ghana consists primarily of layer production system or broiler production system. Commercial poultry farms are mostly located in urban areas in Ghana particularly in areas such as Greater

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Accra, Asanti and Bono Regions of Ghana (Nti, 2018; Ahiale, Abunyuwah & Yenibehit, 2019; Haligah, 2017). Firm size is a key factor that must be considered when it comes to examining the nature of SCI in the commercial poultry industry of Ghana (Shou, Feng, Zheng, Wang & Yeboah, 2013). Large scale farms are those producing above 100, 000 birds, medium-scale farms are those producing 5, 000 - 10, 000 birds and whilst small-scale farms are those producing 50 - 5, 000 birds (Anang, Yeboah & Agbolosu, 2013). Firm size is a significant determinant of firm performance and must be further studied to unravel its weight on such effects (Bamiatzi & Hall, 2009).

Some previous empirical studies (Khalid & Seuring, 2019; Ellram & Murfield, 2019) assert that a typical tool to ensure supply chain management [SCM] is SCI. SCI epitomizes the extent of integration of core processes across organizational value chain system usually built on partnership, communication, and corporation among SC actors (Power, 2005). SCI also represents a network of different firms in same or different industries that are directly and or indirectly related economically (Hugos, 2018; Öberg & Shams, 2019). At the heart of supply chain [SC] are passive exchanges of information among SC partners through synchronization and joint planning and activities (Wang, Gosling & Naim, 2019).

Turbulence in business environments pushes businesses to partners closely and in strategic manner with both forward and reverse chains and individual companies (de Paula, de Campos, Pagani, Guarnieri & Kaviani, 2019), especially when characterized with uncertainty (Loretts, Golovina & Smirnova, 2019) to create stability and resilience to promote harmonious business operations. SCI is integral part of poultry operations due to higher

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level of interdependency among partners (Poojitha & Panigrahi, 2019) given cognizance to numerous big problems farmers encounter (Velde, Charlier, Hudders, Cauberghe & Claerebout, 2018). OP contextually measures the definition, implementation and usage of performance measures on the day-to-day operations of commercial poultry farms (Prawira, Syafdinal, Anwar & Alaeddin, 2019).

SC of the poultry industry is characteristically a deep-rooted connection among raw material suppliers, breeders, broiler farmers, processors, distributors, and final consumers (Das, Khound, Santra & Santra, 2019). Poultry farmers rely on other SC partners such as supplier of chicks, drugs veterinary services providers (Helliwell, Morris & Raman, 2019) feed processing firms (Lamsal, Wang, Pinsirodom & Dossey, 2019), feed sellers (Omondi, 2019), third party logistics providers (Vercillo & Hird-Younger, 2019), financial service providers (Nguyen & Jolly, 2019), distributors, retailers (Ragasa, Andam, Amewu & Asante, 2019) and customers (Baruwa & Omodara, 2018) in order to remain functional and competitive (Chirawurah, et al., 2019).

SCI is broad concept, with dimensions such as logistics integration, information integration (Abbas & Kamal, 2018), customer integration (Khan & Wisner, 2019), supplier integration, internal integration (Wiengarten, Li, Singh & Fynes, 2019) and financial integration (Tsai, Liao & Hsu, 2015). SCI is evidentially linked to performance improvements (Dey & Cheffi, 2013), enhances cost efficiency and lead time (Power, 2005), operating excellence and revenue growth (Rajaguru & Matanda, 2019) and profitability (Bagher,

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2018). SCI affects firm performance significantly, both explicit and implicit considerations (Frohlich & Westbrook, 2001).

At the heart of SCI among commercial poultry farmers is the issue of business trust. SCI relationships are built based on trust among SC partners (Butt, 2019). Trust is needed in uncertainty situations (Butt, Sohal & Prajogo, 2019). Trust in business relations is context specific, based on previous experience, not transitive, dynamic, and non-monotonic (Lin, Sung & Lo, 2005). Trust refers to the extent of cognitive perception of other's credit and goodwill (Tsai & Tsai, 2016). Trust is conceptualized as a mediator in the SCI-OP predictive relationship (Shipley & Cao, 2019; Butt, 2019; Outila, Mihailova, Reiche & Piekkari, 2018).

SCI in poultry industry is underpinned by the resource dependency theory and the network theory. The central notion of the resource-based dependency theory is that where firms are limited by resource competence, integration becomes the best alternative (Villasalero, 2017). Partners in SC therefore combine their resources to promote synergistic performance variations to which all members equally benefit (Barratt & Oke, 2007) through network flow of capital, products and knowledge (Villasalero, 2017).

The network theory encapsulates a web of personal connections and relationships for the purpose of securing favours in person and or organizational action (Moghaddam, Rustambekov, Weber & Azarpanah, 2018). Network theory proposes that such social ties create avenue for actors in the network to seize opportunities (Moghaddam, et al., 2018). This study essentially is associated with food sustainability which is linked to sustainable development goals and premised on thematic principles such as no poverty

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[SDG2], zero hunger [SDG3], good health and well-being [SDG6] and responsible consumption and production [SDG14] (Acar, Aktas, Agan & Bourlakis, 2019; Zaid, Jaaron & Bon, 2018).

Statement of the Problem

Operational complexities increase when companies integrate more closely partly due to unclear clarity and interplay associated with industrial networks (Ojansivu, & Medlin, 2018). Ghanaian poultry industry is challenged due to unhealthy foreign competition subject to trade liberalization policy in Ghana, outbreak of diseases (Butler, 2016) pest, high cost of feed supply, limited access to finance (Haligah, 2017; Kusi, Agbeblewu, Anim & Nyarku, 2015), limited access to veterinary services, unfavourable climatic conditions, limited production capacity, managerial lapses (Nyoni, Grab & Archer, 2019) expensive vaccine (Butler, 2016), weak exchange rate (Nti, 2018), high taxes on poultry products (Sarpong, 2017), high credit cost (Ragasa, Lambrecht & Kufoalor, 2018), unreliable markets, lack of relevant and timely extension information (Folitse, Sam, Dzandu & Osei, 2018).

Commercial poultry farmers have resulted to forging integrative business relationships to overcome the numerous challenges bedevilling their operational success. Poultry farmers facing difficulty in not only in integrating activities with SC partners (Simatupang & Sridharan, 2005), but they also find it difficult manage their internal integration (Louis & Pagell, 2019; Queiroz, Telles & Bonilla, 2019). Academics have rarely dealt with poultry sustainability and SC issues (Shamsuddoha, 2014).

Firms that integrate with no focus are mostly disadvantaged by such arrangement (Springinklee & Wallenburg, 2012). Negative relationships may

bring negative business outcomes (Rahman & Hamid, 2019). de Man & Luvison, (2019) opined that business alliances do not realize their full potential always. SCI could be a major driver of joint problem solving among supply chain partners (Hugos, 2018) but it is saddled with risks which could negatively affect the performance of members through the bullwhip effect (Ojha, Sahin, Shockley & Sridharan, 2019). It is difficult for firms to select a single measure for OP (Bayraktar, Demirbag, Koh, Tatoglu & Zaim, 2009).

There are limited studies on role of logistics integration in overall SC performance (Naway & Rahmat, 2019). Although, SCI is far from being new (Stevens, & Johnson, 2016) a single accepted definition is still missing (Marak & Pillai, 2019), it has been described as "more a rhetoric than reality in most industries (Bagchi, Ha, Skjoett-Larsen & Soerensen, 2005; Weerakkody, El-Haddadeh, Sivarajah, Omar & Mohnar, 2019). Thus, there is the need to develop instrument for SCI evaluation (Simatupang & Sridharam, 2005).

Finding the contextual factors that inhibit or improve both internal and external integration is commendable (Pakurár, Haddad, Nagy, Popp & Oláh, 2019). Studies on the effect of firm size on performance have produced contradictory results (Fernández, et a., 2019), therefore this study adds some empirical evidence to the clarity of such inconsistent findings. Trust is major factor in integrative business arrangement but difficult to build (Horak & Long, 2018). Particularly, e-commerce trust is a major constraint in integrative process (Ribadu & Rahman, 2019). Besides, there is no transparency in poultry supply chain among stakeholders (Nallusamy, Rekha, Balakannan, Chakraborty & Majumdar, 2015), partly due to the professional stance by some SC managers which tends to stifle partnering success (Butt, 2019).

Poultry industry is usually by characterized unstructured supply chain (Gowane, Kumar & Nimbkar, 2019). Studies on trust-SCI relations in different cultural context is commendable (Butt, 2019; Searle, Nienaber & Sitkin, 2018), hence the study in the commercial poultry industry in Ghana.

Unlike where studies focused only on the customer integration, supplier integration and internal integration (Borazon & Supangco, 2018; Abbas, Nobanee, Khan & Varas, 2018) and information integration (Kumar, et al., 2017), separately, the study integrates these dimensions of SCI into a single model to test their interactive effect on OP, given cognizance to the intervening factors of trust and firm size. This decision was informed by the claim that SCI is now a broad construct that has evolved overtime (Ahmed, Pagell, Kristal & Gattiker, 2019). Based on the above submissions, this study was conducted to assess the effect of SCI on OP of commercial poultry farmers, it then controlled for the mediating and moderating effects of SC relationship trust and firm-size in that relationship respectively.

Purpose of the Study

The study sought to assess the effect of supply chain integration on operational performance of commercial poultry farmers in Dormaa Municipality after controlling for the intervening effect of trust and firm size. Specifically, the study sought to:

1. assess the effect of supply chain integration on operational performance of commercial poultry farms.

2. assess the mediating effect of trust in the relationship between supply chain integration and operational performance of commercial poultry farms.

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3. assess the moderating effect of firm size in the relationship between supply chain integration and operational performance of commercial poultry farms.

4. assess if there is difference in operational performance among the various classes of commercial poultry farm.

Research Questions

With regards to the specific research objectives, these research questions are subsequently asked to finding answers to the objectives at the end of the study.

1. Does supply chain integration affect operational performance of commercial poultry farms?

2. Does trust mediate the relationship between supply chain integration and operational performance of commercial poultry farms?

3. Does firm size moderate the relationship between supply chain integration and operational performance of commercial poultry farms?

4. Is there a difference in the operational performance of the various categories of commercial poultry farms?

Significance of the Study

The findings of this study contribute significantly to the literature of SCI and OP, particularly those existing in poultry industry in a developing country context. Commercial poultry farmers may find this study insightful as it provides information as to the aspects of SCI that scientifically improve their OP, given cognizance of the possible effects of trust in SCI relationship and firm size. For poultry farmers, the findings would provide reliable insights as to how changes in SCI affect their performance, particularly

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operational and financial performance. It is expected that the findings will help farmers to identify the significant measures on SCI that can be manipulated at the end of the study to cause a desired variance in OP of poultry farmers in Dormaa Municipality. The study may come out with factors that negatively affect the joint integrative efforts of commercial poultry farmers which will inform decision making.

The moderation analysis may provide explanation as how firm size affects the strength and direction of relationship between SCI from the perspectives of focal firms and their OP. Researchers and students may see this study extremely useful as it will serve as a material for empirical literature for them to rely on for further studies in the subject area. The study may operationalize some key concepts to fit the situation of the Ghanaian commercial poultry industry will key emphasis on poultry production, given cognizance to firm size trust and SCI. Based on the findings at the end of the study, the study will suggest areas that can be exploited by students and researchers alike in terms of further studies. Gaps identified but not fully filled by this study can also be a fertile ground for exploit among researchers.

Also, the findings of the study are very useful to poultry SC actors as such findings inform them as to how integration in the presence of working trust in business relationship among SC partners influence the operations of the focal firms. These findings would influence their decisions on issues affecting SC performance and activities. For policy purposes, study provide insights guided by the empirical findings in terms of policy recommendations to policy makers in the poultry industry as how policies can be formulated to enhance efficiency of SCI among commercial poultry farmers.

Delimitation

The study seeks to assess the effect of SCI on the OP of commercial poultry businesses in Dormaa Municipality which is notable for a vibrant commercial poultry industry in Ghana (Haligah, 2017; Kusi, et al., 2015; Sarpong, 2017). Domestic poultry farmers were excluded from the study. The accessible population include 413 commercial poultry farmers currently operating in Dormaa Municipality. Two hundred and sixty-two (262) commercial poultry farms were targeted for the study. Farmers, owners and supply chain mangers served as proxies for the respect element in the sampling frame. The unit of analysis was commercial poultry farms.

Organisation of the Study

The study is organized mainly on five key chapters. Chapter One deals with the introduction of the study with special emphasis on background of the study, statement of the problem, significance of the study, delimitation, and organization of the study. Chapter Two focuses on extensive literature review as guided by the theoretical, conceptual, and empirical themes of the study cognizance of specific research objectives of the study. Interrelationship among the concepts were also examined. This section provides means to evaluate the findings in the light of empirical claims.

Chapter Three focuses on the research methods that were employed to conducting the study. Chapter Four deals with presentation of the results and discussion. Discussion covered both managerial implications as well as references to empirically established claim as directed by findings of the study. In Chapter Five, summary of the key findings was presented, in addition to conclusions drawn as well as recommendations offered. The

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chapter also provided information about suggestions for further studies as well

as limitations of the study.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The study sought to assess the effect of SCI on OP of commercial poultry farms in Ghana with special emphasis on those located in Dormaa Municipality in the Bono Region. It also treated trust in SC relationship and firm size as mediating and moderating variables respectively. This chapter provides information regarding theoretical perspective, conceptual perspective, empirical review as well as conceptual framework chronologically.

Theoretical Review

Theories are nets cast to catch what we call 'the world' with the view to rationalize, to explain and to master it by endeavouring to make the mesh ever finer and finer (Solesvik, 2018). For quantitative-explanatory research, it becomes necessary for one to review theories that better explain the behaviour of the actors underpinning the interrelationships the study seeks to establish among the actors given cognizance to research objectives, hypotheses, and statistic analytical tools. The study is underpinned by two main theories and these are resource dependency theory and network theory.

Resource Dependency Theory

Pfeffer, (1981) defines organizational success in the context of resource dependency theory as a means of maximizing organizations' power. Research into organizational power extends as early as 1947 as advanced by Weber (1947). Specifically, resource dependency theory is linked to the power

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relations existing among organizations based on exchange of organizational resources. Resource dependency theory have it that those actors that lack strategic resources or essential resources seek to form relationship with those actors with such resources to get the needed resources.

Firms, therefore change the degree of dependence on interrelationships by, reducing their own level of dependence or by raising the level of dependence of other firms on them. Thus, firms are defined as coalitions responding to their structure and patterns of behaviour to obtain resources needs of their entities in the outside world. To obtain external resources, firms reduce their dependence on outsiders and or by raising other's dependency on it, signifying the modification of firm's power with other firms. The resource dependency theory is anchored on the pillars that firms' position is composed on both external and internal coalitions born out of social exchanges formed to affect and control corporate behaviour, there are scarce resources in the business environment and firms value resources essential for their survival.

The theory posits firms try to achieve two-related objectives including the quest to amassing control over resources to minimize their degree of dependency on other firms and to maximize their level of control over resources against other firms. Striving to achieving either objective has the capacity to affect power shift in that social exchange relationship (Pfeffer & Salancik, 2003). Organizational behaviour as informed by resource dependency theory is meant to reduce uncertainty in operations by reducing dependence.

It thus means the main variables considered under the resource dependency theory include organizational environment with special emphasis

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on effectiveness and resource constraints, interdependence and resource dependence as influenced by the degree of interaction among actors as well as power actors possess (Nienhüser, 2008; Delke, 2015). Although resource dependency theory was initially framed to handle relationships between firms, the theory is however applicable to relationships among units within firms. The theory has been applied in SC studies (Davis & Cobb, 2009), merger and joint venture relationships (Hillman, Withers & Collins, 2009), supply management (Delke, 2015), and trust in business relationships (Zhao, Pan & Song, 2018).

This theory fits the context of this very study. From technical point of view, one can infer that commercial poultry farmers foresee the possibility of failure arising from relying on their resources without seeking support from other actors within the poultry SC, hence in order to avert eventualities that may occur when their internal resources are not able to meet operational capacity demands, they then heighten their level of dependency on their SC actors by forging integrative relationships with these actors so as to tap into their resources base for their mutual benefits. SCI integration acts as the conduit that aids access to inter-firm and intra-firm access to strategy-supportive resources.

Inferences from such relatively competitive position of focal firms are that they can sometimes dominate the terms of contracts (Zhao, Pan & Song, 2018) thereby forcing other actors that may be affected in this sense to make concessions to keep business going, especially in situations where uncertainties in the business environment supports such as actions. To minimize dependence of the remaining actors in the SC, the focal firms

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deepen the level of supply chain actors' dependency on them as a result of favourable positions held in the integrative arrangements.

Network Theory

The network theory uncovers the dynamics of interorganizational relations with special focus on personal relationships between the parties as well as mutual creation of trust through corporative relations and exchange processes (Borgatti & Ofem, 2010). The theory encapsulates a web of relationships and connections at the personal level as well as organizational level for the purpose of securing favours in person and or organizational action (Moghaddam, et al, 2018). Network theory proposes that such social ties create avenue for actors in the network to seize opportunities (Moghaddam, et al., 2018).

The network theory sees social relationships as nodes and ties. Individual actors in the network represent the nodes whilst ties represent the nature of relationships among actors in the network. Within a given network, there could be several nodes and ties. The network is used to determine social capital possessed by individual actor and essentially encapsulates a social network which serves as a map of all-important ties among nodes being considered. Nodes are displayed as points whilst ties are demonstrated as lines in a social network diagram (Rodrigues, Evans & Galatti, 2019).

The essence of building networks is to establish relationships which creates networks that are stable and dynamic (Mahapatra, Narasimhan & Barbieri, 2019). Among the major features of network theory include bounded rationality, trust, dyadic relationships embedded in network, exchange, and adaptation (Song, Temby, Kim, Cisneros & Hickey, 2019). SC network is

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made up of with several enterprises as well as their mutual partnerships, which is driven by corporations with core enterprises directly and indirectly (Fang, et al., 2018). Networks can be morphed into at least six regular structures varying in number of clusters, interconnectivity, and cohesion (Litterio, Nantes, Larrosa & Gómez, 2017). Its level of analysis includes individual, group, and network (Hardyns, Snaphaan, Pauwels, Vyncke & Willems, 2019; McGee & Jones, 2019).

This theory is highly applicable to the context of this study. To start with, the whole idea of forming integrative relationship is anchored on the thrust that the actors in in each of the nodes supply chain form a network through which mutual exchange of resources is created. Again, although SCI with other actors in the commercial poultry supply chain strives on personal connections among the human elements in such web, such interpersonal relationship is strongly anchored on the level of trust among the SC partners in the integrative relationship.

Commercial poultry farmers form social ties with others in the industry to seize opportunities that may accrue due to such collaborative arrangement. These opportunities are in this context operationalized as the measures of operational performance that linked to the internal efficiency of operations of the focal firms (Commercial poultry farmers). Through the network of actors in various nodes in the supply chain structure of the commercial poultry industry in Ghana, commercial poultry farmers can create stable and dynamic larger-scale network based on SCI that flourishes on adaptability, exchange, bounded rationality, and trust.

Conceptual Review

This section provides information relating to the key concepts under consideration. It extensively explains the concepts, given cognizance to their definition and dimensions recognized by empirical studies. It also provides information relating to context of the study which ultimately provide concise picture about how the constructs are regarded in case of this study.

Commercial Poultry Supply Chain Structure in Ghana

Poultry supply chain in Ghana is highly characterized with multiple nodes with numerous actors whose activities are highly interdependent by virtue of the nature of the product they deal in. The poultry industry is made up of blend of both local and foreign actors although they are predominantly privately owned (Nti, 2018; Folitse, Sam, Dzandu & Osei, 2018). These actors all perform different but interdependent functions within the commercial poultry chain which collectively lead to improved performance among these SC actors. The sector is also characterized with both horizontal and vertical industries with varied value chain systems (Shamsuddoha, Quaddus & Klass, 2013).

Forward SCs, reverse SCs and combined SCs are major features of commercial poultry industry (Shamsuddoha, Quaddus & Klass, 2013) in Ghana although much emphasis is placed on forward supply chain (Nti, 2018). Forward supply chain is a system with actors such as suppliers of materials, production facilities, distributors and customers that are linked by the forward feed flow of materials and feedback flow of information. Reserve SC is the direct opposite of forward SC and deals with effect implementation of series

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of activities involved in collecting products from any stage of the forward SC to either dispose or recover value.

The interdependency among these actors in commercial poultry industry in Ghana is partly responsible for much integrative interrelations among the actors. Different stages of the poultry SC include grandparent firms, parent firms, hatchery units, feed mills, broiler farms, open markets, slaughtering plants, processing centres, waste processing units, distribution, and consumption (Shamsuddoha, 2014).

Major flows in the commercial poultry SCSs includes information, products, and finance. Information flow cuts across all nodes and must therefore be timely coordinated system-wide approach to provide reliable accurate information for well-informed business decision making among supply chain actors. From the perspective of the study, resource flow is dominant among input suppliers as well as supporting actors whilst financial flow goes to mostly to the input suppliers and supporting actors. Traditionally, the commercial poultry industry in Ghana focuses livestock such as chicken [layers and broilers], guinea fowl, ostrich, duck, and turkey (Aning, 2006). The final product categories are meat and egg.

Major players in the poultry SC in Ghana include commercial poultry farmers [focal actors in this study], input suppliers [both local and foreign suppliers-feed sellers, chick suppliers, drug sellers], distributors [both local and foreign retailers and wholesalers alike]; supporting actors: meat processors, feed processors, third party logistic firms, poultry farmers association, financial institutions, veterinary services; customers [both consumer and industrial market-local market and international market and

sellers of poultry gadgets. These actors are of different sizes and different locations across the country and beyond. The supply chain structure of the commercial poultry industry in Ghana is presented in Figure 1. The red lines represent cashflows, the green lines show information flows, the blue lines show product flows whilst the dotted yellow line shows support services.
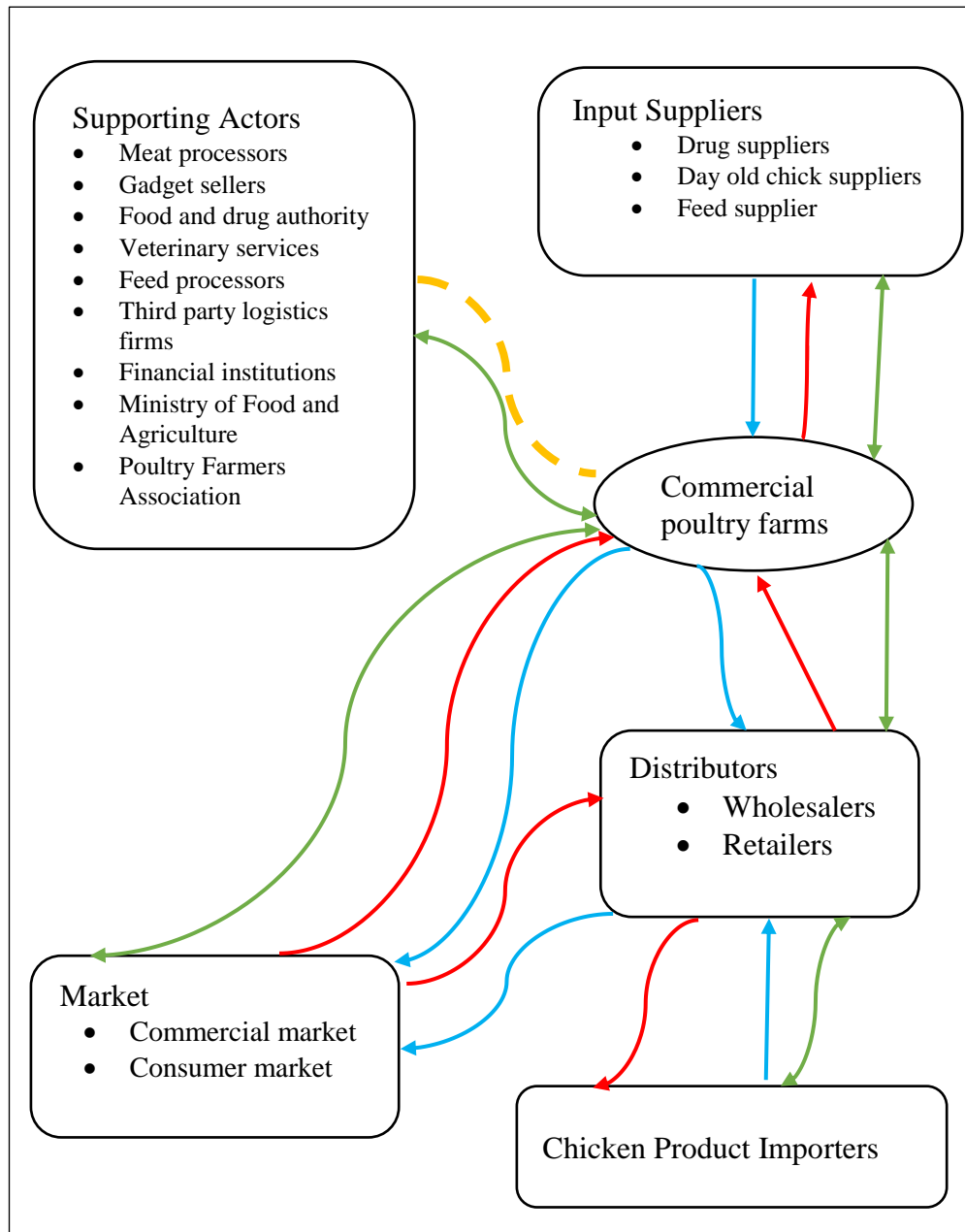
Figure 1: Commercial Poultry Supply Chain Structure in Ghana
Source: Author's construction, Kusi (2020)

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Supply Chain Integration

According to Ojansivu and Medlin, (2018) business relationships strategies are meant to create value through adaptation and management of activities and resources within a network. Integration is aspect of business relationship. Several models exist for such business relationships including the sharing model, the specialization model, the allocation model, and the hybrid model (de Man & Luvison, 2019; Keers & van Fenema, 2015; Khanna, Gulati & Nohria, 1998). Partners in SC rely on one of these models or a combination (de Man & Luvison, 2019).

SCI also includes the application of new technology to improve information flows (Van der Vaart & van Donk, 2008), financial flow (Mabert & Venkataramanan, 1998) and coordinate the flow of physical goods (Zolait, Ibrahim, Chandran, & Sundram, 2010) between SC partners (Samaranayake, 2005; Stank, Keller & Closs, 2001). SCI encapsulates the practice of directing organizational efforts to working together in various units with a given firm by sharing information and inputs to achieve common mutual goals in SC chains (Qi, Huo, Wang & Yeung, 2017)

Components of Supply Chain Integration

Customer integration involves the strategic competencies and activities firms apply in providing optimum services with customers through relationship building (Stank, Keller & Closs, 2001). Customer integration refers to building long-term relationships with customers to obtain information about the market, technology and creating products that meet customer requirements and enhance their satisfaction (Butt, 2019; Abbas & Kamal, 2018; Lotfi, Mukhtar, Sahran & Zadeh, 2013). Customer integration means

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understanding for needs of core customers and responding to the needs (Bae, 2017; Chiang, Chen & Wu, 2015). Nature of relationship between customer integration may vary with customer response speed (Chiang, Chen & Wu, 2015). The basic principle of customer integration consists of gathering customer problems and then solving them in a combined effort (Lis & Horst, 2013). According to Bae (2017), Supplier integration encompasses structuring collaborative relationships with core suppliers for stock management and stable supply of raw materials and parts.

Internal integration has been said to be the foundation of other kinds of integration and is defined as the linkage of business processes of departments in an organization into a strategic fit for improved performance (Fawcett & Magnan, 2002). Internal integration means processes of cooperation and interaction for maintenance of the close relationship between departments (Bae, 2017). Internal integration is the level to which a company integrates and connects its internal departments, teams, and information to cooperate effectively and improve performance, competitiveness, and customer satisfaction (Lotfi, et al., 2013).

Information integration involves the sharing of key information data among supply chain partners through IT systems in order to bring about mutually beneficial outcomes (Trkman, Indihar Štemberger, Jaklič & Groznik, 2007). The supply chain information integration consists of information technology and information sharing and they are viewed as an example for the logistics integration (Abbas & Kamal, 2018; Chiang, et al., 2015). Channels mostly used for information sharing in IT include traditional methods (emails, phones, faxes etc.), corporate information system, in-house information

system, warehouse management system and electronic data interchange (Pham, Nguyen, McDonald & Tran-Kieu, 2019; Lee & Ma, 2012).

Information type normally shared include but not limited to operational information, capability-related information and strategic plan and competitive information (Han, Wang & Naim, 2017). Information technology plays active role in three aspects. Information technology increases firms' volume of information communicated to partners, it also allows firms to plan their activities related to supply chain including managing inventory level, timings of the production and condition of the end-to-end delivery (Abbas & Kamal, 2018). Another aspect of IT is facilitating the smoothness between firms and suppliers' operation for best output. It is a means to ensuring sharing of standardized information formats with supply chain partners, creating opportunity for integrated sourcing, transport, service process and visibility in supply chain (Han, Wang & Naim, 2017).

Another form of SCI worthy of reviewing is logistic integration (Ju, Wang, Cheng & Jia, 2019). As a result of seamless logistics integration, the connection between firms and suppliers creates no boundaries and thus well-coordinated flow of materials from suppliers allows smooth production (Sukati, Hamid, Baharun & Yusoff, 2012). Logistic are characterized with subordination, immediacy, demand volatility and sustainability (Ju, et al., 2019). Ju, et al, further acknowledge low level of logistic integration hinders the development of logistics service supply chain for sustainable performance. According to Rai, Patnayakuni and Seth, (2006) financial flow integration is defined as the extent to which exchange of financial resources between a focal

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firm and its supply chain partners is driven by workflow events. (Johnson & Mena, 2008; Tsai, 2011; Yu, Jacobs, Salisbury & Enns, 2013).

Firm Size

The study employed the contingency approach to stablishing the conceptual framework ((Töyli, Häkkinen, Naula, & Ojala, 2008). The underlying notion under this approach is that the "fit" of applied SCI and firm OP hinges on the environment the firms operate in (Drazin & Van de Ven, 1985). The adoption of the contingency approach was influenced mainly by the works of some researchers in the past in this field of study (Donaldson, 2001; Ketchen & Hult, 2007) because recognized the need to controlled the possible effect of firm size, manufacturing strategy and industry orientation in studies of this nature.

Firm size seems appropriate factor for consideration given the context of the study. This is because firm size relates to the resources the firm possesses (Sivadasan, Smart, Huatuco & Calinescu, 2010; Khouja, 2003). These power imbalances stem from unequal access to resources as postulated by Resource-Based Theory (Barney, 1991). Firm size is contextual in nature and its measurement depends on industrial and country-specific standards (Anang et al., 2013). Nti, (2018) also classified commercial poultry farmers into small-sized farmers [Under 2000 birds in broiler operations] or [Under 5000 birds in layer operations]; medium-sized farmers [2,000-4,999 birds in broiler operations] or [5,000-9,999 birds in layer operations]; and large-sized farmers [5000 or more birds in broiler operations] or 10,000 or more in layer operations]. This study adopted the firm sized as proposed by Anang et al., (2013) because it is easy to measure, apply and compare.

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Firm size has been treated as moderator in some causal studies (Chuang, Oliva, & Heim, 2019; Haar, et al., 2018) with contingency approach (Mohammad & Bujang, 2019). Firm size also sometimes relates to the location of such farms. In Ghana, most of the commercial poultry farmers are in Brong Region, Ahafo Region, Ashanti Region, Eastern Region, Greater Accra, Northern Region, Central Region and Western Region (Aning, 2006; Kusi et al., 2015; Nti, 2018). This is supported by Figure 2 given the type of focal breed under consideration.
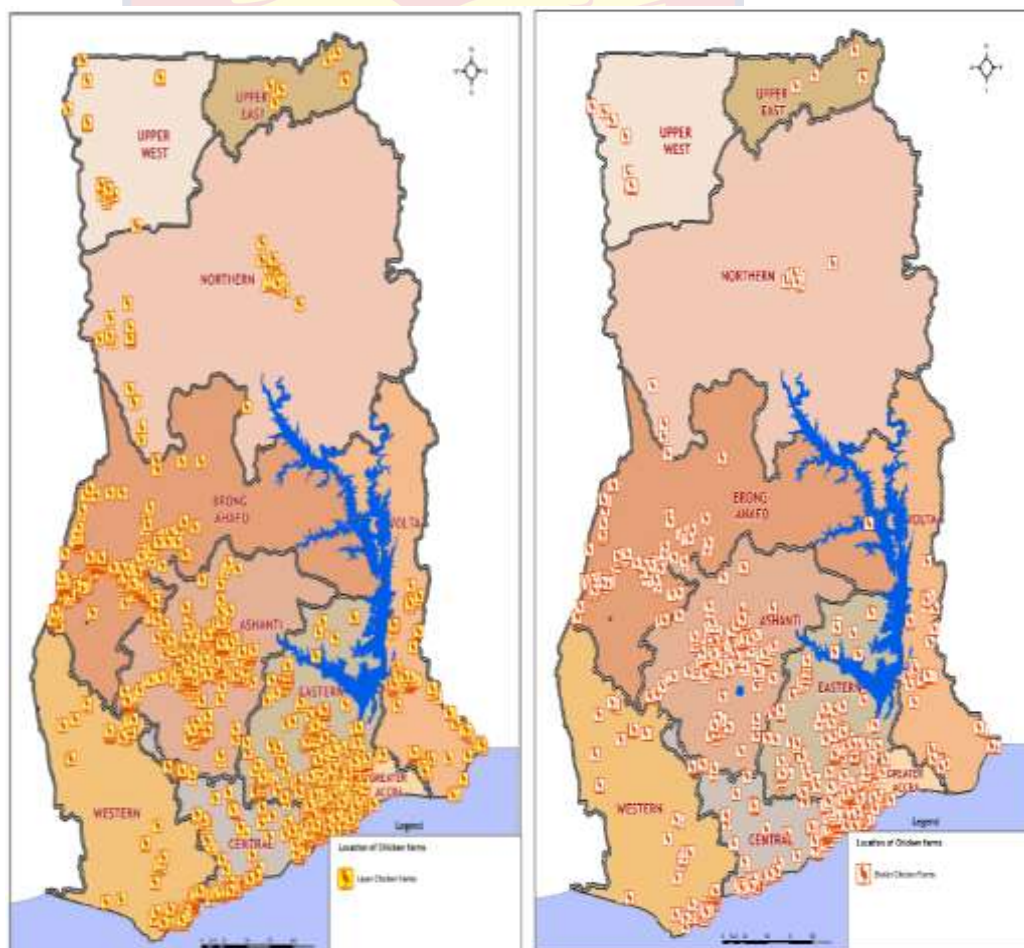
Figure 2: Distribution of Broiler and Layer Commercial Farms by Region
Source: Adapted from Nti, (2018)

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Trust in Supply Chain Integration

Trust-based relationship is a strong pillar for sustainable SCI (Wicks, Berman & Jones, 1999). It is therefore central to the success of commerce and its impact has been felt across market structures, processes, and relationships over the years (Ribadu & Rahman, 2019). Trust is the basis for communication among SCI partners (Drawel, Bentahar & Shakshuki, 2017). It must be emphasized that trust changes as business relations develop overtime (Shipley, Cao & Davis, 2019). Trust as one party's believe that the other party in the relationship will not exploit its vulnerabilities even when such exploitation would not be detected (Ureña, Kou, Dong, Chiclana & Herrera-Viedma, 2019; Dyer & Chu, 2011). Firms must commit resource to build trust with SC partners in business-to-business relationship if they are to succeed with their SCI.

Trust must ensue among all SC partners and each must be committed to making such collaborative business arrangement work (Hasche, Linton & Öberg, 2017). This call is legitimate in the sense that trust is an indispensable tool in relational exchanges (Purnasari & Yuliando, 2015). In measuring trust in business relationship, Mpinganjira, Roberts-Lombard and Svensson, (2017) stressed on fairness on negotiations, reliance on promise of business partners and trustworthiness of partners. Tsao and Hsieh, (2012) also measured customer trust on honesty in exchanges, stability of quality of exchanges and extent of meeting partners needs in exchange relationship.

Trust in business relationship can lead to a strong, long-term business relationships (Abdallah, Abdullah & Saleh, 2017), produces superior information flows (Chu & Fang, 2006), reduces ex-ante and ex-post

transaction cost (Kim & Chai, 2017) and eliminates complex legal contracts and conditions (Stuart, Verville & Taskin, 2012). Trust in SCI improves cooperation, lowers cost of negotiation, and enhances social interaction (Outila, et al., 2018; Cardona, Morley & Reiche, 2013).

Zhao, Pan and Song (2018) further disclosed that trust is a partial mediator in the supplier dependence-green supplier integration. It must be cognized that opportunistic behaviour among supply chain partners inhibits trust in SCI relationship (Ju, et., 2019). Distrust is inherently linked with risk which highly possible in complex SCs (Han & Dong, 2015). With network-oriented business relationships including SCI, trust is the fabric that holds the actions and inaction for supply chain partners towards mutually beneficial SC business arrangement (Ureña, et al., 2019).

Operational Performance

Performance measurement deals with the process of estimating the output of actions that are carried out with respect to a job (Panwar, Jain, Rathore, Nepal & Lyons, 2017; Gimenez & Ventura, 2005) and could be categorized into different dimensions; operational, financial, environmental (Dey & Cheffi, 2013). SCI is positively related to performance either through explicit (Frohlich & Westbrook, 2001) or implicit (Narasimhan & Kim, 2002) consideration. Performance is context-specific (Kumar, Brint, Shi, Upadhyay & Ruan, 2019; Feng, et al., 2018). In this context, key emphasis is placed on OP of commercial poultry farmers.

OP refers to as the results of the organization's processes and activities and is the common assessment for organizational efficiency and organizational effectiveness (Yang, Huang & Hsu, 2014). To de Leeuw and van den Berg,

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(2011) OP encompasses the definition, implementation and use of performance measures on the level of day-to-day operations. OP measures therefore capture internal efficiency because such measures are affected directly by both organizational activities and managerial decisions (Turkulainen & Ketokivi 2012; Pashaei & Olhager, 2019).

OP measures therefore capture both internal efficiency (Turkulainen & Ketokivi, 2012) and measurable organizational processes (Azim, Ahmed & Khan, 2015). Feng, et al., (2018) measured OP in terms of quick response to changes in market demand, capacity to make rapid product mix changes, an outstanding on-time delivery record to our customer, the lead time for fulfilling customer' order in short, provide a high level of customer services and reduction of waste in production process. Other measures of OP include conformance specification compliance, delivery speed, product delivery reliability, product performance, product mix flexibility, volume flexibility, unit cost of product (Hallgren & Olhager, 2009; Pshaei & Olhager, 2019), competitive advantage, flexibility in responding to changes (Boyer & Lewis, 2002), operating cycle and inventory turns, (Azim, Ahmed & Khan, 2015).

Furthermore, analysis of some previous studies shows that other indicators were used to measured OP and these included value addition, efficiency, improved order fulfilment rate, delivery, quality time (Trattner, Hvam, Forza & Herbert-Hansen, 2019), cost performance, service performance (Bae, 2017), product performance, brand name, product innovation, cost effectiveness, price competitiveness and on-time delivery (Huo, Gu & Prajogo, 2016), reduction of waste cost, reduction of usage of harmful material, reduction of accidents and safety issues, high capacity

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utilization, effective reverse logistics, perceived quality, process efficiency and cost effectiveness (Dey & Cheffi, 2013).

Supply Chain Integration and Operational Performance

Empirically, Bento, Schuldt and Carvalho (2020) examined the influence of supplier integration and lean practices adoption on OP in the textile industry. Conceptually, lean practices adoption was treated as a mediating variable, supplier integration as an independent variable whilst OP was considered the dependent variable. 122 companies in Brazil were surveyed through structured questionnaire administration. The scales for measuring the constructs were adopted from validated scales.

A 5-point Likert scale was used for assessing the attitude of the respondents on the items considered in the scale for the respective construct. Structural equation modelling was used for the testing of the proposed hypotheses. The results proved that supplier integration was a significant positive predictor of speed of new product introduction. Also, the study proved that supplier integration does not support lean practices for any of the OP indicators tested.

Errassafi, Abbar and Benabbou (2019) in their empirical study examine the effect of SCI on OP after controlling for the mediating effect of internal integration. The study targeted Moroccan manufacturing companies. Structured questionnaire was used for the collection of the primary data. The items in the scale were adapted from empirically tested scales. A 5-point Likert scale was used to assess the opinions of the respondents on the items that were measured. A total of 502 manufacturing firms were considered but 75 cases were used for the data analysis.

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Structural equation modelling through partial least square (PLS-SEM) was used for the analysis of the primary data in respect of the demands of the formulated hypotheses. A two-stage approach to structural equation modelling was employed. The study proved that internal integration accounted for a positive and significant change in OP. Also, supplier integration proved to be significant positive predictor of OP. Similarly, customer integration also caused a significant positive variance in OP. The mediation analysis also showed that internal integration mediated the relationship between customer integration and OP and supplier integration and OP.

Al-Doori (2019) further conducted a study that sought to assess the impact of SC collaboration on performance in the automotive industry. The study employed a quantitative study to measuring and analysis the variables and hypotheses respectively. The population included automotive companies in Pakistan. 232 respondents were surveyed through questionnaire administration. Data transformation was carried out to aid a holistic approach to analysis the specific objectives. It was discovered that there were statistically significant positive linear correlations between the components of SC collaboration and OP. SCI as measured by information sharing, joint decision making and electronic data interchange accounted for 58.0% (significant), 51.6% (significant) and 39.7% (insignificant) variance in performance of automotive companies respectively.

Osei and Kagniciogu (2018) examined the impact of SCI on firms' business and OP in the food retail sector. SC managers and CEOs were surveyed through emailing. Stratified sampling technique was used for the selection of the respondents. Structured questionnaire was used for the

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collection of the primary data. 216 firms where selected but 208 dully submitted their filled questionnaires. AMOS software was used for the structural equation modelling. It was discovered that there was a statistically significant positive relationship between internal integration and external integration. Both internal integration and external integration collectively accounted for a significant positive variance in firm's OP as well as business performance.

Abbas and Kumar, (2018) conducted a study the sought to examine the effect of SCI on firm performance among Chines Enterprises in Pakistan under CPEC as influenced by long term relationship. A 5-point Likert Scale was used to measure the opinions and attitudes of the respondents targeted in the study. All the items were reliable based on the internal consistency as measured by Cronbach's Alpha values. A structural model was configured through AMOS application. The structural was based on co-variance among the constructs of study.

The findings indicated that logistics integration was a significant positive predictor of firm performance. Similarly, it was discovered that information sharing and logistic performance all related positively. Furthermore, it was discovered that information technology and logistic performance all related positively. However, it was found that long-term relationship related negatively with information sharing and this relationship was statistically insignificant.

Borazon and Supangco (2018) conducted a study to evaluate the effect of SCI on business performance and competitiveness of small and medium enterprises in Philippine. SCI was measured by internal integration, customer

integration and supplier integration. The study employed snowball and convenience sampling techniques to target a population of 1900 small and medium enterprises in Philippines. The participants were conducted through email, personal administration, and telephone. The sample size of 384 respondents completed the questionnaire and returned same timely.

The opinions of the respondents relating to the items considered in all the constructs were measured on a 7-point Likert Scale. The dependent variables included business performance and competitiveness. The independent variables included customer integration, supplier integration, internal integration. The study controlled firm size in this context. Internal consistency as measure of reliability showed that all the constructs were reliable. Structural equation modelling was used to test the hypotheses. Supplier integration failed to predict a positive change in business performance and competitiveness among the firms. The study also revealed that internal integration positively predicted a significant change in business performance and competitiveness.

Another study was conducted by Feng, et a., (2018) the effect of green SC management on financial performance after controlling for the mediating effect of operational and environmental performance. The study targeted automotive manufacturing companies in China. A sample of 1000 manufacturing plants was considered. The study targeted informants of 600 automotive firms in China and through email and post, 600 questionnaires were sent to those who were willing to participate in the study. A response rate of 21% was however recorded. A two-step approach and structural equation modelling were used to test the conceptual model. The measurement model

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was measured alongside recognized measures for quality assessment of the configured model.

It was discovered that green supply chain as integral part of SC strategy was significantly and positively associated with both environmental performance and OP, which indirectly led to improved financial performance. Besides, there was a statistically significant positive relationships between OP and financial performance, and between environmental performance and financial performance. Both operational and environmental performance mediated the predictive relationship between green SC management and financial performance.

Mediating Role of Trust

On empirical review relating to business trust, Tarigan, Siagian, Sutjianto and Panjaitan (2020) in their empirical study examined the effect of supplier trust, supplier innovation and buyer-supplier relationship on supplier performance. The study targeted Death Service Companies in Surabaya, Indonesia. The study adopted a causal study. Primary data were gathered through structured questionnaire administration. The opinions of the respondents were measured on a 5-point Likert scale. 110 death companies were targeted but only 52 responded which led to 47.3% response rate. Structural equation modelling was used for the testing of the hypotheses. Recognized indexes were adequately met in the structural analysis. It was discovered that supplier trust predicted a statistically significant positive variances in supplier innovation, buyer-supplier relationships, and supplier performance.

A study was conducted by Zhao, Pan and Song, (2018) which investigated the moderating effect of contract management difficulty in the relationship and dependence on supplier, supplier trust and green supplier integration. Supplier trust was also treated as a mediating variable. The study targeted Chinese manufacturing companies located in different regions in China including Guangdong, Jiangsu, Shaanxi and Hanam. 600 companies were randomly selected as target population. Questionnaires were used for the primary data collection and eventually, 187 completed questionnaires were retrieved although 284 manufacturing companies were initially targeted. Thus, a response rate of 31.2% was recorded.

Supply chain mangers, CEOs/presidents, vice presidents were targeted for the answering of the items in the questionnaire. Supplier trust was measured on a 5-point Likert scale with 5 items. Firm size, firm age, industry type, longevity of relationship with supplier were measured along natural logarithm and treated as controlled (moderating) variables. It was discovered that supplier dependence was a positive and significant predictor of green supplier integration. Again, supplier dependence was a significant positive predictor of supplier trusts.

Liu, Ke, Wei and Hua, (2015) also conducted a study that examined the influence of power and trust on the intention to adopt electronic supply chain management in China. The study employed a survey as the main design of the study and targeted firms in the manufacturing and service sector. A sample of 202 senior executives were randomly selected.

Primary data was collected through structured questionnaire administration. Firm size was measured by the number of full-time employees.

Common method bias was measured through one-factor model and measurement model. Test of goodness of fit was done using LISREL 8.5. Among the control variables, only firm age and firm size had significant effects on eSCM adoption. Both competence trust and contractual trust positively and significantly predicted the adoption intention of eSCM among the targeted firms but goodwill trust however failed to significantly predict changes in adoption intention of eSCM.

Another study was carried out by Abdullah and Musa (2014) to assess the effect of trust and information sharing on relationship commitment in SCM. The study targeted wholesalers, distributors and retailers in Klang Valley. Trust was adopted from empirically validated scale and it had 5 items. Other related constructs where also adapted from validated scales. A 7-point Likert scale was used to measure the opinions of the respondents on items that were measured through the structured questionnaires. Although 235 questionnaires were distributed, 232 were however usable.

Structural equation modelling was carried out to test the proposed hypotheses. It was discovered that both trust and information sharing accounted for 58.5% positive variance in relationship commitment in SCM. Trust was a significant positive predictor of relationship commitment in SCM. Also, information sharing also proved to be a significant positive predictor of relationship commitment in SCM.

Moderating Role of Firm Size

Wang, Zhang and Goh (2018) in their empirical study examined the moderating effect of firm size in the effect of sustainable SCM on sustainable performance. The study surveyed ISO14001 and ISO9001 certified firms in

China. Although 670 firms were targeted, only 178 firms filled the structured questionnaires that were issued to the respondents. The questionnaires were adopted from validated sources. Hierarchical multiple regression with six steps were carried out. It was discovered that firm size significantly and positively affected economic performance, environmental performance, and social performance.

Regarding the moderating effect, the study proved that firm size had a significant moderating effect on the relationship between sustainable supply chain management and sustainable performance. Also, the study proved that both internal sustainable supply chain practices and external sustainable supply chain practices have significant positive impact on the environmental performance of mid-sized enterprises and that the co-efficient interaction between sustainable supply chain management practices and large enterprise are positive and significant.

Ali, Mukulu, Kihoro and Nzulwa (2016) in their empirical study examine the moderating effect of firm size on the relationship between functional integration and firm performance. The study targeted manufacturing firms in Kenya. Functional integration had three main subscales including coordination, information sharing and coopetition and was treated as the independent variable. Firm size was treated as the moderator whilst firm performance including financial and non-financial performance was treated as the dependent variable.

Structured questionnaire was used for the gathering of the primary data that was used for testing the hypotheses through multiple regression analysis. Data transformation was carried out to obtain composite variables to aid a

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holistic approach to the data processing and analysis. The study proved that both firm size and functional integration significantly predicted positive variance in firm performance in a single model. Furthermore, firm size failed to moderate the relationship between functional integration and firm performance within the Kenyan manufacturing firms.

Lee, Seo and Dinwoodie (2016) examined the effect of SCI on logistic performance and controlled for the moderating role of supply chain dynamism and controlled for firm size. Structured questionnaire was used for the collection of the primary data and measured the constructs on a 7-point Likert scale. Firm size was measured by natural logarithm of the number of full-time employees. The study targeted manufacturing companies in South Korea. The study targeted 864 firms and issued online (email) questionnaires to them. The study proved that internal integration, supplier integration and customer integration significantly predicted logistic performance positively. Furthermore, firm size had no significant effect on the relationship between SCI and logistic performance and therefore was considered insignificant determinant of firm performance.

Wu (2013) also conducted an empirical study the sought to examine the influence of green SCI and environmental uncertainty on green innovation in Taiwan's IT industry. Firm size was controlled for in the analysis. Questionnaires were mailed to IT companies and targeted managers who were knowledgeable in green supply chain management. 211 useable questionnaires were relied on although 254 questionnaires were initially mailed to the respondents. Hierarchical moderation was carried out in the bid to testing the

formulated hypotheses. The results proved that firm size positively and significantly related with green product and process innovation.

Lessons from Empirical Review

A close observation of the empirical studies shows that the level of analysis of the relationship between SCI and firm performance were just aimed at establishing linear relations (Abbas & Kumar, 2018; Pakurár, et al., 2019; Kumar, et al., 2017). However, this study takes the level of analysis further to test predictive effect, mediating effect of trust in SC as well as moderating effect of firm size in a single model. The inclusion of these contextual intervening factors in the model was informed by previous empirical studies. For SCI trust (Tarigan, et al., 2020; Zhao, Pan & Song, 2018) whilst firm size was informed by these studies (Zhang & Goh, 2018; Ali, et al., 2016; Wu, 2013).

Again, what is new is the fact the study integrates all the various components of SCI-customer integration, supplier integration, information integration, internal integration, financial integration and logistics integration into a single predictive model unlike where others concentrated only on the customer integration, supplier integration and internal integration (Pakurár, et al., 2019; Borazon & Supangco, 2018; Abbas & Kumar, 2018; Alfalla-Luque et al., 2015), and information integration (Kumar, et al., 2017) separately. This is a great theoretical contribution by this study. It also provided the opportunity to test their predictive accuracy empirically in the commercial poultry industry of Ghana.

Most of these studies targeted manufacturing industries (Kumar, et al, 2017), construction, pharmaceuticals, hospitality, energy, and light

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engineering firms (Abbas & Kumar, 2018), ports (Han, 2018), banking industry (Pakurár, et al., 2019). However, the study on SCI and SME performance was conducted in Philippines (Borazon & Supangco, 2018). It is not conclusive that similar studies cannot be conducted in the context of SME in the commercial poultry industry of Ghana since different conditions exist in different environments.

Besides, there is difference in what constitute small-sized enterprises and medium-sized enterprises [SMEs] for these countries (Borazon & Supangco, 2018) therefore, this study measures firm size in the context of scale of operation of commercial poultry farms in Ghana. Again, several different data analytical approaches were employed for the data analysis, some employed a correlational analysis (Kumar, et al., 2017; Pakurár, et al., 2019), regression analysis (Al-Doori, 2019; Wang, Zhang & Goh, 2018; Ali, et al., 2016) structural equation modelling with is covariance-based approach (Abbas & Kumar, 2018; Han, 2018; Borazon & Supangco, 2018; Lee, Seo & Dinwoodie, 2016; Liu, et al., 2015).

This study however employs a structural modeling through the SMART PLS application (Ringle, Wende & Becker, 2015). This application is preferable in situations where predictive models are been configured and tested. This decision is also informed bt the fact the the study per is purpose is deemed explanatory in nature which calls for testing of predictive relationships (Xu & Long, 2020). The mode of assessement of the model was based on the approcah suggested by some empirical studies (Tarigan, et al., 2020; Errassafi, Abbar & Benabbou, 2019). Most of the studies employed questionnaires for the primary data collection exercise with a 5-pint Likert

scale of measuremnt (Bento, Schuldt & Carvalho, 2020; Kumar, et al., 2017; Pakurár, et al., 2019).

Although this study employed structured questionnaire for the primary data collection as in the case of many of these empirical studies, its scale of measurement was a 7-point Likert scale since such scale of measurement (7-point Liker Scale) is considered continuous scale that warrants such predictive study (Borazon & Supangco, 2018; Bae, 2017). Again, the items in the scale were informed by extant literature because these scales were adopted from empirically validated sources which improved the level of reliability of the data. The items were also subjected to scrutiny by experts in supply chain management. Through the SMART PLS application, validity and reliability of the scales were established. Since e-mail primary data collection methods produced smaller return rate (Han, 2018; Abbas & Kumar, 2018) this study varied the data collection approach and therefore employed self-administration through drop-and-pick method of primary data collection.

Conceptual Framework

Based on the overall purpose of the study as backed by theoretical review, research empirical claims, nature of data analytical techniques and the underlying interrelationship among the constructs, this conceptual framework (Figure 3) is formulated to give deeper meaning as to the nature of interactions and interrelationships the study seeks to examine. The study proposes that changes SCI components which are conceptualized as latent exogenous constructs can positively and significant influence variance in OP of commercial poultry farmers in Ghana, particularly, those in Dormaa Municipality.

The study proposes a positive but significant relationship among the predictors jointly and same with the latent endogenous construct, OP. Furthermore, it is proposed that trust among actors in each node of the integrative relationship among SC partners plays mediating role in explaining the effect of the predictors [SCI components] on performance of focal firms [Commercial poultry farmers]. These views would then be expressed at the individual predictor level as well as holistic predictor level. Firm size was also considered a moderating variable, having bearing on the strength and direction on the effect of SCI on OP.
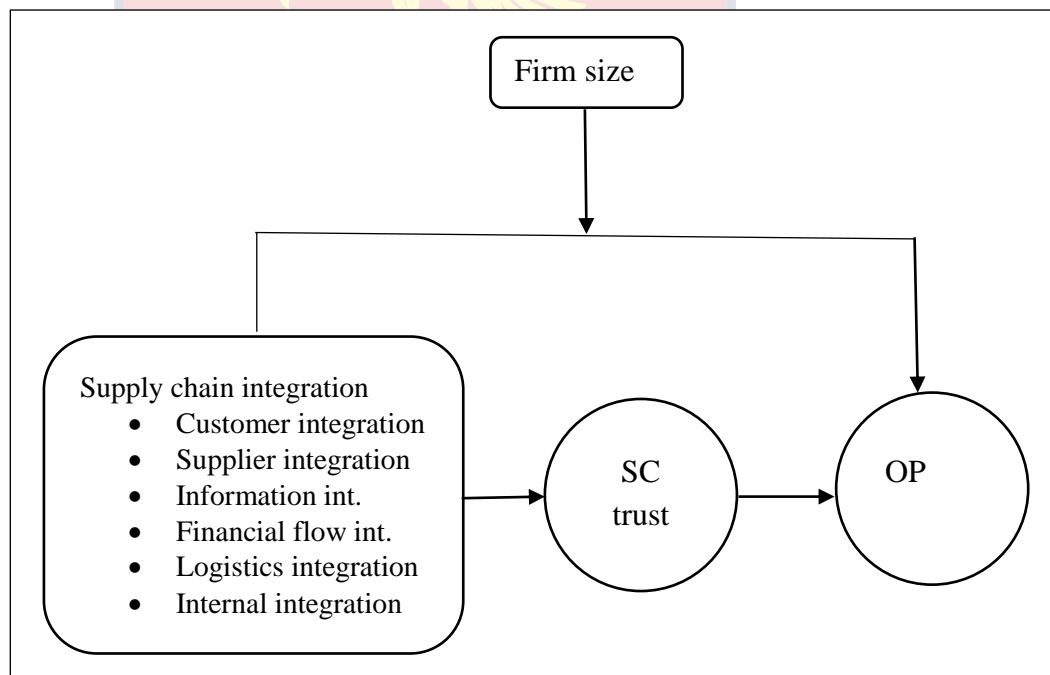
Figure 3: Conceptual Framework
Source: Author's construction, Kusi (2020)

Chapter Summary

In this chapter, information has been provided regarding the theories that underpinned the study, key concepts (constructs) that made up the thematic areas have been well defined, operationalized and explained,

empirical review of some related studies has been carried out as well as a conceptual framework reflecting the interrelationships among the constructs was configured based on the specific objectives of the study, trends identified through empirical review as well as the theoretical claims.

CHAPTER THREE

RESEARCH METHODS

Introduction

The study sought to assess the effect of SCI on OP of commercial poultry farms in Dormaa Municipality, Bono Region, Ghana. It however controlled for the intervening effect of firm size and trust among SC partners. This section provides information regarding the methodological approaches to data collection, processing, and analysis with appropriate theoretical inferences.

Research Paradigm

The study adopted the positivist philosophy. The positivist philosophy reflects the assumptions absolute truth can be applied to the study of a phenomena through scientific approach (Ballard, 2018; Alnaser, Ghani & Rahi, 2019). The study therefore assumes through application of scientific research methodology, objective results relating to the specific research objectives, would be produced to inform scientific evidence-based decision making. Empiricism is the main characteristic of positivism. It posits there is existence of objective universal reality, regulated by universal laws and mechanisms and thus, such objective reality is factual sensed by human senses in the environment (Kankam, 2019).

Objectivity is the focus of the positivist philosophy against the backdrop of testing hypothesis or theory as well as highlighting both the researcher and the research as separate structures through distancing (Kumar, 2019). Positivist paradigm helps in generating generalizable replicable findings (Kiyala, 2019). Positivism is criticized in that it focuses on only

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observable phenomenon at the expense of unobservable phenomenon (de Chantal, Gagnon-St-Pierre & Markovits, 2019).

Research Approach

The study adopted a quantitative research approach to analysing the primary data that were collected. The choice of this approach was informed by the numerical nature of the data collected (Kumar, 2019), the statistical approach to data processing and analysis (Shiau, Sarstedt & Hair, 2019), nature of specific research objectives, theoretical inferences, nature of research design (Viotti & Kauppi, 2019), data collection instrument design and the research paradigm (Eisend & Kuss, 2019). Quantitative research approach goes with the deductive reasoning which entails drawing of inferences about the population through statistical test of hypotheses from the sampled participants (Zyphur & Pierides, 2019).

Research Design

The explanatory research design was applied to examine the effect of SCI on OP of commercial poultry farms in Ghana, with special emphasis on those located in Dormaa Municipality in the Bono Region in Ghana. Explanatory research design is a typical predictive-oriented experimental study where changes in some phenomenon is attributed to changes in other phenomenon (Potwarka, Snelgrove, Drewery, Bakhsh & Wood, 2019). Since the study by nature is quantitative method, it became necessary for the constructs to be numerically measured to as to facilitates their subjecting to statistical manipulation through structural equation modeling (Nyarku, Kusi, Domfeh, Ofori, Koomson & Owusu, 2018).

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The study treated OP as the dependent variable (latent endogenous variable) whist SCI was also treated as the predictor (latent exogenous variable). Trust in SCI and firm size were treated as mediating and moderating variables respectively. In explanatory studies, hypotheses are specified in respect of the nature, strength and direction of relationships existing between or among variables or constructs being studies (Birru, Runhaar, Zaalberg, Lans & Mulder, 2019).

Profile of Study Area

The study was carried out in Dormaa Municipality which is recognized as one of the most vibrant commercial poultry industry location in Ghana (Nti, 2018; Haligah, 2017; Kusi, et al., 2015; Sarpong, 2017). The municipality also has strong industrial actors such as third-party logistics firms, feed processors, distributors, abattoirs, veterinary service providers, financial service providers, hatcheries, poultry gadget sellers, feed suppliers, drug suppliers, day old chick suppliers (Nti, 2018) and other supporting actors in the poultry supply chain (Sarpong, 2017). Commercial poultry farmers in the municipality are bombarded with numerous supply chain disruptions (Sarpong, 2017) which have pushed them to forge integrative business relationships (Kusi, et al., 2015).

Population

The study targeted commercial poultry farms that are into production of layers, broilers or both broilers and layers for commercial purposes. These commercial poultry farms were all located in Dormaa Municipality which comprises Dormaa Central, Dormaa West and Dormaa East in the Bono

Region of Ghana. An estimated 413 commercial poultry farms represent the accessible population of the study (with 213 registered-Agyemang, Ratinger & Ahado, 2019) and 200 unregistered from a feasibility study compilation). These commercial farms vary in sizes and come in different sizes (Nti, 2018; Buallay & Hamdan, 2019). Farm managers, farm owners and SC managers served as proxies for the respective firms. Domestic poultry farms were excluded from the study.

Sampling Procedure

Before selecting and contacting respondents for the study, it became necessary for an appropriate representative sample size to be determined from the sampling frame. G*power was used to determine the sample size (Ryan, 2013). Since the overall model had seven independent variables, with seven arrows pointing at the dependent variable, 262 sample size was considered appropriate for the primary data analysis at 95% confidence interval, at 5% significant level, at estimated 0.05 effect size.

Since population was made up different strata in terms of firm size, a stratified sampling was employed to select the respondents. Computer application was used to generate random numbers for elements in the sampling frame. Code numbers of the elements in the sampling frame that were generated by the application were compared with the random numbers. Elements in the sampling frame whose code numbers corresponded with the random numbers were included in the study. Thus, the respondents were fairly represented given cognizance to the equivalent representation in the population (Zhao, Liang & Dang, 2019).

Data Collection Instrument

Structured questionnaire was used for the primary data collection. The variables and the constructs were numerically measured. The constructs were obtained through validated instruments through review of literature. 7-point Likert Scale was used to measure poultry SCI which rated the opinions of the respondents from 1=Never and to 7=Always true based the extent of engagement in SCI. In measuring trust in SCI relationship, a 7-point Likert Scale was used to measure the extent to which respondents' opinions were reflected on the items rated as 1=Never true and to 7=Always true.

On measuring OP, respondents were asked to rate the level of improvement in OP indicators ranging from 1=Very poor improvement to 7=Exceptional improvement. The Likert Scale was treated as continuous interval scale because items measuring each construct were treated as composite measure to form composite score for each construct in an individual summative score (Boone & Boone, 2012). Section A of the questionnaire measured demographic characteristics of the respondents. This section had 14 items. Section B measured SCI among commercial poultry farms. Section C also measured trust in SCI relationship with 22 items. Section D measured OP among commercial poultry farmers. The instrument is presented at the Appendix section of this research report. The use of structured questionnaire made data collection and analysis easier, simple, and powerful (Nyarku, et al., 2018).

Data Collection Procedure

Primary data collection was carried out for three months period (September-November, 2019) through questionnaire administration. Drop-and-pick method was used in this regard. This was appropriate because of the fact the farms where scatters in different locations within Dormaa West, Dormaa East and Dormaa Central which constitute Dormaa Municipality. Through personal contact, rapport was built with the respondents which made the data collection exercise easier although it was time consuming and tedious.

After the initial issuance of questionnaires to the various farms, phone calls were made subsequently, at least once, to all the respondents to remind them about the need for the questionnaires to be completed on time. This facilitated the retrieval of the 248 questionnaires from the 262 questionnaires that were distributed. The first and last week in December, 2019 and February, 2020 were used for the issuance and retrieval of the 248 questionnaires. This was also carried out personally by the researcher. An initial screening of the questionnaires proved that the retrieved questionnaires were fully completed and filled in an accurate manner. At the end of it all, 94.66% return rate was recorded.

Common Method Bias

Common method bias happens when the same method is used to measure multiple constructs (Schaller, Patil & Malhotra, 2015). Common method bias was controlled through addition of psychological separation when measuring the dependent variable and the independent variables. After measuring SCI, trust in SCI was then measured before OP was measured.

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Again, response format (Criteria for measurement) was different for each of the constructs.

To eliminate ambiguity, the items were worded in a simple clear-cut manner which helped eliminate the possibility of respondents relying on systematic response tendencies such extreme or midpoint responses in filling the questionnaire (Podsakoff, MacKenzie & Podsakoff, 2012). Common method bias was measured through collinearity statistics for each of the structural model configured (Afum, Sun & Kusi, 2019).

Data Processing and Data Analysis

SMART PLS 3.2.8 was used for the data processing although coding and data entry (data preparation) were done with the Statistical Package for Social Science (SPSS version 25.0). The prepared data file was then converted into "comma delimited" format "csv" before the final data file was imported for the model configuration (Browne, O'Reilly, Hutchinson & Krdzavac, 2019). The SMART PLS application is well noted for estimating hypothesized model (Ahrholdt, Gudergan, & Ringle 2019; Hair, Junior, Hult, Ringle & Sarstedt, 2018; Schberth, Henseler & Dijkstra, 2018; Sharma, et al., 2019).

A two-tailed test of hypotheses was configured in this regard because of the non-directional nature of the specific objectives (Nikitina, Paidi & Furuoka, 2019). As a decision rule, all indicators with outer loadings less than 0.7 (not statistically significant) were eliminated in order to improve the measurement model (Jung & Park, 2018). The model configuration treated SCI as exogenous latent variable whilst OP was treated as endogenous latent variable in the context of the study (Objective 1). Firm size was treated as a moderating variable (Objective 3) whist trust in SCI relationship was treated

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as a mediating variable (Objective 2). Firm size was treated a single-item because its measurement was without error. It also did not cause any identification and convergence problems (Garson, 2016).

Repeated indicator approach was used to configure the structural models for objective 3 and 4 (Wold, 1980). Test of difference was conducted through PLS multigroup analysis particularly for research objective 4 (Hair, Risher, Sarstedt & Ringle, 2019). Reliability of the scale was measured with the rho_A although Cronbach's Alpha ($\geq$ 0.7) and Composite Reliability ($\geq$0.7) were also computed. It must have a minimum score of 0.7 (Afum, Sun & Kusi, 2019). The rho_A is therefore recognized as the most important PLS reliability measure (Dijkstra & Henseler 2015), which is currently the only consistent reliability measure of PLS construct scores (Henseler, 2017).

Content validity was ensured through constant review of literature in line with main constructs. The items that were used to measure the constructs were obtained through validated scales. Furthermore, the supervisor subjected the items to strict scrutinization before final acceptance. Convergent validity was measured with the Average Variance Extracted [AVE] (AVE>0.5). Benitez, Henseler, Castillo and Schuberth (2020) explained that convergent validity measures the extent to which indicators belonging to one latent variable measure the same construct.

Discriminant validity was measured with Heterotrait-Monotrait Ratio (Should be less than 0.9 or 1). Discriminant validity represents the subjective independence of every indicator on its latent variable (Afum, Sun & Kusi, 2019), thus, it measures the degree to which a concept distinguishes itself from other constructs (Kassem, Khoiry & Hamzah, 2020; Benitez, et al., 2020) and

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best measures discriminant validity in reflective model than Fornell-Larcker Criterion and Factor Loadings (Ringle, Wende & Becker, 2015). This justifies why these indices were not reported in the context of this study. Generally, as a rule of thumb, VIF needs to have a score of 5 or lower to avoid muticollinearity particularly threat of common method bias (Kock & Lynn, 2012; Afum, Sun & Kusi, 2019). Commom method bias was measured with the Collinearity Statistics (VIF $\leq$5).

The structuiral model was evaluted as follows. Factors loadings for all significant indicators were measured acoordingly, given cognizance to p-values and t-statistics (Jung & Park, 2018). Outer loadings are considered a form of item reliabiity co-efficients for reflective model (Garson, 2016; Henseler, Rimgle & Sarstedt, 2012). The outer loadings also measure convergent validity (Kassem, Khoiry & Hamzah, 2020). By convention, for a well-fittng reflective model, path loadings should be above 0.70 (Henseler, Ringle & Sarstedt, 2012; Hair, et al., 2014)

Path-coefficinets were used to asseess the contribution of the predictor(s) to the variance in the dependent variable (Schberth, Henseler & Dijkstra, 2018). The beta coefficient value represents the power of latent structures between exogenous and endogenous constructs (Kassem, Khoiry & Hamzah, 2020). Effect size (f^2) was used to quantify the contributions of the predictors to the changes in the dependent variable (Ahrholdt, Gudergan, & Ringle 2019). Effect size values above 0.35, 0.15, and 0.02 can be interpreted as strong, moderate, and weak (Cohen, 1988) respectively.

Predictive relevance of the direct effect in the model were measured with the q^2. The q^2 values were obtained by way of blindfolding procedure

(Ringle, Sarstedt, Mitchell & Gudergan, 2020). It is categorized as follows: $0.02 \leq q^2 < 0.15$ as weak effect: $0.15 \leq q^2 > 0.35$ as moderate effect and $q^2 \geq 0.35$ as strong effect (Becker, Rai, & Rigdon 2013). The predictive capacities of the models were assessed with the coefficient of determination (R^2). The R^2 provides insights into a model's in-sample predictive power (Becker, Rai & Rigdon, 2013; Benitez, et al., 2020). The prescribed tantative cut-off points (Kassem, Khoiry & Hamzah, 2020) for describing R-square are as follows: Results above 0.67 (Substaintial), 0.33 (Moderate) and 0.19 (Weak). The findings were presented in Tables and Figures for easy understanding and reporting.

Limitations

The study targeted commercial poultry farms in Dormaa Municipality and failed to include domestic poultry farms hence limiting the generalizability of the findings in this regard. The second-order construct configuration affected the discriminant validity between some few constructs in model 2 and 3 because their scores of HTMT ratio were not less than one.

Ethical Consideration

To summarize, the researcher sought formal permission from authorities of University Cape Coast for this exercise. The benefits as well as the purpose of the study were fully explained to all stakeholders particularly participants. Again, informed verbal consent of participants was sought and no respondent was coerced into participating in the study. Where respondents had issues with respect to responding to some the items, active steps were taken to resolve such misunderstanding. Issues such as confidentially, privacy and

unanimity were carefully treated through design of a robust structured questionnaire. No data manipulation was carried out during the data processing and analysis stage of the study. The findings were dully reported as generated.

Chapter Summary

The chapter has provided information regarding the methodological approaches the researcher followed in gathering the primary data, processes followed to ensure primary data processing and analysis, particularly in the light of the specific research objectives. Data analytical tools appropriate for the analysis were explained in the light of the nature of the measurement system employed for measuring the items that measured the constructs and variables alike.
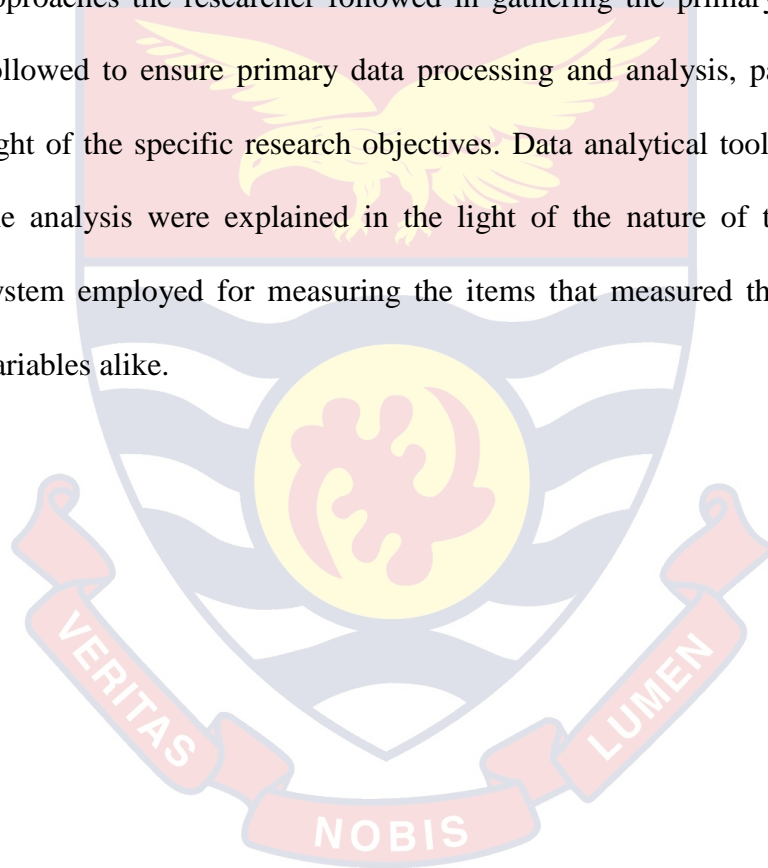
CHAPTER FOUR

RESULTS AND DISCUSSIONS

Introduction

The study sought to examine the effect of SCI on the OP of commercial poultry farms in Ghana. The mediating effect and moderating effect of trust in SCI and firm size were however statistically controlled for respectively. This chapter provides information relating to the findings obtained and further discusses the findings given cognizance to their managerial, practical, and theoretical implications aside considering empirical stance by some previous empirical studies.

Demographic Information

Frequency and percentage were appropriate for analysing the variables under consideration given the nature of measurements of demographic feature of the target population. The demographic characteristics of the respondents and their respective commercial poultry farms are presented in Table 1. Most of the respondents were male (73%) whilst the remaining 27% female. This notwithstanding provides input from both sexes given the nature of the constructs and variables under consideration. Most of the participants were farm managers (73%) whilst the remaining 27% were farm owners. Per the farm size classification, it was discovered that most of the commercial poultry farms were medium-sized farms with current production capacity of 5001-10,000 birds (47.2%). 27.8% of the farms were small-sized enterprises with production capacity between 50-5000 birds whilst the remaining 25.0% were large scale farms with production capacity above 10,000 birds.

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Table 1: Demographic Information

Variable	Variable categories	Frequency	Percentage (%)
Sex	Male	181	73%
	Female	67	27%
Position	Farm manager	181	73%
	Farm owner	67	27%
Farm size	Small-sized	69	27.8%
	Medium-sized	117	47.2%
	Large-sized	62	25.0%
Current production capacity	50-5000 birds	64	25.8%
	5001-10000 birds	114	46.0%
	Above 10,000 birds	70	28.2%
Focal breed	Layers	81	32.7%
	Broiler	29	11.7%
	Layers and broiler	138	55.6%
Legal form of Business	Private company	68	27.4%
	Partnership	14	5.6%
	Sole proprietorship	166	66.9%
Form of ownership	Publicly owned	0	0.0%
	Privately owned	248	100%
Origin of firm	Ghana-based	65	26.2%
	Foreign-based	183	73.8%
Branch status	Yes	185	74.6%
	No	63	25.4%
Registration status	Registered	238	96.0%
	Not registered	10	4.0%
Source of day-old chick	Own DOC	16	6.5%
	Self-imported	26	10.5%
	Local importer	191	77.0%
	Local supplier	15	6.0%
Years in operation	1-10 years	78	31.5%
	11-20 years	152	61.3%
	21-30 years	12	4.8%
	31-40 years	2	0.8%
	Above 40 years	4	1.6%
Number of employees	1-10 workers	72	29.9%
	11-20 workers	50	20.7%
	21-30 workers	42	17.4%
	31-40 workers	41	17.0%
	Above 40 workers	36	15%

Source: Field survey, Kusi (2020)

Regarding the focal breed of the commercial poultry farms, it was discovered that most of the farms had mixed system, comprising the production of layers and broilers at the same time (55.6%). This was followed

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by farms with layers only (32.7%) and then farms with only broilers (11.7%). On the issue of the nature of legal form of business, it was discovered that most of the commercial poultry farms were sole proprietorship (66.9%), then partnership (5.6%) and private company (4.4%). All the commercial poultry farms were privately owned. Most of the farms were foreign-based (73.8%) whilst the remaining 26.2% were Ghana-based firms.

On the registration status, it was found that 96.0% farms where registered whilst 4.0% were not registered. Majority of these commercial farms had branches (74.6%). The remaining 25.4% had no branch. Analysis of source of day-old chicks showed that 77.0% of the farms source DOCs from local importers, 10.5% through self-importation whilst the remaining 6.0% get DOCs through local suppliers. Most of the commercial poultry farms had existed between 11-20 years (61.3%). Only few had more than 40 years working experience. With respect to the strength of their labour, it was found that 20.7% had 11-20 employees, followed by those with 21-30 employees and then those with 31-40 employees. Only 15% had workers above 40.

Lessons from the demographic characteristics show that the managerial workforce structure in the commercial poultry industry in Ghana is male-dominated. This situation could be attributed to the relatively labour-intensive nature of operations of commercial poultry businesses. The industry seemed to be dominated by medium-sized enterprises. Continuous efforts and investments need to be carried out to expand production capacity of these small-scale enterprises and medium-sized enterprises to reach large-scale operational status in order to fill the domestic demand gap in poultry products in Ghana as stated earlier on (Ojansivu, & Medlin, 2018; Kusi, et al., 2015).

Surprisingly, none of the commercial farms was publicly owned hence unravelling the failure of the state to actively engage in the production of chicken for meat and egg to meet the hug supply gap in Ghana. This unfortunate situation is partly ascribed to the posture of successive governments of Ghana which favours trade liberalization (Haligah, 2017; Kusi, et al., 2015), thereby paving a massive way to promote importation of chicken products from advanced countries instead to equipping local industrial efforts to promote commercial poultry in the country. Government of Ghana in conjunction with private investors can set up large-scale commercial poultry farms in Ghana to supplement the production capacity of the domestic commercial poultry industry.

A closer look at the focal breed shows the dominance of mixed system (both layers and broiler) production with relatively few commercial farms focusing only on broiler production. A relatively sizeable number of the commercial poultry farms are also into layer production only. This justifies the claim that commercial poultry farms in Ghana are pushed into production of egg through layer production at the expense of chicken meat production (Djang-Fordjour, 2017). This situation creates avenue for importation of frozen chick meat from advance countries such as China, United States, Brazil, and others into Ghana which ultimately drains the foreign exchange reverse of Ghana, hence deepening the depreciation of the Ghana Cedi against the Dollar.

Furthermore, it is conclusively established that the commercial poultry farms in Ghana are owned privately (Nti, 2018; Folitse, Sam, Dzandu & Osei, 2018) with most of these farms being sole proprietorship. The dominance of

private sector in the commercial poultry industry of Ghana shows how significant private sector contributes to the GDP of Ghana, given its attendant direct benefits of employment, income generation, tax revenue to the government of Ghana and provision of food for consumption. Assessment of the origins of the firms rather provides startling result as it shows most of the commercial poultry farms in Ghana are foreign-based. This signals expatriation of returns on investment in the industry to other countries which has resulted in less investment in the industry, hence reliance on massive poultry product imports in Ghana (Folitse, et al., 2018; Haligah, 2017).

Business regulatory agencies must ensure that all commercial poultry farms in Ghana are formalized and get registered. Government of Ghana is advised to invest in hatcheries for production of day-old chicks because this study proves commercial poultry farms in Ghana most import their day-old chicks from other countries through local importers and self-importation. This situation is not encouraging since the very seed for production is not available in Ghana. What happens if there is embargo on export of day-old chicks into Ghana?

Effect of Supply Chain Integration on Operational Performance

Measurement Model

The evaluation of the specified model is based on the recommendation that, measurement model is evaluated for quality assessment before structural model (Benitez, et al., 2020). The findings are presented as follows.

Measurement Model

Construct Reliability and Validity

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Table 2: Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Customer integration	0.813	0.832	0.889	0.728
Financial flow integration	0.922	0.928	0.941	0.762
Information integration	0.730	0.842	0.876	0.779
Internal integration	0.897	0.901	0.936	0.830
Logistics integration	0.809	0.826	0.887	0.725
OP	0.892	0.896	0.920	0.698
Supplier integration	0.840	0.858	0.884	0.605

Source: Field survey, Kusi (2020)

Internal consistencies for the constructs were measured [CA>0.7] (Hair, et al., 2017; Kassem, et al., 2020). This limitation is however resolved by the use of composite reliability. Compiste reliabilities of the constructs were accurately measured [CR>0.7] (Ringle, Wende & Becker, 2015; Garson, 2016; Hair, et al., 2014). The constructs were highly reliable given their respective rho_A scores (rho_A>0.7) Again, convergent validities of the constructs were measured (AVE>0.5).

Discriminant Validity

Table 3: Heterotrait-Monotrait Ratio

	CusI	FinFI	InfoI	IntI	LogI	OP
FinFI	0.605					
InfoI	0.444	0.862				
IntI	0.718	0.833	0.738			
LogI	0.779	0.866	0.682	0.946		
OP	0.657	0.830	0.710	0.813	0.703	
SupI	0.684	0.431	0.384	0.501	0.504	0.521

Note: FinF=Financial flow integration; InfoI=Information integration; IntI=Internal integration; LogI=Logistics integration; SupI=Supplier integration; CusI=Customer integration
Source: Field survey, Kusi (2020)

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The findings in Table 3 demonstrates with the exception of logistics integration and internal integration that had a little over 0.9 all the remaining constructs accurately measured discriminat validity. This, not withstanding is acceptable in so far as HTMT ration less than one (Benitez, et al., 2020; Gaskin, Godfrey & Vance, 2018; Henseler, 2017).

Collinearity Statistics (VIF)

Table 4: Inner VIF values

	OP
Customer integration	2.219
Financial flow integration	3.532
Information integration	2.144
Internal integration	3.670
Logistics integration	3.733
Supplier integration	1.551

Source: Field survey, Kusi (2020)

The VIF scores for the inner model (Table 4) therefore portray there is no commom method bias for all the constucts because VIF scores for the inner model did not exceed 5 (Kock, 2012).

Structural Model

This section provides findings relating to the output of the predictive modeling carried out. Thus, the structural model provides information relating to the effect of SCI on OP of commercial poultry farms in Ghana. The aspects of the results recommended for reporting in explanatory studies (Benitez, et al., 2020) for reflective models include loadings, path co-efficients, effect size, predictive relevance (For direct paths) and co-efficient of determination.

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Outer Loadings

The outer loadings were all statistically significant and measured the respective constructs under investigate ($p<0.05$; $t>1.96$). The results are in Table 5 (See Appendix B).

Coefficients, Effect Size and Predictive Relevance

Table 5: Coefficients, Effect Size and Predictive Relevance

	Beta	f^2	q^2	T Statistics	p-values
Customer integration -> OP	-0.146	0.030	7.3126	1.816	0.070
Financial flow integration -> OP	0.494	0.215	0.0768	4.694	0.000
Information integration -> OP	0.045	0.003	-1.8282	0.697	0.486
Internal integration -> OP	0.406	0.140	0.0530	3.050	0.002
Logistics integration -> OP	-0.274	0.062	0.0238	2.508	0.012
Supplier integration -> OP	-0.125	0.031	9.1408	2.417	0.016

Source: Field survey, (2020)

The contributions of the predictors [SCI indicators] to causing the 67.8% variance in OP were measured with the beta coefficient value. The co-efficient results (Table 5) indicate financial flow integration is the strongest unique but positive predictor of OP (Beta=0.494; t=4.694; p=0.000: $p<0.05$) with a moderate effect size (f^2=0.215) and small predictive relevance (q^2=0.0768). Iinternal integration is the next significant positive predictor of OP of commercial poultry farms in Ghana (Beta=0.406; t=3.050; p=0.002: $p<0.05$) with a small effect size (f^2=0.140) and weak predictive relevance (q^2=0.0530).

Logistics integration had a statistically significant negative effect on OP of commercial poultry farms (Beta=-0.275; t=2.508; p=0.012: $p<0.05$) with a small effect size ((f^2=0.062) and weak predictive relevance (q^2=0.0238). Similarly, it was discovered supplier integration had a statistically significant negative effect on OP of commercial poultry farms (Beta=-0.125; t=2.417;

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p=0.016: p<0.05) with small effect size (f^2=0.031) and strong predictive relevance (q^2=9.1408).

Customer integration is not a significant positive predictor of OP of commercial poultry farms in Ghana (Beta=-0.146; t=1.816; p=0.070: p>0.05). Customer integration in the context of this study signals the potential to negatively relate with OP. Information integration is not a significant predictor of OP of commercial poultry farms in Ghana (Beta=0.045; t=0.697; p=0.486: p>0.05). It can best signal that it may negatively affect OP of commercial poultry farms in Ghana.

The study has therefore established that SCI among commercial poultry farms in Ghana causes substantial improvement (67.8%) in OP of commercial poultry farms in Ghana. Components of OP improved as a result of the adoption and practice of SCI between commercial poultry farms and other poultry SC partners in the commercial poultry industry of Ghana included quick response to changes in demands, inventory turns, order fulfilment rate, business process innovation and operating cycle. This vindicates the position held in some previous empirical studies that collectively held that SCI has the capacity to predict positive variance in firm performance, (Khalil, Khalil & Khan, 2019; Siddique, 2019) particularly OP (Bae, 2017).

It must be recognized that financial flow integration (As measured by the assertions that we ensure flow of funds among SCI partners, we ensure improved cash conversion cycle in SC, we ensure real-time exchange of financial data among SCI partners, we ensure accessibility of financial statements of SCI partners and we offer financial assistance to SCI partners)

has a statistically significant strong effect on OP with a weak predictive relevance. These specific indicators of financial flow integration collectively relieve financial burdens that could have been faced singularly by commercial poultry farms if they were not connected through SCI with other partners in the poultry SC industry. This supports the claims advanced by some previous empirical studies (Ojansivu & Medlin, 2018; Lee & Ma, 2012; Vercillo & Hird-Younger, 2019; Nguyen & Jolly, 2020) that financial integration improves OP.

Furthermore, the study proved that internal integration also causes a statistically significant positive effect on OP. These findings therefore are in line with the stance collectively held by some previous empirical studies that internal integration improves organizational performance (Shashi, et al., 2019), and for that matter, OP (Osei & Kagniciogu, 2018; Bae, 2017). On the other hand, the study proves logistic integration although significantly predicts OP, such contribution however reduces the level of OP in the commercial poultry industry of Ghana.

These discoveries contradict with the stance collectively held by some previous empirical studies that logistics integration improves organizational performance, particularly OP (Vercillo & Hird-Younger, 2019; Nguyen & Jolly, 2020). It therefore confirms the position that not all business alliances realize their full potential always (de Man & Luvison, 2019) hence the need for managers of commercial poultry farms to work hard to improve the conditions affecting effective execution of logistics integration. As a strong edge to promoting efficiency in handling logistics integration, managers must

be on the alert since poorly managed SCI can negatively affect firm performance (Springinklee & Wallenburg, 2012).

Similarly, the study proves that supplier integration also causes significant reduction in OP of commercial poultry farms in Ghana. These practices are however, encouraged to deepen the nature of supplier relationship among commercial poultry farms (Bae, 2017; Quesada, et al., 2008). Therefore, these findings jointly contradict the stance collectively held by some previous empirical studies that supplier integration improves organizational performance (Kumar, et al., 2017), particularly OP Errassafi, Abbar & Benabbou, 2019; Bento, Schuldt & Carvalho, 2020; Helliwell, Morris & Raman, 2019).

Furthermore, the study proves customer integration failed to contribute to substantial variation in OP. It must however, be recognized that the actual indicators of customer integration that contextually measured this construct included jointly solving customer-related problems with major customers, connecting in-real time with major customers, and supplying goods and services to respond to customer needs. These strategies have been acknowledged as key measures of customer integration (Chiang, Chen & Wu, 2015; Lis & Horst, 2013). This finding contradicts the assertion that customer integration is a significant positive predictor of OP of commercial poultry farms in Ghana as held in some empirical studies (Errassafi, Abbar & Benabbou, 2019; Han, 2018; Khan & Wisner, 2019).

In similar fashion, the study proves that information integration also failed to cause significant improvement in OP of commercial poultry farms in Ghana. The measures of information integration that failed to improve OP in

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commercial poultry farms include the practice of promoting exchanges of technical knowledge with SC partners and improvement in data analysis (auditing and reporting) through integrated information system.

In the area of exchanges of technological know-how, partners in the poultry supply chain can get accurate information relating to technical complexities of the commercial poultry operations through SCI which has the potency to spread ideas with no or minimal cost to partners in such integrative arrangements (Trkman, et al., 2007; Pham, et al., 2019). Holistically, this finding contradicts the claim that information integration causes a statistically significant positive variance in OP (Abbas & Kamal, 2018; Pham, et al., 2019).

Coefficient of Determination

Table 6: Coefficient of Determination

	R Square	R Square Adjusted
OP	0.678	0.666

Source: Field survey, Kusi (2020)

Predictive capacity of the model is presented in Table 6. The results show that SCI accounted for a substantial positive variance in OP (R-Square =0.678) when all other factors not captured in this study but are affecting OP of commercial poultry farms are statistically controlled for. Other factors not captured in the model could account for 32.2% variance in OP Thus, substantial (67.8%) positive variation in OP is attributed to changes in SCI.

In the context of this study, OP indices improved as a result of efficient practice and implementation of SCI among commercial poultry farms include quick response to changes in demands (Feng, et al., 2018; Boyer & Lewis, 2002), inventory turns (Azim, Ahmed & Khan, 2015), order fulfilment rate

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(Trattner, et al., 2019; Pashaei & Olhager, 2019), business process innovation and operating cycle (Azim, Ahmed & Khan, 2015). Generally, this overall effect of SCI on OP is supported by some empirical studies (Khalil, Khalil & Khan, 2019; Siddique, 2019; Bae, 2017).

With most components of SCI (supplier integration, customer integration, information integration, and logistics integration) not positively and significantly predicting improvement in OP, this unfortunate incidence can be accentuated to earlier claim that many organizations, and by extension poultry farmers experience difficulties not only in integrating activities with supply chain partners (Simatupang & Sridharan, 2005), but they also find it difficult to integrate activities within an organization (Louis & Pagell, 2019; Queiroz, Telles & Bonilla, 2019). On wonder only financial integration and internal integration were adjudged significant positive predictors of SCI. The structural model is pictorially presented in Figure 4.
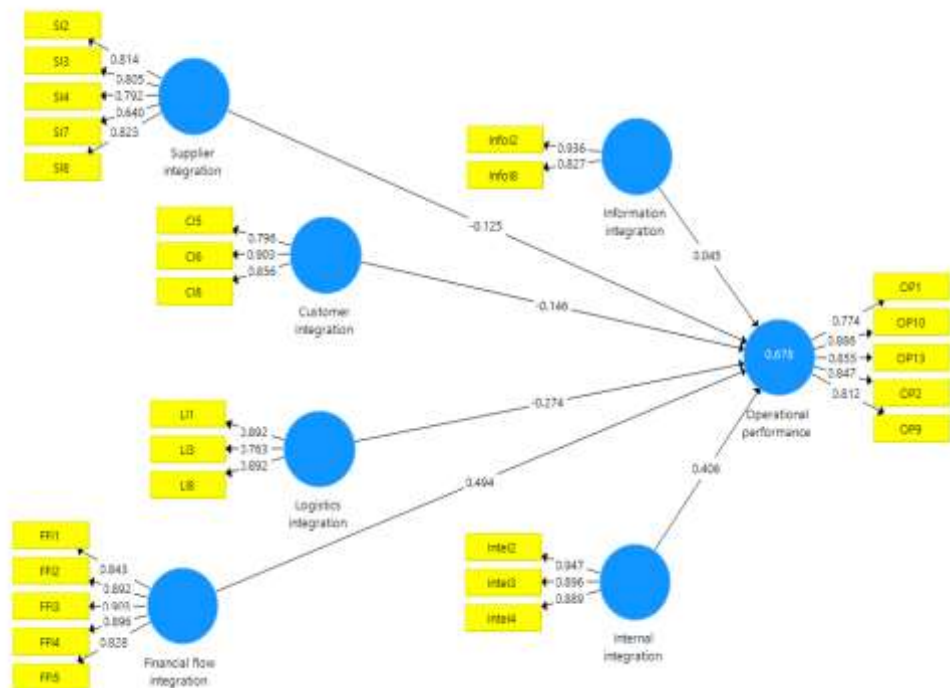
Figure 4: Structural Model for Objective 1
Source: Field survey, Kusi (2020)

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Mediating Effect of Trust in the Relationship between Supply Chain Integration and Operational Performance

The study proposed to examine the mediating effect of trust among SC partners in the commercial poultry industry of Ghana. A second-order model construction was reflectively configured to this effect (Ringle, Sarstedt, Mitchell & Gudergan, 2020). The results are presented as follows.

Measurement Model

Construct Reliability and Validity

Table 7: Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Customer integration	0.791	0.799	0.905	0.826
Financial flow integration	0.922	0.923	0.941	0.762
Information integration	0.730	0.771	0.879	0.784
Internal integration	0.897	0.904	0.936	0.830
Logistics integration	0.809	0.832	0.887	0.725
OP	0.892	0.897	0.920	0.698
Supplier integration	0.778	0.791	0.871	0.692
SCI	0.799	0.953	0.858	0.521
Trust	0.947	0.952	0.962	0.863

Source: Field survey, Kusi (2020)

Internal consistencies for the constructs were reliable (CA>0.7) (Hair, Hult, Ringle & Sarstedt, 2014). Composite reliabilities were also measured [CR>0.7] (Afum, Sun & Kusi, 2019). The rho_A results prove all the constructs were reliable because they all met the 0.7 minimum criteria. Convergent validity was achieved (AVE<0.5).

Discriminant Validity

The findings in Table 7 demonstrates with the exception of logistics integration and SCI that did not have perfect discriminant validity, all the remaining constructs accurately measured discriminat validity. This can be attributed to the fact the measures of logistic integration were also included in the formation of the second-order construct (SCI).

Table 8: Heterotrait-Monotrait Ratio

	CusI	FinFI	InfoI	IntI	LogI	OP	SupI	SCI
FinFI	0.654							
InfoI	0.539	0.862						
IntI	0.741	0.833	0.738					
LogI	0.819	0.866	0.682	0.946				
OP	0.681	0.830	0.710	0.813	0.703			
SupI	0.755	0.439	0.416	0.465	0.523	0.593		
SCI	0.890	0.967	0.882	0.957	1.000	0.860	0.718	
Trust	0.657	0.730	0.703	0.869	0.784	0.797	0.560	0.843

Source: Field survey, Kusi (2020)

Collinearity Statistics (VIF)

Table 9: Inner VIF

	OP	SCI	Trust
Customer integration		2.379	
Financial flow integration		3.647	
Information integration		2.143	
Internal integration		3.689	
Logistics integration		3.899	
OP			
Supplier integration		1.559	
SCI	2.832		1.000
Trust	2.832		

Source: Field survey, Kusi (2020)

An observation of the VIF scores for the inner model of the constructs shows all the VIF scores are less than five. The VIF scores for the inner model

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(See Table 9) therefore portray there is no threat of common method bias for all the constructs.

Structural Model

Outer Loadings

The indicator loadings were all reliable and significant for all the constructs under investigation (See Appendix B). The outer loadings were all statistically significant ($p<0.05$; $t>1.96$).

Coefficient and Effect Size

Table 10: Coefficient and Effect Size

	Beta	f^2	T Statistics	p-values
Customer integration -> SCI	-0.129	106.217	10.367	0.000
Financial flow integration -> SCI	0.367	560.675	18.326	0.000
Information integration -> SCI	0.122	105.375	11.700	0.000
Internal integration -> SCI	0.252	261.432	16.994	0.000
Logistics integration -> SCI	0.194	147.349	15.909	0.000
Supplier integration -> SCI	-0.134	173.844	2.766	0.006
SCI -> OP	0.561	0.321	6.625	0.000
SCI -> Trust	0.804	1.832	28.992	0.000
Trust -> OP	0.287	0.084	3.208	0.001

Source: Field survey, Kusi (2020)

The co-efficient results (Table 10) indicate that SCI is a significant positive predictor of SC trust (Beta=0.804; t=28.992; p=0.0001: $p<0.05$) with a moderate effect size (f^2=1.832). The findings also proved that SC trust made a statistically significant positive contribution to causing the positive variance in OP of commercial poultry farms in Ghana (Beta=0.287; t=3.208; p=0.001: $p<0.05$) with a small effect size (f^2=0.084). Moreover, the study proved that SCI made a statistically significant positive contribution to causing the positive variance in OP of commercial poultry farms in Ghana (Beta=0.561; can t=6.625; p=0.0001: $p<0.05$) with large effect size (f^2=147.349).

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Coefficient of Determination

Table 11: Coefficient of Determination

	R Square	R Square Adjusted
OP	0.655	0.650
SCI	1.000	1.000
Trust	0.647	0.645

Source: Field survey, Kusi (2020)

The study further sought to assess how much and the kind of variance in OP of commercial poultry farms is attributed to changes in the predictor (SCI and SC trust) in a single model. Results from Table 10 show that SCI and trust jointly accounted for a moderate positive variance in OP (R^2=0.655) when all other factors not captured in this study but are affecting OP of commercial poultry farms are statistically controlled for. Thus, 65.0% positive variation in OP is attributed to changes in SCI and SC trust.

Furthermore, SCI accounted for a moderate positive variance in trust among SC partners in the poultry industry (R^2=0.647). This therefore suggests SCI in the commercial poultry industry also improves the level of trust among actors in the industry. This goes to prove that SCI is a means to deepening trust among SC partners (Liu, et al., 2015). Strong and working integration therefore builds trust among SC partners.

Mediating Effect

Table 12: Specific Indirect Effect

	Beta	T Statistics	p-values
SCI -> Trust -> OP	0.253	3.983	0.000

Source: Field survey, Kusi (2020)

The specific indirect effect (Table 12), which measures the mediation effect, proved that trust among actors in the in SCI mediates significantly and positively the predictive relationship between SCI and OP in the commercial

poultry industry in Ghana (Beta=0.253; p=0.0001: p<0.05). The study proved that although SCI significantly predicts variance in OP of commercial poultry farms in Ghana, such impact is improved by the presence of the level of trust among SC partners in the supply chain of the poultry industry. The specific indirect effect (mediation) shows SC trust accounts for a statistically significant positive variance in OP given the existence of the nature of SCI in the commercial poultry industry.

Simply put, trust among SC partners can better improve the impact of SCI on OP of commercial poultry farms in the Ghana. Among the measures of SCI trust that significantly cause improvement in the effect of SCI on OP include the practice of SCI partners being sincere with commercial poultry farms (Roberts-Lombard, Mpinganjira & Svensson, 2017), SCI partners supporting commercial poultry farms in periods of crises (Lin, Sung & Lo, 2005), SCI championing the idea that in all situations trust is the overall pillar among SCI partners and the practice of ensuring that SC partners have or should have the necessary abilities to meet their obligations in the poultry industry.

Empirically, this stance has be expressed by some previous studies that collectively held the assertion that for SCI to improve better the performance of firms, it is important for there be trust among SC partners (Tarigan, et al., 2020; Butt, 2019; Shipley, Cao & Davis, 2019; He, Lai, Sun & Chen, 2014). Trust in the context of SCI in the commercial poultry industry has therefore proven to be a strong pillar for sustainable SCI as advanced in some previous empirical studies (Urena, et al., 2019; Ribadu & Rahman, 2019). This also justifies the calls for SC partners to commit resource to make such

collaborative arrangement work efficiently (Hasche, et al., 2017). The structural model is pictorially displayed on Figure 5.
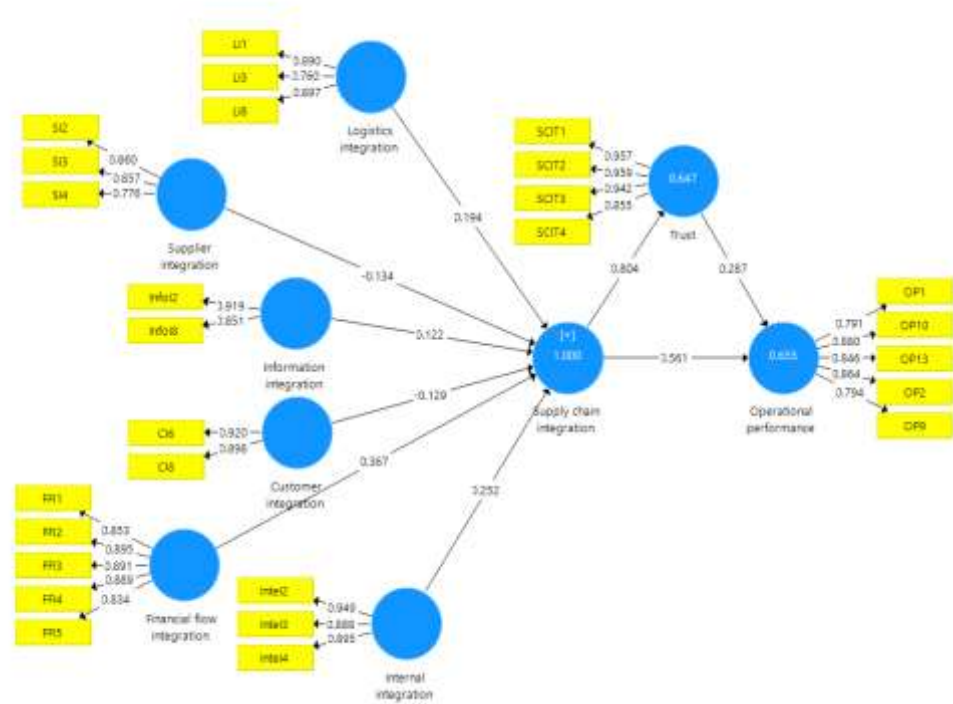
Figure 5: Structural Model for Objective 2
Source: Field survey, Kusi (2020)

Moderating Effect of Firm Size in the Relationship between Supply Chain Integration and Operational Performance

Based on the contingency approach, this study also examined whether the intervening effect of firm size can affect the strength and direction of the effect of SCI on OP of commercial poultry farms in Ghana. Internal consistency for all the constructs was reliable [CA>0.7] (Hair Junior et al., 2014). Composite reliabilities for the contrusts were measured   [CR>0.7] (Garson, 2016; Hair, et al., 2014).

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Construct Reliability and Validity

Table 13: Construct Reliability and Validity

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
Customer integration	0.797	0.807	0.907	0.830
Financial flow integration	0.925	0.925	0.943	0.769
Firm size	1.000	1.000	1.000	1.000
Information integration	0.707	0.763	0.869	0.769
Internal integration	0.897	0.906	0.936	0.830
Logistics integration	0.824	0.853	0.895	0.740
Moderating Effect 1	1.000	1.000	1.000	1.000
OP	0.885	0.897	0.916	0.686
Supplier integration	0.812	0.814	0.889	0.727
SCI	0.754	0.947	0.818	0.512

Source: Field survey, Kusi (2020)

The rho_A is cognized as the most important PLS reliability measure (Dijkstra & Henseler 2015; Henseler, 2017) in reflective models. The constructs were reliable given their rho_ A scores [rho_A>0.7]. Convergent validities for the constructs were measured [AVE>0.5] (Henseler, 2017).

Discriminant Validity

The findings in Table 14 demonstrate, all the constructs accurately measured discriminat validity.

Table 14: Heterotrait-Monotrait Ratio

	CusI	FinFI	Firm size	InfoI	IntI	LogI	Mod.Effect 1	OPerf	SupI
FinFI	0.671								
Firm size	0.414	0.320							
InfoI	0.507	0.826	0.214						
IntI	0.756	0.839	0.265	0.723					
LogI	0.825	0.827	0.203	0.630	0.929				
Mod. Effect 1	0.369	0.095	0.080	0.184	0.087	0.143			
OPerf	0.681	0.855	0.340	0.692	0.797	0.659	0.108		
SupI	0.743	0.458	0.272	0.422	0.458	0.476	0.144	0.583	
SCI	0.913	0.962	0.331	0.853	0.956	0.977	0.179	0.858	0.729

Source: Field survey, Kusi (2020)

Collinearity Statistics (VIF)

Table 15: Inner VIF

	OP	SCI
Customer integration		2.584
Financial flow integration		3.393
Firm size	1.117	
Information integration		1.953
Internal integration		3.837
Logistics integration		3.736
Moderating Effect 1	1.019	
Supplier integration		1.593
SCI	1.129	

Source: Field survey, Kusi (2020)

To avoid the problem of common method bias, VIF score of not more than five (5) is required. The VIF scores (Table 15) for the inner model therefore portray there is no commom method bias for all the constucts.

Structural Model

Outer Loadings

All the indicators for measuring the constructs were reliable and significant [See Table 16: See Appendix B] (p<0.05; t>1.96).

Coefficient and Effect Size

Table 16: Coefficient and Effect Size

	Beta	f^2	T Statistics	p-values
Firm size -> OP	-0.089	0.019	2.410	0.016
Moderating Effect 1 -> OP	0.086	0.019	2.469	0.014
SCI -> OP	0.773	1.459	23.854	0.000

Source: Field survey, Kusi (2020)

The co-efficient results (Table 16) indicate firm size moderated significantly and in a positive manner the predictive relationship between SCI

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and OP of commercial poultry farms in Ghana given its interaction effect (Beta=0.086; t=0.2469; p=0.014: p<0.05), with a moderate effect size (f^2=0.019). SCI made a statistically significant positive contribution to causing the positive variation in OP of commercial poultry farms in Ghana (Beta=0.773; t=23.854; p=0.0001: p<0.05) with a large effect size (f^2=1.459). Firm size had a statistically significant negative effect on OP of commercial poultry farms (Beta=-0.089; t=2.410; p=0.016: p<0.05) with small effect size (f^2=0.019).
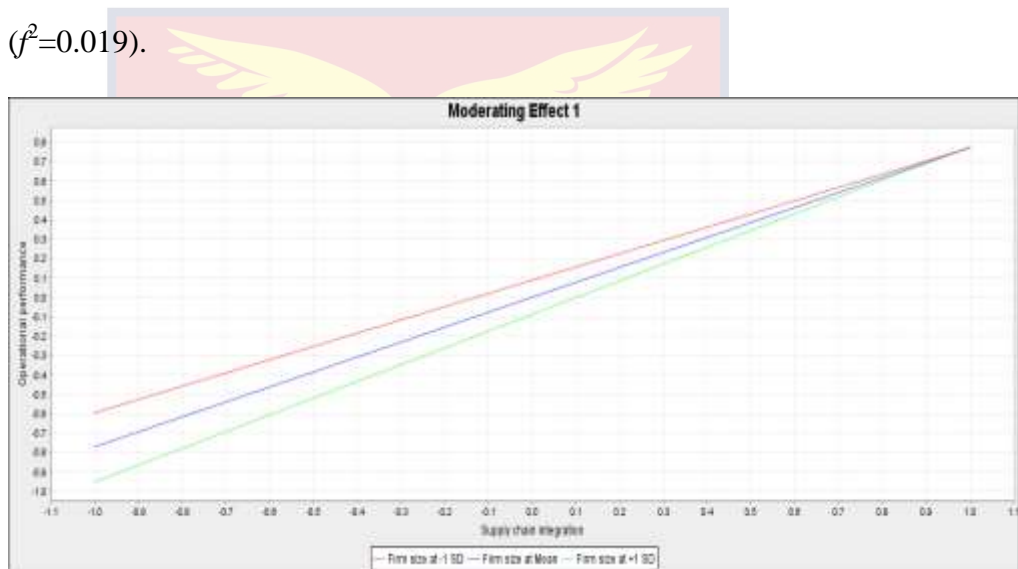
Figure 6: Interaction Effect
Source: Field survey, Kusi (2020)

The interaction effect is presented in Figure 6. An observation of Figure 6 shows that there was an interaction among SCI, OP and firm size hence, the conclusion that firm size consideration in SCI adoption in the commercial poultry industry of Ghana is a deciding factor to predicting the effect of SCI on OP of commercial poultry farms in Ghana.

The moderation analysis also proves firm size consideration is integral part of the kind of SCI existing in the commercial poultry industry of Ghana (Nti, 2018; Haligah, 2017). The findings indicate firm size consideration have the capacity to statistically cause a significant reduction in the impact of SCI

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on OP in the commercial poultry industry of Ghana. The inclusion of firm size in the model shows a reduction in the predictive capacity of SCI on OP (From 67.8% to 63.8%) which means SCI may not be prudent organizational relational strategy for all sizes of commercial poultry farms in Ghana.

This finding supports that claim established under the contingency approach which asserts the "fit" of applied SCI and firm OP hinges on the environment the firms operate in (Drazin & Van de Ven, 1985) hence the significant role of firm size in such context (Wang, Zhang & Goh, 2018; Wu, 2013). This confirms the claims established earlier on that firm size moderates the predictive relationship between SCI and OP (Fernández, et al. 2019). However, the findings also contradict the position of Yu, et al., (2013) when it was held that firm size is not a significant factor when it comes to the predictive relationship between SCI and OP.

Coefficient of Determination

Table 17: Coefficient of Determination

	R Square	R Square Adjusted
OP	0.638	0.633

Source: Field survey, Kusi (2020)

Results from Table 17 show that SCI together with firm size and its moderating effect accounted for a moderate positive variance in OP (R^2=0.638) when all other factors not captured in this study but are affecting OP of commercial poultry farms are statistically controlled for. Thus, 63.8% positive variance in OP is attributed to changes in SCI, firm size, and its interaction effect.

A reduction in the impact of SCI on OP in given the nature of firm size in the commercial poultry industry in Ghana signifies the need for one to

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consider this (Firm size) element when forging integrative organizational relationship with supply chain partners in the poultry industry of Ghana, thereby supporting the position of these empirical studies (Buallay, & Hamdan, 2019; Chuang, Oliva, & Heim, 2019). The structural model is presented pictorially on Figure 7.
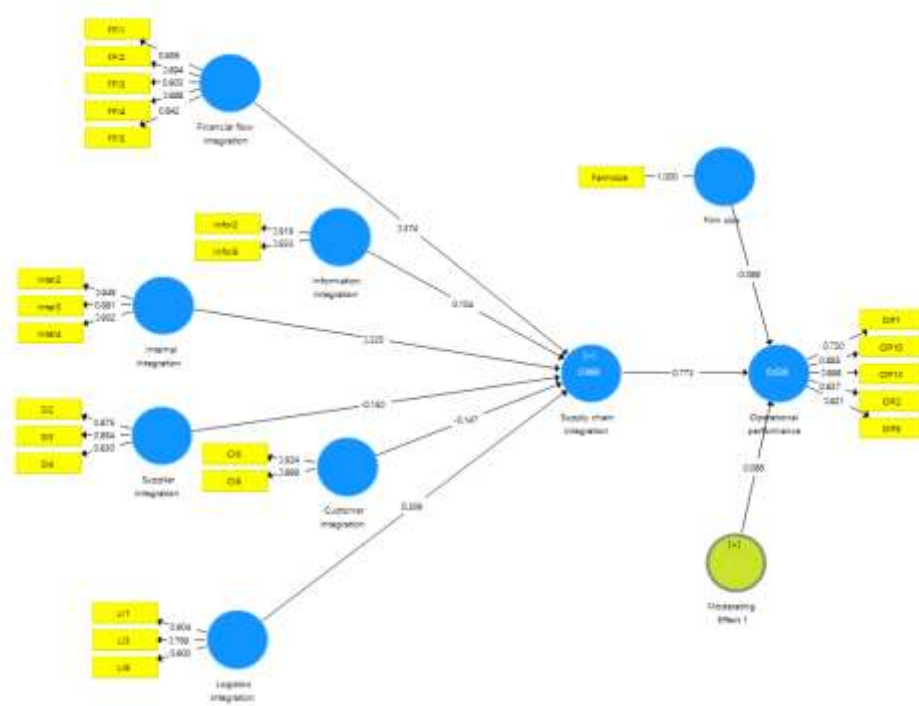
Figure 7: Structural Model for Objective 3
Source: Field survey, Kusi (2020)

Difference in Operational Performance among the Various Categories of Commercial Poultry Farms

Once the study has proven that firm size is a significant predictor of OP of commercial poultry farms in Ghana, it becomes necessary to examined how the various classes of commercial poultry farms performed in terms of their operations given the state of their integration with other SC partners in the commercial poultry industry of Ghana. This was assessed through the multigroup analysis in SMART pls.

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Large-Sized Enterprise and Small-Sized Enterprises

Table 18: Large-Sized Enterprise Verse Small-Sized Enterprises

	Path Coefficients-diff (LSE-SSE)	p-Value new (LSE vs SSE)
Customer integration -> SCI	0.168	0.010
Financial flow integration -> SCI	0.090	0.017
Information integration -> SCI	-0.021	0.567
Internal integration -> SCI	-0.012	0.759
Logistics integration -> SCI	-0.004	0.922
Supplier integration -> SCI	-0.300	0.018
SCI -> OP	0.133	0.033

Source: Field survey, Kusi (2020)

The study further sought to assess if there is difference in OP as influenced by SCI for large-sized commercial poultry farms and small-sized commercial poultry farms in the poultry industry of Ghana. PLS Multigroup Analysis was conducted to that effect. The findings are presented in Tables 18. Per the findings of the PLS MGA, SCI improves the OP of large-sized commercial poultry farms in the poultry industry significantly and better compared with the OP of small-sized commercial poultry farms s in that same industry (Beta-diff:| LSE - SSE |=0.133; p=0.033: p<0.05).

This can be attributed to that fact that customer integration (Beta-diff:| LSE - SSE |=0.168; p=0.010: p<0.05) and financial flow integration (Beta-diff:| LSE - SSE |=0.090; p=0.017: p<0.05) were significantly better in terms of measuring the level of SCI in large-sized commercial poultry farms than in small-sized commercial poultry farms in the poultry industry. It must however be recognized that, supplier integration measured SCI much better significantly in small-sized commercial poultry farms than in the case of large-

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sized commercial poultry farms (Beta-diff:| LSE - SSE |=-0.300; p=0.018: p<0.05).

Medium-Sized Enterprises and Large-Sized Enterprises

Table 19: Medium-Sized Enterprises verses Large-Sized Enterprises

	Path Coefficients-diff (MSE- LSE)	p-Value new (MSE vs LSE)
Customer integration -> SCI	-0.066	0.068
Financial flow integration -> SCI	0.018	0.642
Information integration -> SCI	0.028	0.482
Internal integration -> SCI	0.016	0.604
Logistics integration -> SCI	-0.004	0.844
Supplier integration -> SCI	-0.026	0.320
SCI -> OP	-0.152	0.029

Source: Field survey, Kusi (2020)

The study further sought to assess if there is difference in OP as influenced by SCI for medium-sized commercial poultry farms and large-sized commercial poultry farms in the poultry industry of Ghana. Per the findings of the PLS MGA (Table 19), SCI improves the OP of large-sized commercial poultry farms in the poultry industry significantly and better than it does in OP of medium-sized commercial poultry farms in that same industry (Beta-diff:| MSE - LSE |=-0.152; p=0.029: p<0.05).

The measures of SCI in terms of customer integration (Beta-diff:| MSE - LSE |=-0.066; p=0.068: p>0.05), financial flow integration (Beta-diff:| MSE - LSE |=0.018; p=0.642: p>0.05), information integration (Beta-diff:| MSE - LSE |=0.028; p=0.482: p>0.05), internal integration (Beta-diff:| MSE - LSE |=-0.016; p=0.604: p>0.05), logistics integration (Beta-diff:| MSE - LSE |=-0.004; p=0.844: p>0.05) and supplier integration (Beta-diff:| MSE - LSE |=-0.026; p=0.320: p>0.05) however where not statistically different for both

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medium-sized commercial poultry farms and large-sized commercial poultry farms.

Small-Sized Enterprise and Medium-Sized Enterprises

The study further sought to assess if there is difference in OP as influenced by SCI for small-sized commercial poultry farms and medium-sized commercial poultry farms in the poultry industry of Ghana. Per the findings of the PLS MGA (Table 24), SCI does not improve the OP of small-sized commercial poultry farms in the poultry industry significantly and better than it does predict OP among medium-sized commercial poultry farms in that same industry (Beta-diff:| SSE – MSE |=0.019; p=0.778: p>0.05).

Table 20: Small-Sized Enterprise Verse Medium-Sized Enterprises

	Path Coefficients-diff (SSE - MSE)	p-Value new (SSE vs MSE)
Customer integration -> SCI	-0.102	0.045
Financial flow integration -> SCI	-0.108	0.011
Information integration -> SCI	-0.007	0.761
Internal integration -> SCI	-0.003	0.871
Logistics integration -> SCI	0.008	0.799
Supplier integration -> SCI	0.326	0.094
SCI -> OP	0.019	0.778

Source: Field survey, Kusi (2020)

However, the study proved that customer integration (Beta-diff:| SSM – MSE |=-0.102; p=0.045: p<0.05) and financial flow integration (Beta-diff:| SSE – MSE |=-0.108; p=0.011: p<0.05) significantly predicted SCI in medium-sized commercial poultry farms that they did among small-sized commercial poultry farms. On the other hand, measures of SCI in terms of information integration (Beta-diff:| SSE - MSE |=-0.007; p=0.761: p>0.05),

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internal integration (Beta-diff:| SSE - MSE |=-0.003; p=0.871: p>0.05), logistics integration (Beta-diff:| SSE - MSE |=0.008; p=0.799: p>0.05) and supplier integration (Beta-diff:| SSE - MSE |=-0.326; p=0.094: p>0.05) were not statistically different for small-sized commercial poultry farms and medium-sized commercial poultry farms in the commercial poultry industry in Ghana.

Given the nature of firm size of the commercial poultry farms surveyed, it can be inferred from the test of difference conducted that SCI in large-sized commercial poultry farms has stronger impact on their OP than it does in small-sized commercial poultry farms in the same industry. It therefore proves that large-sized commercial poultry farms must continue to forge integrative supply chain relationship with their supply chain partners particularly with much emphasis on customer integration, financial flow integration, and supplier integration. Large-sized commercial poultry farms performed significantly and better than small-sized commercial poultry farms in terms of customer integration and financial flow integration. However, small-sized commercial poultry farms did better in terms of supplier integration compared to large-sized commercial poultry farms.

However, the study proves there is no statistically significant difference in the predicting SCI in the light of information integration, internal integration, and logistics integration between large-sized commercial poultry farms and small-scale commercial poultry farms. This finding also goes to confirm the notion that powerful companies (Large-sized commercial poultry farms in this context) take advantage of smaller ones in SCI relationships (Sivadasan, Smart, Huatuco & Calinescu, 2010).

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Again, a closer look the results relating to medium-sized commercial poultry farms and large-sized commercial poultry farms also indicates SCI impacts strongly on the OP of large-sized commercial poultry farms than it does in medium-sized commercial poultry farms. This therefore confirm that emphasis in SCI among large-sized commercial farms in Ghana would strongly influence their OP better than medium-sized commercial poultry farms although it also significantly impacted on the OP of medium-sized commercial poultry farms.

Both large-sized commercial farms and medium-sized commercial farms do not differ in customer integration, financial flow integration, information integration, internal integration, logistics integration and supplier integration. However, through the second order approach to the structural equation modelling, it was emphatically established that OP of large-scale commercial poultry farms is significantly improved compared to that of medium-sized commercial poultry farms in Ghana.

Furthermore, the results relating to test of difference in OP for medium-sized commercial poultry farms and small-sized commercial poultry farms also indicates SCI impacts at the same rate on the OP of small-sized commercial poultry farms and medium-sized commercial poultry farms. This conclusion was facilitated by the fact there is no statistically significant difference in OP for both small-sized commercial poultry farms and medium-sized commercial poultry farms in the commercial poultry industry in Ghana. Hence it is managerially prudent for managers in both small-sized commercial poultry farms and medium-sized commercial poultry farms to continue to adopt similar SCI practices as measured in the study.

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The strength of customer integration and financial flow integration in medium-sized commercial poultry farms is higher than they occur among small-scale commercial poultry farms in Ghana. There is no statistically significant difference in predicting SCI through information integration, internal integration, logistics integration, supplier integration. Thus, both small-sized commercial farms and medium-sized commercial farms do not differ in these aspects of SCI.

Chapter Summary

The chapter provided information relating the findings in line with specific research objectives of the study. The study proves SCI accounts for 67.8% positive variance in OP of commercial poultry farms in Ghana. Trust among supply chain partners in the poultry supply chain mediated significantly and positively, the predictive relationship between SCI and OP among commercial poultry farms in Ghana. Firm size had a statistically significant moderation (interaction) effect with SCI in predicting the positive variance in OP.

SCI predicted significantly positive variance in OP of large-sized commercial poultry farms than small-sized commercial poultry farms. Similarly, SCI predicted significantly positive variance in OP of large-sized commercial poultry farms when compared with its impact on OP of medium-sized commercial poultry farms. SCI failed to predict any statistically significant change in OP for both small-sized commercial poultry farms and medium-sized commercial poultry farms.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The study sought to assess the effect of SCI on OP of commercial poultry farms in Ghana. The study further treated trust among SC and firm size as mediating and moderating constructs respectively. The study targeted commercial farms located in Dormaa Municipality in the Bono Region of Ghana. The previous chapter provided information relating to the results and discussions made. This chapter however provides information relating to the summary of the key findings, conclusions drawn based on the findings relating to the specific objectives as well as the recommendations offered.

Summary

Relating to the specific objective that sought to assess the effect of SCI on OP of commercial poultry farms, it was discovered that SCI accounted for a substantial positive variance in OP. Measures of OP that were improved as a result of adoption and practice of SCI among commercial poultry farms include quick response to changes in demands, inventory turns, order fulfilment rate, business process innovation and operating cycle.

Financial flow integration is adjudged a moderate significant positive predictor of OP. The predictive relevance score of the construct also shows that financial flow integration has a small predictive relevance. Aspects of financial flow integration that improves OP include the practice of ensuring improved flow of funds among SCI partners, ensuring improved cash conversion cycle in SC, promoting accessibility of financial statements of SCI partners, and offering financial assistance to SCI partners.

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Internal integration is a significant positive predictor of OP with small effect size. The predictive relevance score shows that that internal integration has a small predictive relevance in the context of this study. However, logistics integration had a statistically significant negative effect on OP of commercial poultry farms with a small effect size and weak predictive relevance.

Similarly, it was discovered supplier integration had a statistically significant negative effect on OP of commercial poultry farms with small effect size and strong predictive relevance. Customer integration however causes a statistically insignificant negative variation in OP of commercial poultry farms. Information integration though has the potential to improve the level of OP of commercial poultry farms, such impact is however can be attributed to chance and not the nature of scientific interaction among the variables in the structural model, given the underlying measurement considerations.

The specific indirect effect, which measures the mediation effect, proved that trust in SCI among commercial polutry farms mediates significantly and positivesly the predictive relationship between SCI and OP in the commercial poultry industry in Ghana. The indicators of trusts among the SC partners that contextually measured trust include SCI partners being sincere with commercial poultry farms, SCI partners supporting commercial poultry farms in periods of crises, the SC relationship being guided by the idea that trust is the overall pillar among SCI partners and the capacity of SCI partners having the necessary abilities to meet their obligations in the poultry industry.

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Firm size moderates significantly, the predictive relationship between SCI and OP. Again, firm size had a statistically significant negative effect on OP of commercial poultry farms, with small effect size. It thus shows moderate significant positive variance in OP is attributed to changes in SCI, firm size, and its interaction effect. The fourth specific research objective sought to assess the difference in OP among small-sized enterprises, medium-sized enterprises, and large-sized enterprises. SCI improves the OP of large-sized commercial poultry farms in the commercial poultry industry of Ghana significantly and better compared with the OP of small-sized commercial poultry farms in that same industry.

This can be attributed to that fact that the contributions of customer integration and financial flow integration were significantly better in terms of measuring the level of SCI in large-sized commercial poultry farms than in small-sized commercial poultry farms in the poultry industry. Supplier integration measured SCI better and significantly in small-sized commercial poultry farms than the case of large sized commercial poultry farms. SCI improves the OP of large-sized commercial poultry farms in the Ghanaian poultry industry significantly and better than it does in OP of medium-sized commercial poultry farms in that same industry. The measures of SCI however were not statistically different for both medium-sized commercial poultry farms and large-sized commercial poultry farms.

SCI does not improve the OP of small-sized commercial poultry farms in the poultry industry significantly and better than it does predict OP among medium-sized commercial poultry farms in that same industry. However, the study proved that customer integration and financial flow integration

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significantly predicted SCI in medium-sized commercial poultry farms more than the case of small-sized commercial poultry farms. On the other hand, measures of SCI in terms of information integration, internal integration, logistics integration and supplier integration were not statistically different for small-sized commercial poultry farms and medium-sized commercial poultry farms in the commercial poultry industry in Ghana.

Conclusions

Conclusively, it is evidentially established that SCI accounts for a substantial positive change in OP of commercial poultry farms in Ghana. This therefore confirms the need for commercial poultry farms to adopt SCI as a key relational strategy in their operations with the various SC partners in the industry. The aspects of SCI that cause a statistically significant positive variance in OP include financial flow integration and internal integration.

However, logistics integration and supplier integration have statistically significant but negative impact on OP of commercial poultry farms in Ghana which justifies the call for the stoppage of these forms of integration among commercial poultry farms. Information integration and customer integration do not cause any significant change in OP of commercial poultry farms in Ghana. These forms of SCI are just waist of organizational resources given the context of the study.

Trust among SC partners in the poultry SC mediates significantly and positively, the predictive relationship between SCI and OP among commercial poultry farms in Ghana. Firm size has a statistically significant moderation (interaction) effect on SCI in predicting the positive variance in OP. This put firm size at the epicentre of managerial decision making in terms

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consideration of adoption and practice of SCI among commercial poultry farms in Ghana.

Comparatively, SCI predicts a statistically significant positive variation in OP in large-sized commercial poultry farms than small-sized commercial poultry farms. Similarly, one can conclude SCI predicts a statistically significant positive variance in OP in large-sized commercial poultry farms than medium-sized commercial poultry farms. However, SCI fails to predict any statistically significant change in OP for both small-sized enterprises and medium-sized enterprises. Hence the claim that similar approaches to SCI should be adopted by both small-scale commercial poultry farms and medium-scale poultry farms.

Recommendations

From the impact analysis conducted, it becomes imperative for commercial poultry farms in Ghana to adopt and practice SCI. Adopting SCI would obviously improve the level of their OP in terms of improvements in quick response to changes in demands, inventory turns, order fulfilment rate, business process innovation and operating cycle. Special emphasis should be place on financial flow integration if OP of commercial poultry farms is to be improved significantly. Managers of commercial poultry farms in SCI must adopt the strategies of ensuring flow of funds among SCI partners, ensuring improved cash conversion cycle in the SC, promoting accessibility of financial statements of SCI partners, and offering financial assistance to SCI partners. These practices reinforce financial flow integration to improve OP of commercial poultry farms.

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Furthermore, it is strategically prudent for managers and owners of commercial farms to adopt internal SCI if they are to improve their OP. This recommendation is rooted from the fact that internal integration significantly predicted a positive variance in OP. To this effect, it is prudent for managers to rely on cross-functional teams and must undertake joint monitoring of internal functions to detect deviations, provide of accurate and timely reliable data that promote coordination of internal functions in order to ensure efficiency in internal functions.

It is also not managerially prudent for commercial poultry farms to rely on logistics integration and supplier integration because these aspects of integration rather reduce the level of OP of commercial poultry farms in Ghana. It therefore makes sense for managers of commercial poultry farms in Ghana to stop integrating with their third-party logistics firms and key suppliers. Customer integration and information integration however must be discarded as means of integration because these aspects of SCI do not affect OP in any significant manner.

Managers of commercial poultry farms must therefore consider firm size in when it comes to deciding on the type of SCI to adopt and practice in the commercial poultry industry. Large-scale commercial farms must adopt SCI, particularly customer integration and financial flow integration compared to small-scale enterprises because such integration strategies have the potential to influence their OP more than that of small-scale enterprises. Small-scale enterprises must also focus much on supplier integration because they did better than that of large-scale enterprises in the commercial poultry industry.

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Similarly, it is recommended that large scale enterprises must adopt SCI in the operations more than that of medium sized enterprises because SCI influenced the OP of large-scale enterprises better and significantly than that of medium sized enterprises in the commercial poultry industry. Small-sized enterprises and medium-sized enterprises do not differ in OP given the nature of SCI existing in the commercial poultry industry, hence they could adopt same inter-organisational and inter-organisational relational integrative strategies.

Suggestions for Further Studies

Further studies should be conducted in the commercial poultry industry to assess the effect of SCI on both OP and financial performance. Firm characteristics such as firm aga, focal breed and origin of business can be treated as moderating factors in such studies. Other studies could also be conducted to examine why most commercial poultry farms go into mixed and layer production at the expense of broiler production.

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APPENDIX A

This study is being conducted by Kusi Yaw Lawrence, a postgraduate student in University of Cape Coast, to assess the effect of poultry supply chain integration on operational performance of commercial poultry farm in Ghana. With your rich experience and knowledge in collaboration with other stakeholders in the poultry industry, I humbly ask for your priceless effort and time to complete this questionnaire as accurate as you could. This exercise is for academic purpose only. Thank you.

Instructions: Kindly write or tick (√) where appropriate

Demographic Information

1. Sex a. Male [ ] b. Female [ ]
2. Position   a. Farm manager [ ] b. Farmer owner [ ] c. Supply chain manager [ ]
3. Current production capacity   a. 50-5,000 birds [ ] b. 5001-10,00 birds [ ] c Above 10,000 birds [ ]
4. Focal breed a. Layers [ ] b. Broilers [ ] c. Layers and broilers [ ]
5. Legal for of business a. Company [   ] b. Partnership [   ] Sole proprietorship [ ]
6. Form of ownership a. Publicly owned [ ] b. Privately owned [ ]
7. Origin of firm   a. Ghana-based [ ] b. Foreign-based [ ]
8. Branch status   a. No [ ] b. Yes [ ]
9. Number of employees […………………………………]
10. How many years has your business been in operation? […….]
11. Formalization status a. Registered [ ] b. Not registered [ ]
12. Source of day old chicks a. Own DOC [ ] b. Self-imported [ ] c. Local importer [ ] d. Local supplier [ ]

Poultry Supply Chain Integration Among Commercial Poultry Farmers

13. To what extent do you engage in these supply chain integration practices in your business operations?
    Where: 1=Never; 2=Rarely; 3=Occasionally; 4=Sometimes; 5=Frequently; 6=Usually; 7=Every time

	Supply Chain Integration	1	2	3	4	5	6	7
No	**Supplier Integration**							
1	We synchronize business activities with those of key suppliers							
2	We constantly explore new working relationships with suppliers							
3	We pursue supplier interrelationship and involvement that go beyond operational transactions							
4	We keep key suppliers informed about events or changes that may affect them							
5	We share sensitive business information frequently with supply chain integration suppliers							
6	We work with suppliers to improve their							

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No		1	2	3	4	5	6	7
	quality in the long run							
7	There is real-time checking on total stocks with supply chain integration suppliers							
8	We have a high degree of joint planning to obtain rapid response ordering processes (inbound) with suppliers							
No	**Customer Integration**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	We jointly make production capacity decisions with our major customers							
2	We jointly develop and maintain measurement systems with major customers							
3	We jointly engage in capacity planning with our major customers							
4	We exchange support services with our major customers							
5	We jointly solve customer-related problems with major customers							
6	We connect in-real time with major customers							
7	We rapidly respond to customer order process							
8	We supply goods and services to respond to customer needs							
No	**Logistics Integration**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1	We ensure that logistic activities are well-integrated with the logistics activities of supply chain integration partners							
2	We ensure that there is seamless integration of logistics activities with supply chain integration partners							
3	We have integrated both in-bound and out-bound logistics with major suppliers and major customers							
4	We have developed joint transport planning, management and control processes with supply chain integration partners							
5	We closely work with third-party logistics partners with the view to reducing distribution costs							
6	We share storage facilities with third party logistic firms							
7	We share logistics risks with third party logistics partners							
8	We share same logistics software with third party logistics partners							

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No	Internal Integration	1	2	3	4	5	6	7
1	We conduct periodic interdepartmental meetings among internal functions							
2	We use cross-functional teams in process innovation							
3	We ensure there is real-time integration and connection among internal functions from raw material management through production, logistics and sales							
4	We monitor business process jointly with different internal functions							
5	We jointly develop and maintain measurement systems with different internal functions							
6	We have a high level of responsiveness within our unit to meet other department's needs							
7	Within our unit, we emphasize physical flows among various departments							
8	We have an integrated system across functional areas of production control							
No	Information Integration	1	2	3	4	5	6	7
1	We share production and inventory data with SC partners							
2	We promote exchanges of technical knowledge with SC partners							
3	We integrate modern communication technology in supply chain integration with SC partners							
4	We share standardized information equipment and systems with supply chain integration partners							
5	We ensure that forecasting is done based on integrated data capture systems of supply chain integration partners							
+6	We share work schedule information with supply chain integration partners							
7	We integrate sourcing, transport, service process and other areas internally							
8	Improvement in data analysis (auditing and reporting) through integrated information system							
No	Financial Flow Integration	1	2	3	4	5	6	7
1	We ensure flow of funds among supply chain integration partners							

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2	We ensure improved cash conversion cycle in SC							
3	We ensure real-time exchange of financial data among supply chain integration partners							
4	We ensure accessibility of financial statements of supply chain integration partners							
5	We offer financial assistance to supply chain integration partners							
6	We promote joint finance of projects among supply chain integration partners							
7	We support supply chain integration partners financially with flexible terms							
8	We partner with financial service providers for business purposes							

Trust in Supply Chain Integration Relationship

14.   How do these statements reflect the state of trust among supply chain partners in supply chain integration relationship of your business?

Where: 1=Never true; 2=Rarely true; 3=Sometimes but infrequently true; 4=Neutral; 5=Sometimes true; 6=Usually true; 7=Always true

No	Supply Chain Integration Trust	1	2	3	4	5	6	7
1	Supply chain integration partners are sincere with us							
2	Supply chain integration partners support us in periods of crises							
3	Trust is the overall pillar among supply chain integration partners							
4	Supply chain integration partners have the necessary abilities to meet their obligations							
5	SC partners negotiate honestly							
6	Conflicts are resolved amicably through appropriate adopted conflict resolution mechanism(s)							
7	Complex legal conditions do not regulate supply chain integration contract relationship among supply chain integration partners							
8	We can count on our supply chain integration partners to be concerned about our welfare							
9	We do not plan to monitor SC partners closely to ensure they fulfill their obligations to us							

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Operational Performance

15. How has the operational performance of your poultry business measured by these indicators improved because of integration with key supply chain actors in the poultry supply chain?

Where: 1=Very poor improvement; 2=Poor improvement; 3=Fair improvement; 4=Good improvement; 5=Very good improvement; 6=Excellent improvement; 7=Exceptional improvement

No	Operational Performance	1	2	3	4	5	6	7
1	Quick response to changes in demands							
2	Business process innovation							
3	Reduction in procurement costs							
4	Product delivery reliability							
5	Outstanding on-time delivery to customers							
6	Reduction in waste in production process							
7	Error-free products							
8	Operating capacity							
9	Operating cycle							
10	Inventory turns							
11	Price competitiveness							
12	Cost effectiveness							
13	Order fulfilment rate							
14	Labour productivity							

APPENDIX B

FACTOR LOADINGS

Factor Loadings-Objective 1

Table 5: Factor Loadings

		Loading	P Values
CI5 <- CI	We jointly solve customer-related problems with major customers	0.796	0.000
CI6 <- CI	We connect in-real time with major customers	0.903	0.000
CI8 <- CI	We supply goods and services to respond to customer needs	0.856	0.000
FFI1 <- FFI	We ensure flow of funds among supply chain integration partners	0.843	0.000
FFI2 <- FFI	We ensure improved cash conversion cycle in SC	0.892	0.000
FFI3 <- FFI	We ensure real-time exchange of financial data among supply chain integration partners	0.903	0.000
FFI4 <- FFI	we ensure accessibility of financial statements of supply chain integration partners	0.896	0.000
FFI5 <- FFI	We offer financial assistance to supply chain integration partners	0.828	0.000
InfoI2 <- InfoI	We promote exchanges of technical knowledge with SC partners	0.936	0.000
InfoI8 <- InfoI	Improvement in data analysis (auditing and reporting) through integrated information system	0.827	0.000
InteI2 <- IntI	We use cross-functional teams in process innovation	0.947	0.000
InteI3 <- IntI	We ensure there is real-time integration and connection among internal functions from raw material management through production, logistics and sales	0.896	0.000
InteI4 <- IntI	We monitor business process jointly with different internal functions	0.889	0.000
LI1 <- LogI	We ensure that logistic activities are well-integrated with the logistics activities of supply chain integration partners	0.892	0.000
LI3 <- LogI	We have integrated both in-bound and out-bound logistics with major suppliers and major customers	0.763	0.000
LI8 <- LogI	We share same logistics software with third party logistics partners	0.892	0.000
OP1 <- OP	Quick response to changes in demands	0.774	0.000
OP10 <- OP	Inventory turns	0.886	0.000
OP13 <- OP	Order fulfilment rate	0.855	0.000
OP2 <- OP	Business process innovation	0.847	0.000
OP9 <- OP	Operating cycle	0.812	0.000
SI2 <- SI	We constantly explore new working relationships with suppliers	0.814	0.000
SI3 <- SI	We pursue supplier interrelationship and involvement that go beyond operational transactions	0.805	0.000
SI4 <- SI	We keep key suppliers informed about events or changes that may affect them	0.792	0.000
SI7 <- SI	There is real-time checking on total stocks with supply chain integration suppliers	0.640	0.000
SI8 <- SI	We have a high degree of joint planning to obtain rapid response ordering processes (inbound) with suppliers	0.823	0.000

Source: Field survey, (2020)

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Factor Loadings-Objective 2

Table 11: Factor Loadings

		Loading	P Values
CI6 <- CI	We connect in-real time with major customers	0.920	0.000
CI6 <- SCI	We connect in-real time with major customers	-0.726	0.000
CI8 <- CI	We supply goods and services to respond to customer needs	0.898	0.000
CI8 <- SCI	We supply goods and services to respond to customer needs	-0.645	0.000
FFI1 <- FFI	We ensure flow of funds among supply chain integration partners	0.853	0.000
FFI1 <- SCI	We ensure flow of funds among supply chain integration partners	0.747	0.000
FFI2 <- FFI	We ensure improved cash conversion cycle in SC	0.895	0.000
FFI2 <- SCI	We ensure improved cash conversion cycle in SC	0.818	0.000
FFI3 <- FFI	We ensure real-time exchange of financial data among supply chain integration partners	0.891	0.000
FFI3 <- SCI	We ensure real-time exchange of financial data among supply chain integration partners	0.757	0.000
FFI4 <- FFI	We ensure accessibility of financial statements of supply chain integration partners	0.889	0.000
FFI4 <- SCI	We ensure accessibility of financial statements of supply chain integration partners	0.819	0.000
FFI5 <- FFI	We offer financial assistance to supply chain integration partners	0.834	0.000
FFI5 <- SCI	We offer financial assistance to supply chain integration partners	0.851	0.000
InfoI2 <- InfoI	We promote exchanges of technical knowledge with SC partners	0.919	0.000
InfoI2 <- SCI	We promote exchanges of technical knowledge with SC partners	0.742	0.000
InfoI8 <- InfoI	Improvement in data analysis (auditing and reporting) through integrated information system	0.851	0.000
InfoI8 <- SCI	Improvement in data analysis (auditing and reporting) through integrated information system	0.558	0.000
InteI2 <- InteI	We use cross-functional teams in process innovation	0.949	0.000
InteI2 <- SCI	We use cross-functional teams in process innovation	0.883	0.000
InteI3 <- InteI	We ensure there is real-time integration and connection among internal functions from raw material management through production, logistics and sales	0.888	0.000
InteI3 <- SCI	We ensure there is real-time integration and connection among internal functions from raw material management through production, logistics and sales	0.764	0.000
InteI4 <- InteI	We monitor business process jointly with different internal functions	0.895	0.000
InteI4 <- SCI	We monitor business process jointly with	0.801	0.000

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	different internal functions		
LI1 <- LogI	We ensure that logistic activities are well-integrated with the logistics activities of supply chain integration partners	0.890	0.000
LI1 <- SCI	We ensure that logistic activities are well-integrated with the logistics activities of supply chain integration partners	0.744	0.000
LI3 <- LogI	We have integrated both in-bound and out-bound logistics with major suppliers and major customers	0.760	0.000
LI3 <- SCI	We have integrated both in-bound and out-bound logistics with major suppliers and major customers	0.636	0.000
LI8 <- LogI	We share same logistics software with third party logistics partners	0.897	0.000
LI8 <- SCI	We share same logistics software with third party logistics partners	0.866	0.000
OP1 <- OP	Quick response to changes in demands	0.791	0.000
OP10 <- OP	Inventory turns	0.880	0.000
OP13 <- OP	Order fulfilment rate	0.846	0.000
OP2 <- OP	Business process innovation	0.864	0.000
OP9 <- OP	Operating cycle	0.794	0.000
SCI1 <- Trust	Supply chain integration partners are sincere with us	0.957	0.000
SCI2 <- Trust	Supply chain integration partners support us in periods of crises	0.959	0.000
SCI3 <- Trust	Trust is the overall pillar among supply chain integration partners	0.942	0.000
SCI <- Trust	Supply chain integration partners have the necessary abilities to meet their obligations	0.855	0.000
SI2 <- SI	We constantly explore new working relationships with suppliers	0.860	0.005
SI2 <- SCI	We constantly explore new working relationships with suppliers	-0.469	0.000
SI3 <- SI	We pursue supplier interrelationship and involvement that go beyond operational transactions	0.857	0.006
SI3 <- SCI	We pursue supplier interrelationship and involvement that go beyond operational transactions	-0.532	0.000
SI4 <- SI	We keep key suppliers informed about events or changes that may affect them	0.776	0.005
SI4 <- SCI	We keep key suppliers informed about events or changes that may affect them	-0.411	0.000

Source: Field Survey, (2020)

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Factor Loadings: Objective 3
Table 18: Factor Loadings

		Loadings	P Values
CI6 <- CI	We connect in-real time with major customers	0.924	0.000
CI6 <- SCI	We connect in-real time with major customers	-0.760	0.000
CI8 <- CI	We supply goods and services to respond to customer needs	0.898	0.000
CI8 <- SCI	We supply goods and services to respond to customer needs	-0.661	0.000
FFI1 <- FFI	We ensure flow of funds among supply chain integration partners	0.856	0.000
FFI1 <- SCI	We ensure flow of funds among supply chain integration partners	0.750	0.000
FFI2 <- FFI	We ensure improved cash conversion cycle in SC	0.894	0.000
FFI2 <- SCI	We ensure improved cash conversion cycle in SC	0.811	0.000
FFI3 <- FFI	We ensure real-time exchange of financial data among supply chain integration partners	0.903	0.000
FFI3 <- SCI	We ensure real-time exchange of financial data among supply chain integration partners	0.772	0.000
FFI4 <- FFI	We ensure accessibility of financial statements of supply chain integration partners	0.888	0.000
FFI4 <- SCI	We ensure accessibility of financial statements of supply chain integration partners	0.830	0.000
FFI5 <- FFI	We offer financial assistance to supply chain integration partners	0.842	0.000
Farmsize <- Firm size		1.000	
InfoI2 <- InfoI	We promote exchanges of technical knowledge with SC partners	0.919	0.000
InfoI2 <- SCI	We promote exchanges of technical knowledge with SC partners	0.707	0.000
InfoI8 <- InfoI	Improvement in data analysis (auditing and reporting) through integrated information system	0.833	0.000
InfoI8 <- SCI	Improvement in data analysis (auditing and reporting) through integrated information system	0.504	0.000
InteI2 <- InteI	We use cross-functional teams in process innovation	0.949	0.000
InteI2 <- SCI	We use cross-functional teams in process innovation	0.884	0.000
InteI3 <- IntI	We ensure there is real-time integration and connection among internal functions from raw material management through production, logistics and sales	0.881	0.000
InteI3 <- SCI	We ensure there is real-time integration and connection among internal functions from raw material management through production, logistics and sales	0.744	0.000
InteI4 <-	We monitor business process jointly	0.902	0.000

InteI	with different internal functions		
InteI4 <- SCI	We monitor business process jointly with different internal functions	0.804	0.000
LI1 <- LogI	We ensure that logistic activities are well-integrated with the logistics activities of supply chain integration partners	0.904	0.000
LI1 <- SCI	We ensure that logistic activities are well-integrated with the logistics activities of supply chain integration partners	0.744	0.000
LI3 <- LogI	We have integrated both in-bound and out-bound logistics with major suppliers and major customers	0.769	0.000
LI3 <- SCI	We have integrated both in-bound and out-bound logistics with major suppliers and major customers	0.613	0.000
LI8 <- LogI	We share same logistics software with third party logistics partners	0.900	0.000
LI8 <- SCI	We share same logistics software with third party logistics partners	0.875	0.000
OP1 <- OP	Quick response to changes in demands	0.720	0.000
OP10 <- OP	Inventory turns	0.885	0.000
OP13 <- OP	Order fulfilment rate	0.868	0.000
OP2 <- OP	Business process innovation	0.837	0.000
OP9 <- OP	Operating cycle	0.821	0.000
SI2 <- SI	We constantly explore new working relationships with suppliers	0.875	0.005
SI2 <- SCI	We constantly explore new working relationships with suppliers	-0.505	0.000
SI3 <- SI	We pursue supplier interrelationship and involvement that go beyond operational transactions	0.854	0.006
SI3 <- SCI	We pursue supplier interrelationship and involvement that go beyond operational transactions	-0.520	0.000
SI4 <- SI	We keep key suppliers informed about events or changes that may affect them	0.830	0.005
SI4 <- SCI	We keep key suppliers informed about events or changes that may affect them	-0.484	0.000
SCI* Firm size <- Moderating Effect 1		0.963	0.000

Source: Field survey, (2020)

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