UNIVERSITY OF CAPE COAST

RISK AND OPERATIONAL PERFORMANCE: EVIDENCE FROM THE SACHET WATER SUPPLY CHAIN IN GHANA

GREGORY KAKU

2019

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BY

GREGORY KAKU

Thesis submitted to the 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 the award of Master of Commerce degree in Procurement and Supply Chain Management.

SEPTEMBER 2019

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: Gregory Kaku

Supervisors' Declaration

We 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.

Principal Supervisor's Signature...……. Date ….……...

Name: Dr. Edmond Yeboah Nyamah

Co-Supervisor's Signature…… Date……..

Name: Dr. Dominic Owusu

ABSTRACT

Actors in Ghana's sachet water supply chain are constrained by numerous risks factors from functioning properly. The study recognises the need to investigate the risks faced by actors in the sachet water supply chain and its impact on their Operational performance. Underpinned by constraints and theory, the study adopted the positivism paradigm, quantitative approach and explanatory research design due to their relevance to the research objectives. The simple random sampling technique was used to select a sample of three hundred and seventy (370) actors in the sachet water supply chain from the National Board for Small Scale Industries (NBSSI) for the study. Structured questionnaires were administered which yielded a response rate of 74.32%, (275), reliable data set which was processed using the IBM SPSS Statistics version 25. Descriptive tools such as frequencies, percentages, means and standard deviations and inferential tools like correlation and regression, the study found variations in risks' probability, impact and threshold in sachet water supply chain. Also, financial ($p = 0.006$), supply-related ($p = 0.001$), managerial and operational ($p = 0.005$) and Logistics and infrastructural risks ($p = 0.022$) significantly affected operational performance, whiles on the contrary political ($p = 0.710$) and demand-related ($p = 0.410$) risks did not affect significantly operational performance. The study, therefore recommended that, actors in the sachet water supply chain are to consistently identify and quantify risks thresholds/impact frequently as this will aid in developing prompt actions to mitigate the high-level risk sources whiles monitoring and developing contingency plans for the medium-level risk sources.

KEYWORDS

Operational Performance

Risk

Risk Matrix

Sachet Water

Supply Chain

Small and Medium Enterprises

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to my supervisors, Dr. Edmond Yeboah Nyamah and Dr. Dominic Owusu both of the Department of Marketing and Supply Chain Management, for their professional guidance, advice, encouragement and the goodwill with which they guided this work. I am really very grateful.

I am also grateful to Prof. Daniel Agyapong, Dr. Gloria Agyapong, Mrs. Christina Appiah-Nimo, Mr. Daniel Ofori, Mr. Innocent S.K. Acquah and Mr. Lawrence Kusi for making generous contributions to make this work better. I am again grateful to Dr. Edmond Yeboah Nyamah for his unflinching support throughout this programme. Finally, I wish to thank my family and friends for their support, especially, my parents, Mr. Augustine Opoku and Mrs. Florence Ackah, my siblings, Mary Asemela Kaku, and Benedicta Kaku, my friends, Frank Baafi, Richard Kofi Opoku, Osman Fuseini, Emmanuel Appiah, Ann-Marie Koomson, Clifford Kevin Benedict Abboah, Helen Mawuena Fiati and Joseph Guba.

DEDICATION

To my family

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

SMEs	Small and Medium Enterprises
NBSSI	National Board for Small Scale Industries
WHO	World Health Organisation
GWCL	Ghana Water Company Limited
SBA	Small Business Administration
ECG	Electricity Company of Ghana
TOC	Theory of Constraints
MOTI	Ministry of Trade and Industry
SSNIT	Social Security & National Insurance Trust
GDP	Gross Domestic Product
GEDC	Ghana Enterprise Development Commission
SC	Supply chain
AGI	Association of Ghana Industries

CHAPTER ONE

INTRODUCTION

Water covers 96.5% of the planet earth yet not all people have access to portable drinking water (Nasa Report, 2005). Four billion people, that is, two-thirds of the world's population, suffer from clean water scarcity or experience severe water scarcity, during at least part of the year, with Sub-Saharan Africa having the largest number of water-stressed countries (Mekonnen, & Hoekstra, 2016). Currently, an estimated 300 out of the 800 million people in Africa, live in a water stressed environment, with 24 to 700 million expected to be displaced and 75 to 250 million more living in areas of high-water stress by 2030 (UNEP Report, 2018). Recent study by World Health Organisation reveals that, lack of safe drinking water is one of the world's leading challenges affecting more than 844 million people globally including Ghanaians (WHO Report, 2019).

Furthermore, the surge in the population of many sub-Saharan African cities in recent decades due to industrialisation driven urbanisation, compounds or add up to the issue of increasing demand for access to portable water (Goldstone, 2010; Bloom, 2011). Efforts made by the governments in sub-Sahara including Ghana, private institutions, nongovernmental organisations and international institutions such as the World Bank in making portable water available in both urban and rural areas, still fall short of meeting the seventh Millennium Development Goal (MDG 7C) which states that "*Reduce by half the proportion of people without sustainable access to safe drinking water and basic sanitation"* (UN Report, 2017).

For more than a decade now, Ghana Water Company Limited (GWCL), the body charged with provision of portable water also faces serious constraints in meeting the challenge of providing adequate water for all rural and urban residents. The average daily water demand in Ghana is 249 million gallons, yet GWCL can only provide 192 million gallons, leaving a deficit of 57million gallons (GWCL Report, 2018). The need generated by this deficit demand arguably calls for public private partnership to augment GWCL's efforts at providing and distributing safe drinking water. Thus, this has necessitated the springing up of private businesses and Small and Medium Enterprises (SMEs) in the production and distribution of purified drinking water to complement the efforts of the government at ensuring that there is adequate water security in Ghana due to the increasing demand for portable drinking water (Kusi, Agbeblewu & Nyarku, 2015).

Background to the Study

Globally, the consumption of packaged drinking water has been growing, evidence of this growth has been recorded both in high income and low- and middle-income countries (Rodwan, 2013). In West Africa, the sachet water industry has undergone transformation through various innovative means. The industry has moved from street traders selling cups of water drawn from large containers to passers-by; selling water in tied plastics bags; to presently heat-sealed water in plastic sleeves (Stoler, Weeks & Fink, 2012; Mosi, Adadey, Sowah & Yeboah, 2019). The Sachet water industry has had a significant impact on economic development in Africa over the years (Bello & Miyanacha, 2016).

The sachet water industry contributes in the areas of job creation; increase in investment opportunities for entrepreneurs and improving the socioeconomic status of actors along the supply chain (Quartey, Tosefa, Danquah, & Obrsalova, 2015). The sachet water industry in Ghana is vibrant and a highly profitable sector since there is always ready market demand for the products of the industry. The actors in the purified sachet drinking water industry usually make close to (sometimes even more than) 100% profit (Ackah-Arthur, 2011). Quartey, Tosefa, Danquah and Obrsalova (2015), postulates that small scale sachet water companies usually produce between 15,000 sachets (500 bags) and 45,000 (1500 bags) sachets per day and have much smaller distribution coverage, more often distributing their products in and around the cities, towns and neighbouring communities along their supply chains.

In Ghana, reliance on sachet water primarily as a drinking source of portable water has been on an increasing trend for the past two decades, furthermore due to its relatively moderate price and accessibility, sachet water is highly patronized by most people (Stoler *et al.*, 2012; Stoler *et al.*, 2014; Stoler *et al*., 2016). Wardrop *et al*., (2017), pointed out that households' consumption of sachet water based on the Ghana Living Standards has increased significantly over the last twelve years, with Survey Round 6 (GLSS6) data indicating that sachet water consumption had increased to 63% as compared to 4.1% of bottled water, furthermore due to its relatively moderate price and accessibility, sachet water is highly patronized by most people (Stoler *et al.*, 2014; Stoler *et al.*, 2016).

Dzodzomenyo, Fink, Hill, Dotse-Gborgbortsi, Coleman, and Wright (2018), similary supported earlier findings by Wardrop *et al*., (2017), by highlighting that the competitive market and easy availability of packaged water has made it a popular choice, especially among the highly mobile urban population. These readily available sachet drinking water, (typically 500 mL) sold in heat-sealed plastic sleeves, has proved a popular supplement to piped water among urban consumers in many settings (Dzodzomenyo, Fink, Dotse-Gborgbortsi, Wardrop, Aryeetey, Coleman, & Wright, 2018). Clearly, the success and market performance of the sachet water industry is critical to the health and economic well-being of the nation (Stoler *et al.*, 2016).

Unfortunately, most of the companies, thus actors in the Sachet water industry are under-performing due to their inability to leverage quality and quality management strategies to achieve the desired market share, competitive advantage, growth and profitability (Dzodzomenyo *et al.*, 2018). This could arguably be attributed to issues of risks which constrains them. The theory of constraints which assumes that, every system has at least one constraint (limiting factor) which prevents it from achieving its set goals can be a key in exploring how the issue of risks hinder the operational performance of actors in the sachet water supply chain (Şimşit, Günay & Vayvay, 2014). Thus, the constraints theory can be related to the study's objectives by seeing the risks factors within the sachet water supply chain as the constraints to their operational performance. Thus, it is against this background that this study sought to utilize the constraints theory to investigate the

risk issues affecting the operational performance of actors within the sachet water supply chain.

Statement of the Problem

The business environments within which Small and Medium-scale Enterprises (SMEs) including those in the sachet water supply chain operate exposes them to numerous risk issues, notably financial, demand-related, supply-related, managerial and operational risks (Burchett, 1999; Zwikael, Pathak, Singh & Ahmed, 2014). These risks have been found to threaten their operational performance levels and invariably survival (Tambunan, 2008). In some developing economies, for instance, about 50% to 71.5% SMEs including those in the sachet water businesses collapse as a result of exposure to risks during their first three to five years of operation (Willemse, 2010; Fatoki, 2012; Adcorp, 2014; Yeboah, 2015). Yeboah (2015), further iterated that five out of every seven new SMEs fail within their first year in Ghana, this number includes those in the sachet water supply chain.

Moreover, about 38.4% of these businesses struggle to survive in the face of risks including financial, operational, demand and supply-related and legal risks (Tambunan, 2008; Zwikael *et al.*, 2014; Yeboah, 2015). According to Vásquez and Adams (2019), over 65% of the actors within the water industry are financially constrained. Similarly, sachet water supply chains within sub-Saharan African (SSA) countries including Ghana, are predominantly exposed to various risk-related issues including licensing delays, lack of credits, regulatory constraints, fierce competitions from larger enterprises and poor legal policies (Quaye, 2006;

Tambunan, 2008). These risks can to some extent hinder the efficiency of their overall operational performance.

Abor and Quartey (2010) also found scarcity, high cost of acquiring, managing materials, poor cash flows, high transportation costs, energy inefficiencies, location challenges, storage issues and price fluctuations as some risk-related issues which potentially hamper the operational performance of actors in the sachet water supply chain. Dada (2011) concluded that most SMEs including those engaged in sachet water business struggle in trade as they face fierce competition from domestic and external larger enterprises due to poor managerial, legal and political risks. A study by Kusi, Agbeblewu and Nyarku (2015) supported the findings of Dada, revealing that, majority of actors in sachet water supply chains struggle to meet their financial needs which hamper their growth and competitiveness. Kusi *et al.*, (2015) added that legal issues arising from unfavourable taxes and lengthy legal requirements affect their operational capacities.

According to the World Bank Doing Business Report (2015) and Association of Ghana Industries Report (2017), Ghanaian businesses including sachet water firms spend about 127 days when dealing with licensing issues. These clearly affect the speed with which the actors in these chain networks operate. Also, actors in water supply chains commit about 45% of their overall finances into taxes amid difficulties accessing finance (Agyapong & Arthur, 2018). Studies by Stoler (2016) and Addo, Amankwaa and Gyasi (2019), further reveal that physicochemical and microbiological contaminants of sachet water are caused by

poor hygiene practices including hand-filled and hand-tied polythene-bagging. Furthermore, mishandlings of sachet water like storing with toxic chemicals and exposure to direct sun rays causes contamination.

As revealed by Stoler (2016), some of these contaminants cannot be simply detected by taste, odour or smell but could have severe health implications for consumers. These contaminants which emanate from typical operational risks can arguably threaten the growth and survival of the Ghanaian sachet water supply chain seriously. This is because, any contamination at one node could have rippling effects on the operational activities of the other nodes within the sachet water supply chain. Statistics by Bastiat Ghana, indicates that actors in the sachet water supply chain are part of the 85% of the SMEs which constitute 92% of all companies registered in Ghana now, offer employment to over 80% of the citizens, with 75% of them contributing to GDP (Senzu, 2017). These actors (SMEs) include those in the sachet water supply chain, however the use of simulation and case study restricts or limits the number of firms that are studied in such researches (Gog, 2016).

This may result in potential researcher bias, restricted generalizability, possible errors and ethical issues (Tumele, 2015), which can arguably to some extent provide an unrealistic view of the issues faced by the SMEs in sachet water supply chain since the use of survey could have provided a better understanding of such issues by reducing potential researcher bias and possible errors, improvement in generalizability, assurance of adherence to ethical issues through anonymity and reliability checks (Creswell, & Creswell, 2017; Nardi, 2018). Again, according to

Chopra and Sodhi (2014) and Hallikas and Lintukangas (2016), risk is a function of probability and impact, thus this makes the measurement, methods and data analysis done in studies which failed to recognise this assertion as such, weak and unrigorous, creating a methodological.

Moreover, the risk matrix which is one of the effective means of assessing risk thresholds and impact has not been used to fully exploit the issues of risks facing actors in the sachet water supply chain in Ghana (Nyamah, Jiang, Feng, & Enchill, 2017). Despite the prevalence of risk-related issues, previous studies in developing economies have focused on SMEs (Fiseha & Oyelana, 2015; Folusho, 2015; Nsiah & Prempeh, 2016; Avevor, 2016; Emezie, 2017; Senzu, 2017; Agyei, 2018) with few of them focusing on sachet water supply chains (Nnji, Eluwa & Nnwoji, 2013; Stoler 2017). However, none of these studies have revealed the extent to which these risk factors influence the operational performances of the actors in sachet water supply chains in developing economies including Ghana.

These gaps in previous studies have, therefore, made it difficult for actors within the Ghanaian sachet water supply chains to identify and invariably manage their risk-related issues. Arguably, actors within this chain would continue to struggle amid government interventions if continuously exposed to various risk issues. It is, therefore, imperative to examine risk-related issues and how they influence the operational performances of actors in the sachet water supply chain in Ghana. Thus, this study seeks to investigate into risks issues faced by SME's in the sachet water supply and its impact on their operational performance.

Purpose of the Study

The purpose of the study was to investigate risks faced by SMEs in the sachet water supply chain and its impact on their operational performance.

Research Objectives

Based on the purpose of the study, the following specific objectives were developed to:

1. assess the risks faced by actors in the sachet water supply chain.
2. examine the effect of financial risks on operational performance of actors in the sachet water supply chain.
3. assess the effect of supply-related risks on operational performance of actors in the sachet water supply chain.
4. analyse the effect of demand-related risks on operational performance of actors in the sachet water supply chain.
5. evaluate the effect of managerial and operational risks on operational performance of actors in the sachet water supply chain.
6. investigate the effect of political risks on operational performance of actors in the sachet water supply chain.
7. examine the effect of logistics and infrastructural risks on operational performance of actors in the sachet water supply chain.

Research Question

The study was guided by the research question:

1. what are the risks faced by actors in the sachet water supply chain?

Research Hypotheses

The study was also guided by the following hypotheses:

H_1: There is significant negative relationship between financial risks and operational performance of actors in the sachet water supply chain

H_2: There is significant negative relationship between supply-related risks and operational performance of actors in the sachet water supply chain.

H_3: There is significant negative relationship between demand-related risks and operational performance of actors in the sachet water supply chain

H_4: There is significant negative relationship between managerial and operational risks and operational performance of actors in the sachet water supply chain.

H_5: There is significant negative relationship between political risks and operational performance of actors in the sachet water supply chain.

H_6: There is significant negative relationship between logistics and infrastructure-related risks and operational performance of actors in the sachet water supply chain.

Significance of the Study

Risk issues are important when it comes to the proper functioning of firms including SMEs in the sachet water supply chain. This is because it helps managers identify and quantify risks thresholds and their impact frequently in order to develop prompt actions to mitigate high level risks sources while monitoring and developing contingency plans for medium level risks. This helps increase productivity and enhance operational performance. Again, aim of this research is to help improve upon the knowledge on risks faced by actors in the sachet water supply chain in developing countries, particularly Ghana. This was done by

explaining the effects that risks have on business performance of small and medium scale enterprises.

This research sought to produce an unambiguous image of the connections between the different types of risks and operational performance. Additionally, the research informs actors in the sachet water supply chain as to the type of risks which significantly undermines their operational performance. The study discusses the degree to which the different types of risks (Financial, Demand-related, Supply - related, Management and Operational, Political and Logistics and Infrastructural risks) influence operational performance of actors in the sachet water supply chain. Ultimately, the study will serve as literature that would add to academic knowledge in the domain of risk identification and assessment in SMEs in Ghana including those in the sachet water supply chain.

Furthermore, findings will be of immense importance to managers of SMEs in the sachet water supply chain, policy makers and other researchers interested in the sector to formulate policies aimed at improving operational performance by developing a risk management policy that is consistent with the risk management strategy adopted to enhance the operational performance of supply chains. The study stimulates interests of scholars, students and other researchers to probe further into the study of risks facing the sachet water supply chain of Ghana.

Delimitation

Even though there are several SMEs in Ghana, the study focused on risk and operational performance of SMEs in the sachet water supply chain in selected metropolises in Ghana, reference to other sectors will only be to either buttress a

fact or make a comparison. Its scope is restricted to four major Metropolises, namely, Accra, Sekondi-Takoradi, Kumasi and Tema. This is because the four constitute industrial hubs which contain a large chunk of the target respondents who are key players in Ghana's industrial sector development and have readily information on risk issues in the sachet water supply chain.

Consistent with Nyamah, Jiang, Feng, Enchill, (2017), and for the purpose of this study, subjective performance measures such as dependability, speed, quality, response, cost and information were used for the study. This is because performance is a multidimensional concept, and the relationship between risk and operational performance may depend upon the indicators used to assess the operational performance of which information was accurately available (Lumpkin & Dess, 1996).

Limitations

In every research, the approach employed comes with some weaknesses which affect the study's findings. The study employed the quantitative research approach and thus improper representation of the target population could affect the study's findings. Also, quantitative approach involves structured questionnaire with close ended questions and this could lead to limited outcomes since the results could not represent the actual occurring. Further, the inability to control the environment (respondents) because of the use structured questionnaires might have affected the study's findings. Also, the study's findings might be affected by the opinions of the respondents.

Definition of Terms

Supply Chain Risk

Refers to the probability of occurrence of an unforeseen disruption capable of impacting a firm.

Supply chain

Is a series of interactions between multiple firms.

Supply Chain Performance

Refers to the extended supply chain's activities in meeting end-customer requirements.

Organization of the Study

The study was made up of five chapters. Chapter one presented the background to the study, statement of the problem, purpose, objectives of the study, research questions, significance of the study, delimitation, limitation of the study, definition of terms as well as organisation of the study. Chapter two dealt with the literature review section of the study. Chapter three focused on the research methods which covered research design, population, sampling procedure, data collection instrument, data collection procedure, ethical considerations, data processing and analysis. Further, chapter four covered the results and discussion section and finally, chapter five discussed the summary, conclusions and recommendations of the study. Also, suggestions for further research were presented in this chapter.

CHAPTER TWO

LITERATURE REVIEW

This chapter presents reviews of literature on actors in the sachet water supply chain Ghana including SMEs, supply chain risk sources and how it impacts on the operational performance of actors in the sachet water supply chain. Specifically, the chapter discusses the theories, key concepts and empirical reviews that summarises information from related literature. It finally presents the conceptual framework of the study, in regards to the theoretical review, the study was underpinned by the theory of Constraints due to it relatedness to the focus of the study.

Theory of Constraints (TOC)

The theory of constraints (TOC) was propounded by Eliyahu Goldratt in 1984 (Goldratt, 1990). According to Levinson (2007), a constraint is anything that prevents a system from functioning properly. Gupta and Boyd (2008) view constraints (bottlenecks) as the weakest link in any system. The theory provides a systematic, clear and sustained focus on addressing a specific constraint until it no longer exists (Gupta & Boyd, 2008). The theory assumes that, every system has at least one constraint (limiting factor) which prevents it from achieving its set goals (Şimşit, Günay & Vayvay, 2014). This constraint a key obstacle to achieving expected goals, including enhanced operational Performance (Şimşit *et al*., 2014).

Constraints has been categorised into four: physical, policy, paradigm and market constraints respectively (Levinson, 2007). Physical constraint comprises tangible items such as lack of space, lack of resources, frequent machine

breakdowns and material shortages which affect firms' performances (Goldratt, 1990). The policy constraint focuses on the imposed directives for carrying out a given activity (Levinson, 2007). It includes government regulations, union agreements and company procedures. Further, the paradigm constraint contains deep-seated habits and beliefs which affects the performance of a system (Levinson, 2007). Finally, the market constraint occurs when unfavourable activities in a market (demand fluctuations, competition, poor supply) affect the operations of a system (Goldratt, 1990; Levinson, 2007).

Gupta and Boyd (2008) emphasized that, TOC is a management philosophy that focuses on continuous system improvement by tackling any constraint through total quality management and effective processing flows. The theory ensures that firms adopt the appropriate strategies to solve problems of bottlenecks (Naor *et al*., 2013). Linhart and Skorkovský (2015) added that, the theory acts effectively by eliminating any constraint while increasing value addition without disrupting the system's flow. Studies have revealed that, the theory of constraint can be implemented in almost every field of study (Linhart & Skorkovský, 2015).

The theory can also be applied to the activities of actors in the sachet water supply chain in Ghana. TOC reveals that, these actors operate within an environment and that exposes them to different constraints (bottlenecks). These constraints include demand fluctuation, severe competitions, scarcity of resources in terms of technology, finance, skilled personnel; unfavourable macroeconomic variables, poor governmental support and lack of access to credits. These constraints expose the actors to various risks which in turn hampers their survival

and growth. As such, for the actors within the sachet water supply chain to overcome these constraints (risks), they need to establish clear policies, procedures and strategies for identifying these risks, their probability of occurring and resultant impact on their operational performance.

Simply put, although actors within the sachet water supply chain contribute immensely to economic growth, they are exposed to various constraints which impede their operational performance, growth and invariably affect the development of the Ghanaian economy as a whole. Thus, the constraints theory can be related to the study's objectives by seeing the risks actors within the sachet water supply chain face as the constraints to their operational performance. This study was therefore underpinned by the Theory of Constraints due to it relatedness to the research objectives.

Overview of Ghana's sachet-water supply chain

The sachet water industry(supply chain) has undergone significant transformation since the late 2000s because many cottage-industry players have been replaced by large corporate-type producers who are importing heavy industrial machinery to filter and process sachet and bottled water (Stoler, Tutu, Ahmed, Frimpong, & Bello, 2014).The sachet-water supply chain in Ghana consists of input suppliers, producers, wholesale distributors, retailers, and end consumers. The chain's operations are highly supported by the technical, financial and logistical service providers such as the, Food and Drugs Board, Ghana Standard Authority, Commercial Banks, Sachet water producers Association of Ghana etc. Quartey, Tosefa, Danquah and Obrsalova, (2015) postulates that the small scale sachet water

companies usually produce between 15,000 sachets (500 bags) and 45,000 (1500 bags) sachets per day and have much smaller distribution coverage, more often distributing their products in and around the towns/communities where their factories are located, via delivery trucks, motor vans and tricylces, popularly known in local parlance as "Abobo Yaa"

About 70% of sachet-water inputs/equipment are imported by private companies and enterprises (Dzodzomenyo *et al.,* 2018). The producers get majority of their input supplies (Alum, Chlorine, Particle Filters, Cartridge Filters, Carbon Filters, Water Softeners, Ultrafiltration, Ion Exchange, Degasifiers, Reverse Osmosis & Nano Filtration machines etc.) from private importers (https://www.arieschem.com). The producers use these inputs together with local ones to produces their sachet water which they supply to the wholesale distributors (who supply to the retailers) The retailers in turn supply the end consumers on the market.

The sachet water supply chain in Ghana is such that sometimes producers supply directly to wholesalers, retailers or even final consumers. The wholesalers too also deal directly with both retailers and final consumers. Whiles the retailers deal with the consumers. As a result of the inherent interdependencies of these actors of the sachet-water supply chain on each other they are arguably exposed to several risk in their operations in Ghana (Nyamah *et al.,* 2014; Blackhurst, 2015; Luo, 2017; Carter, 2017; Nyamah, Jiang, Feng, & Enchill, 2017) (Figure 1).

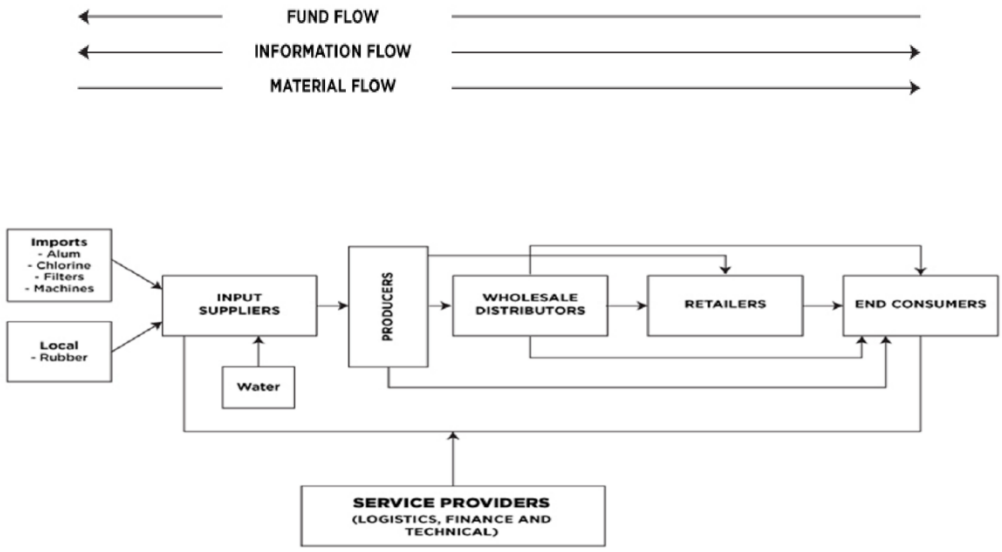

Figure 1: Schematic diagram of Ghana's sachet-water supply chain
Source: Author's own construct, (2019).

Empirical Review

Review of works relating to objectives

The next section presented a review of empirical works in line with the study's research objectives.

Risk sources and Performance measurements

According Jemison (1987), Risk is an elusive construct; thus, the definition of risk depends on the field of study. In fact, several scholars (Harland *et al*., 2003; Zsidisin, 2003; Jüttner *et al*., 2003; Tang, 2006; Ho *et al*., 2015) have indicated that risks (disruptions) could be described as any event that halts any of the three main flows (Material, Fund and Information) of the chain to deviate the distribution of possible outcomes. Thus, this research regards sachet water supply chain risks (disruptions) faced by actors (SMEs) in Ghana as any eventual variation in their

chain's operations that brings about adverse economic impact on the sachet water supply chain's performance. Previous studies have cited the probability and impact of an event as the main components of supply chain risk (Tang, 2006; Aqlan & Lam, 2015a).

These risks could emanate from different sources. Three broad categories and nine sub-divisions of risks have been proposed by Christopher and Peck (2004) and Chopra and Sodhi (2004), respectively. However, this research will focus on six out of these nine sub-divisions described as most crucial to the survival and operational performance of actors in the Ghanaian sachet water supply chain. (Watt, 2007; Smit & Watkins, 2012; Akorsu & Agyapong, 2012; Frimpong & Antwi, 2014; Prempeh & Boateng, 2015; Avevor, 2016; Sarker, 2019)

Financial risk and Operational Performance

Particpants in the sachet water supply chain have been constrained with stringent conditions regarding credit facility, lack of support services and capital adequacy in the area of financial accessibility, which hampers their performance (Abiola, Iyoha & Joseph 2011). These SMEs (actors) include those in the sachet water supply chain. Similarly, As revealed by Hein (2010), actors face numerous challenges in relation to insufficient capital, lack of skills, high level of bureaucracy, regulations and poor market accessibility which impact negatively on their operational performance. Similarly, sufficient capital required by actors in the sachet water supply chain in Ghana to survive was found to be often unavailable to them and thus force some of them to close down within a few years of their commencement (Kusi *et al.*, 2015; Addo *et al.*, 2019).

In Ghana, SMEs particularly those in sachet water supply chain struggle to source for finance although they need funds to meet the working capital needs, asset needs and even growth and expansion needs (Ayuba & Zubairu, 2015). Several studies, (Manuj & Mentzer, 2008; Trkman & McCormack, 2009; Hahn & Kuhn, 2012; Adebisi & Olayinka, 2013), have described some financial risks faced by SME's as include; inadequate financial support, currency fluctuations, inflation, delays in accessing financial support, uncertain financial support (credit), periodic change/uncertain interest and unfavourable exchange rate policies. These were found to hamper the operational efficiency of actors (SMEs) in the sachet water supply chain. World Bank Survey (2014) revealed that, lack of fund accessibility is one of the major constraints (risk) facing SMEs and this includes those in the sachet water supply chain.

This assertion has been supported by Beck and Cull (2014), in their study which revealed that, over 25% of firms in Africa including SMEs perceive unavailability and cost of finance as the major challenge they face. Thus, the first hypothesis:

H_1: There is significant negative relationship between financial risks and operational performance of actors in the sachet water supply chain.

Supply-Related risk and Operational Performance

According to (Zsidisin & Ellram, 2003; Xie *et al.*, 2011; Chopra & Sodhi, 2012; Ketikidis *et al.*, 2006; Cucchiella & Gastaldi, 2006; Abubakar, 2018), supplier quality problems, sudden default of a supplier (e.g. due to bankruptcy), poor performance of logistics service providers, and capacity fluctuations/shortages

on the supply market, all contribute to supply risks likely to be faced by any business of which SMEs are no exception. This includes those in the sachet water supply chain in Ghana. Agyapong, Mmieh and Mordi (2018) in their study on factors influencing the growth of SMEs in Ghana found that, poor quality of product (supplier quality problems), fierce competition for resources, supplier bankruptcy, shortages on the supply market and poor performance of ancillary services providers (logistics service) are major threat to the performance of SME's. Therefore, the second hypothesis was stated as follows:

H_2: There is significant negative relationship between supply-related risks and operational performance of actors in the sachet water supply chain.

Demand-Related risk and Operational Performance

As rightly identified by Fleischhacker and Fok (2015), demand risk is concerned with "downstream" activities in the supply chain (SC). This type of risk is faced by SMEs including those in the sachet water supply chain and may be as a result of unanticipated or very volatile customer demand (demand variability), insufficient or distorted information from customers about orders or demand quantities, changes in food safety requirements customer bankruptcy, high market competition and customer fragmentation (Manuj & Mentzer, 2008; Tuncel & Alpan, 2010).

Also, unfair competition from large-scale enterprises and foreign businesses coupled with dumping of goods from developed countries are additional factors affecting demand for products of SMEs in the country including those in the sachet water supply chain (Avevor 2016; Adjei, 2018; Hariharan, Suresh, & Nagarajan,

2018; Abubakar, 2018). Ocloo, Akaba and Worwui-Brown (2014) further revealed that low demand for output, lack of support services, regulatory issues, poor quality control, limited international market experience and poor access to international markets all contribute to poor demand for SME's products and eventually a decline in their operational performance. Hence, the third hypothesis was proposed as:

H_3: There is significant negative relationship between demand-related risks and operational performance of actors in the sachet water supply chain

Management and Operational risk and Operational Performance

Management and operational risk refer to the disruptions engendered by problems within the organizational boundaries of a firm that affect its ability to produce and supply goods or services. According to (Wu *et al.*, 2006; Tuncel & Alpan, 2010; Xie *et al.*, 2011; Samvedi *et a*l., 2013; He & Lu, 2018; Chowdhury, Lau, & Pittayachawan, 2019), examples of such risks include; poor management decisions in asset allocation, poor quality control, forecast and planning errors accidents and changes in technology. Olu (2009) stressed that most of the SME operators have little or no formal education in managing their business and this has affected the scope of their operation preventing them from taking full advantage of emerging opportunities. Eniola (2014) found inadequate entrepreneurial talent/skills, persistent low level of technology, ineffective management techniques as contributory factors to management and operational risks of SMEs especially those in the sachet water supply chain.

Furthermore, Chidi and Shadare (2011) emphasized that, some risk factors impeding SMEs growth include inadequate market research, poor management,

lack of succession plans, inadequate power supply, over-concentration on few markets for finished products, difficulties in separating business and family or personal finance, employing incompetent staff and cut-throat competition all of which increases SMEs (including those in the sachet water supply chain's) vulnerability to management and operational risk. Hormiga, Batista-Canino and Sanchez-Medina (2011) argued that lack of managerial skills is a major problem faced by SMEs. Thus, the study hypothesizes that:

H_4: There is significant negative relationship between managerial and operational risks and operational performance of actors in the sachet water supply chain.

Political risk and Operational Performance

Many firms believe that political risk could be one of the most crucial constraint to investment in emerging markets. (Nyamah *et al*., 2017). Political-related risk, results in changes in policies such as tax, import, export, nationalization/confiscation of assets, etc. (Peide & Wang, 2008). Kim (2011) found that, SMEs in Africa face several impediments from African local governments such as strict and unfavourable regulations, tax, import and export duties. Kim gave an example of SMEs in Ethiopia which usually complain of harsh regulations and unfavourable policies such as taxes. In fact, previous studies reveal that political unrest could displace workers from their duties, reduce/delay export, increase security or logistics expenses and further weaken operational continuity and performance of firms, including SMEs in the sachet water supply chain of which Ghanaian ones are no exception. (Ksoll *et al*., 2009). Hence the hypothesis that:

H_5: There is significant negative relationship between political risks and operational performance of actors in the sachet water supply chain.

Logistics and Infrastructure risk and Operational Performance

Logistics and infrastructure play a pivotal role in SME supply chain. A highly effective logistics and infrastructure aids in delivering the right product, in the right quantity, in the right condition, to the right place, at the right time, for the right cost in the supply chains and consequentially enhancing the performance of the supply chain (Brimer, 1995; Tarantilis *et al.*, 2004; Aghazadeh, 2004). Rising energy cost, labour shortage, port congestion and closures, unreliable service are typical examples of risks related to logistics and infrastructure (Hauser, 2003; LaLonde, 2004).

Several scholars, (Allotey 2008; Didonet, Simmons, Diaz-Villacencio & Palmer, 2016; Avevor, 2016; Emezie 2017), revealed that, SMEs including those in the sachet water supply chain, are faced with numerous logistics and infrastructure-related risks factor such as inadequate assets, poor access to reliable and affordable transport, unreliable communications and information technology and lack of infrastructural facilities for storage. These adversely impact on the operational performance of SMEs. Thus, it was posited that:

H_6: There is significant negative relationship between logistics and infrastructure-related risks and operational performance of actors in the sachet water supply chain.

Control Variable

According to Swink, Narasimhan and Wang (2007), Control variable is a variable which is held constant in order not to affect a study's outcome, conclusions and generalisation. Antonio, Yam, and Tang (2007), posit that firm size may be seen as the extent of expected growth based on the concept of economies of scale. Niresh and Thirunavukkarasu (2014), noted that, large firms are more likely to perform better than small firms because they can easily access more resources to adjust to changes in current competitive and dynamic market. Thus, there was the need to control for firm size in order not to influence the study's findings relating to the use of both small and medium enterprises in bid to ascertain how they manage their risk in the sachet water supply chain. It would also aid generalisation of findings regardless of the firm's size.

Furthermore, the study, in bid to ensure that both small and medium enterprises were being assessed on a fair scale therefore, controlled for firm size which could account for differences in operational performance measures, using indicators such as number of employees, sales volumes, total assets, management experience and capacity for firm size (Swink *et al.*, 2007; Lau Antonio *et al.*, 2007; Dang, Li, & Yang, 2018; Weerakoon, & Kodithuwakku, 2018). Again, as noted by Diallo (2018), the nature of industry in which a firm operates may arguably affect its' ability to perform well. Similarly, Moskowitz and Pedersen (2018), also argued that the industry type may also influence a firm's capacity to operate efficiently.

Thus, the study therefore controlled for the industry type using indicators such as frequent changes in industry, obsoleting of products, nature of completion

and market share for industry type (Asness, Frazzini, Israel, Moskowitz, & Pedersen, 2018; Diallo, 2018). This was done to reduce the potential for spurious findings when analyzing the data and to thereby allow for more reliable causal inferences (Asness, Frazzini, Israel, Moskowitz, & Pedersen, 2018)

Conceptual framework of risk and Operational Performance

This section presented a framework to explain the impact of risk on operational performance in the sachet water supply chain. The framework provides the linkage/relationship between the key variables (Financial, Demand-Related, Supply-Related, Management and Operational, Political, Logistics and Operational Performance) of the study. The framework was presented in Figure 2.

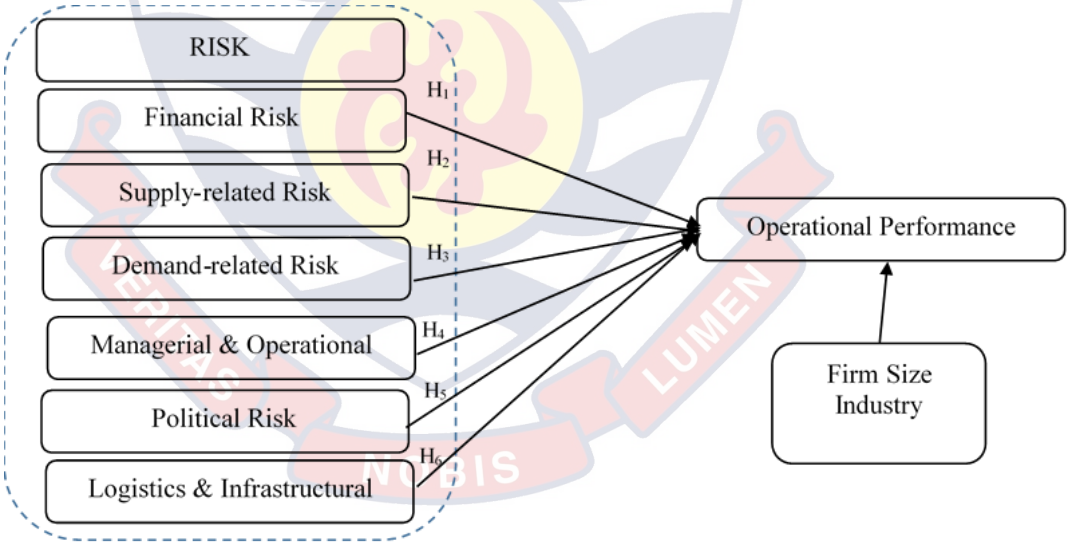

Figure 2: Conceptual framework of the Study

Source: Author's own construct, Kaku (2019)

From Figure 2, the independent variables, financial, demand-related, supply-related, management and operational, political, logistics and infrastructure

risk all directly impact operational performance. The firm size and industry are being controlled for in order to reduce the potential for spurious findings when analyzing the data and to thereby allow for more reliable causal inferences (Asness, Frazzini, Israel, Moskowitz, & Pedersen, 2018), hence their linkage to the dependent variable, operational performance.

Simply put, a change in any of the risk factors could lead to a change in the operational performance levels of the firms in the sachet water supply chain and vice versa. The framework was supported by existing studies by Watt,2007; Smit & Watkins, 2012; Akorsu & Agyapong, 2012; Frimpong & Antwi, 2014; Prempeh & Boateng, 2015; Avevor, 2016; Sarker, 2019. In terms of measuring operational performance, the indicators were obtained from existing studies by van der Vorst, (2005), Aramyan *et al.*, (2007) Nyamah *et al.*, (2014), Van Der Vegt, Essens, Wahlström, and George (2015), Nyamah, Jiang, Feng, and Enchill (2017), and Hopkin (2018). The framework was therefore developed to underpin the study.

Chapter Summary

This chapter reviewed literature on theoretical and conceptual issues relating to financial, demand-related, supply-related, management and operational, political, logistics and infrastructure risk and operational performance as captured in prior studies. Key issues and lessons from the review informed the conceptual framework of the study. The review will further prove beneficial in the methods, analyses, presentation of findings, discussions, conclusions as well as recommendations. The next chapter centres on the research methods of the study.

CHAPTER THREE

RESEARCH METHODS

Introduction

This chapter presents the research methods of the study. It presents the justifications for the chosen methods and their fitness for the study's objectives (Yin, 2017; Kim, Sefcik, & Bradway, 2017). In order to deepen appreciation of the work plan and enable the possibility of replicating this study, this chapter further incorporates discussions and comparison of the weaknesses, strengths, similarities as well as the differences between the selected methods and thus guarantees consistency with recognized academic practice (Tabachnick & Fidell, 2007; Pallant 2007). This chapter specifically, explains the study area, approaches to research, research design and paradigm, population, sample and sampling procedure and pilot study in the Cape Coast metropolis. It also explains the data collection procedures, data preparation, instrument design, pre-test, reliability testing, field work, data analysis procedures, ethics and the limitations of the study.

Research Design

Creswell and Creswell (2014) suggested that, the choice of a research design is primarily dependent on the approach adopted. Creswell and Creswell (2014) further revealed that, three (3) major approaches: quantitative, qualitative and mixed approaches. Creswell and Creswell (2017), argues that, the quantitative approach functions by developing testable hypothesis as well as theories which can be generalised. The quantitative approach is based on information that can be measured numerically, hence it is the purpose or objective of the survey that gives

direction as to the approach that should be used. These questions are presented as information converted into numbers. The data collection techniques used under the quantitative research approach are usually questionnaires, surveys, personality test and standardized research instruments (Creswell & Clark, 2017).

The quantitative research approach is generally applied in the natural sciences and useful for data that is of numeric nature (Creswell & Curtis, 2018). In contrast, the qualitative approach, is defined by Creswell (2013) as an inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and is conducted in a natural setting, bases research on systematic protocols. The subjective opinion of the researcher is normally mirrored in the techniques, findings, interpretations as well as the conclusions that are drawn. It is suitable where insightful understanding of a situation is needed (Creswell & Creswell, 2017; Phillippi & Lauderdale, 2018). The common data collection techniques adopted under this approach include observation, case studies, interview guides (Creswell & Clark, 2017).

Additionally, it is a scientific, fast and easier alternative, which enables statistical analyses of data, generalisation of findings, drawing of logical conclusions based on numerical values and comparability of studies (Crotty, 1998; Amaratunga, Baldry, Sarshar & Newton, 2002). It is also possible to use quantitative method in analysing data with statistical methods since it is easier to generalize the findings. Another advantage is that the final results are based on quantities rather than interpretations, which may simplify potential future

development and comparison with the work. The quantitative approach is, however, criticized for its rigidity, artificial nature and ineffectiveness in gauging human behaviour as well as not helpful in generating theories (Crotty, 1998).

The Mixed methods approach involves researchers collecting, analysing, and integrating both quantitative and qualitative data in a single study or in a sustained long-term program of inquiry to address their research questions. (Creswell, & Creswell, 2017). The mixed methods are preferred because it allows validation or corroboration of the results obtained from other methods. It also provides strengths that offset the weaknesses of both quantitative and qualitative approaches. The disadvantage or limitations is that the research design can be very complex. (Fetters & Molina-Azorin, 2017; Fetters & Molina-Azorin, 2018; Fetters & Molina-Azorin, 2019)

Research Approach

For the purpose of the study, the quantitative approach was adopted because this approach highlights quantification in the collection and analysis of data (Creswell and Creswell, 2017) It also integrates the practices and norms of the natural scientific model and positivism in particular which is of the epistemological view that the social reality behind how the supply chain risk of actors in the sachet water supply chain affects their operational performance as an external objective reality that can be quantitatively be measured using reliable and valid tools (Creswell, & Poth, 2017; Panhwar, Ansari, & Shah, 2017; Hollway & Schwab 2018). The quantitative approach is adopted for this research not only because of

the nature of the study objective, research questions and hypotheses, but also because of the advantages it offers over the qualitative approach.

Research Philosophy

The study adopted the positivism paradigm which is anchored on the ontology that there is a single reality or truth about how the supply chain risk of SMEs within the sachet water supply chain affects their operational performance (Klakegg, 2016). The study employed the positivists' paradigm because it allows the use of the survey research methodology to quantitatively gather data via administered questionnaires to a scientifically sampled number of respondents (Kember, & Corbett, 2018). Again, the positivists' paradigm was adopted in this study because it helps explain the risk phenomenon and it relationship with the performance of SMEs supply chains. (Kember, & Corbett, 2018). This further justifies the use of the quantitative methods and techniques, sampling, measurement and scaling as well as statistical analysis of the data gathered from administering the questionnaires.

The study examined the relationship among two variables (risk and operational performance) which requires quantification and objectiveness of responses. In view of this, the study employed the cross-sectional explanatory research design despite the availability of other designs such as exploratory, case study, among others (Bernard, 2017). The cross-sectional explanatory research design was chosen for the study because relationships and influences among the variables of the study needs to be described using numerical analysis (Hulland, Baumgartner, & Smith, 2018). Moreover, the cross-sectional explanatory research

design was chosen because it allows collection of data to make inferences about a population of interest and comparisons of many different variables at the same time (Hulland, Baumgartner, & Smith, 2018).

Study Area

The study area comprised four major cities, namely Accra, Tema, Takoradi, and Kumasi. These cities have metropolis' which are densely populated with actors (SMEs) per the National Board for Small Scale Industries (NBSSI) and Association of Ghana Industries (AGI) engaged in the sachet water supply chain. Altogether, these cities hold a combined percentage of about 57.45% of the entire number of actors (SMEs) in the sachet water supply chain in Ghana. (NBSSI Report, 2017; AGI Report, 2017). Shared common characteristics of these industrial hubs for actors in the sachet water supply chain, which made them ideal for selection for the study include; availability of infrastructure and resources for business support like water, electricity, roads and hospitals.

Other facilities include airports, tourism monuments and places, busy modern commercial markets, ports or harbours and rapidly increasing number of companies which require ancillary services from actors. This made the selected study area highly suitable as it holds a blend of densely concentrated actors actively involved in the sachet water supply chain, with comparable characteristics with actors in the other cities in the sachet water supply chain. Furthermore, the risks issues faced by actors engaged in the sachet water supply chain in the selected study area, were also arguably similar to ones encountered by actors in other cities similarly involved in the sachet water supply chain in Ghana, which made them

ideal in terms of provision of relevant information necessary for achieving the research objectives.

Population

The target population of the study were actors in the sachet water supply chain within the selected study area. These were chosen because they are the ones in charge of running the businesses, and therefore have knowledge as to the risk issues they encounter and how these specific risks affect their operational performance. According to the NBSSI report 2017, actors (SMEs) in the sachet water supply chain within the four selected cities under the study were 10,973. SMEs in the sachet water supply chain in Accra constituted 4,395, those in Tema and Kumasi were 1,897 and 3,920 respectively, with the remaining 761 coming from Takoradi.

Sampling Procedure

The sample size of the study was three hundred and seventy (370) actors in the sachet water supply chain. This was determined using the Bartlett, Kotrlik, and Higgins (2001) sample size determination table. Moreover, the simple random sampling technique was used to select members from the population to represent the sample using the Microsoft Excel randomize fuction. This technique was employed to yield representative sample and to ensure that each member of the population had equal chance of being selected in order to avoid bias (Alvi, 2016). It was also chosen because it offered more precision and thus suitable the study, as it gave an accurate reflection of the population being studied, with each subgroup

within the population receiving proper representation (Kaur, Brar & Sharma, 2017).Using the simple random sampling technique, a sample (370), was chosen determined based on the Bartlett, Kotrlik, and Higgins (2001) sample size determination table. Table 1 shows the sampling frame of the study.

Table 1: Sampling frame

Metropolis	Population	Sample size
Accra	4395	148
Kumasi	3920	132
Sekondi-Takoradi	761	26
Tema	1897	64
Total	10973	370

Source: National Board for Small Scale Industries (2017)

The sampling frame contained a target respondent of owners, managers and owner-managers of SMEs (actors) in the sachet water supply chain operating in the four selected metropolises.

Measurement of variables

Based on a review and classification of the relevant empirical literature, the following types of risks were identified as the most crucial types of risks within the context of actors (SMEs) operating in the sachet water supply chain. These risks include; Financial, Demand-Related, Supply-Related, Management and Operational, Political, Logistics and Infrastructure risk (Watt,2007; Smit & Watkins, 2012; Akorsu & Agyapong, 2012; Frimpong & Antwi, 2014; Prempeh & Boateng, 2015; Avevor, 2016; Sarker, 2019).

Financial risk which is arguably one of the main types of supply chain risk faced by actors in the sachet water industry relates to the danger or possibility that shareholders, investors, or other financial stakeholders in the sachet water supply chain will lose money (Kumar, Jindal, & Velaga, 2018). Financial risk was measured using the following indicators: Poor cost analysis and pricing, Difficulty in obtaining external loans, Financial controls and payment procedures, Changing interest rates, Fluctuating exchange rates, Delays in accessing financial support and Inadequate financial support (Manuj & Mentzer, 2008; Trkman & McCormack, 2009; Hahn & Kuhn, 2012; Truong & Hara, 2018).

Secondly, demand-related as rightly identified by Fleischhacker and Fok (2015), is concerned with "downstream" activities in the sachet water supply chain. This was measured using indicators such as unanticipated or very volatile customer demand (demand variability), insufficient or distorted information from customers about orders or demand quantities, demand shortfall, latent demand, excess demand than expected from our consumers. (Manuj & Mentzer, 2008; Tuncel & Alpan, 2010; Avevor, 2016; Adjei, 2018; Hariharan, Suresh, & Nagarajan, 2018; Truong & Hara, 2018).

According to Zsidisin and Ellram (2003), Xie *et al.,* (2011), Chopra and Sodhi, (2012); Ketikidis *et al.*, (2006), and Cucchiella and Gastaldi (2006), supply-related risks stem from supplier quality problems, sudden default of a supplier (e.g. due to bankruptcy), poor performance of logistics service providers, capacity fluctuations/shortages on the supply market etc, which affects any business of

which SMEs are no exception. Thus, indicators like frequent resource or raw material scarcity, supplier labour actions, long lead times, sub-standard goods from suppliers (supplier quality problems) and sudden default of a supplier (e.g. due to bankruptcy) (Truong & Hara, 2018), were used in operationalizing supply-related risk.

Management and operational risk refer to the disruptions engendered by problems within the organizational boundaries of a firm that affect its ability to produce and supply goods/services (Truong & Hara, 2018). According to (Wu *et al*., 2006; Tuncel & Alpan, 2010; Xie *et al.,* 2011; Samvedi *et al.,* 2013; Truong & Hara, 2018; Chowdhury, Lau, & Pittayachawan, 2019), indicators of such risks include; poor management decisions in asset allocation, poor quality control, forecast and planning errors accidents and changes in technology. Management and operational risk were therefore measured using indicators such as constant forecast and planning errors, poor management decisions in asset allocation, poor-quality control due to poor supervision, disruption to productivity due to energy fluctuation, system or equipment failure and inadequate skilled personnel.

Last but not least another crucial risk factor considered was political risk. This involves adverse impact to firms as a result of political changes or instability in a country (Haendel, 2019). The following indicators were used to measure political risk; trade disputes with other countries, government imposed transfer and conversion policies, political instability, wars, civil unrest or other sociopolitical crises like chieftaincy disputes, frequent changes in the political environment due

to the introduction of new laws, stipulations regarding business, currency valuation, and manipulation of trade tariffs and labour law. Finally, the indicators used to measure logistics and infrastructural risk were: inadequate or poor facilities infrastructure, unreliable transport system, incremental changes in energy cost, labour disputes and conflicts with transport services and problems or damages from supplies in transit (Didonet, Simmons, Diaz-Villacencio & Palmer, 2016; Avevor, 2016; Emezie 2017).

Concerning the dependent variable, operational performance (how well a firm manages its internal resources and adapts to its external environments), which reflects the accomplishment of its strategic objectives and performance goals (Smart & Conant, 2011; Jiménez-Jiménez & Sanz-Valle, 2011). It was measured using indicators such as Dependability: meeting quoted or anticipated delivery dates and quantities on a consistent basis, Speed: time between order receipt and customer delivery, Qualities: number of faultless deliveries, Response: response to urgent deliveries, high costs and quality of Information.

The study also included firm size and industry type as control variables. These were operationalized using indicators such as number of employees, sales volumes, total assets, management experience and capacity for firm size (Dang, Li, & Yang, 2018; Weerakoon, & Kodithuwakku, 2018); and frequent changes in industry, obsoleting of products, nature of completion and market share for industry type (Asness, Frazzini, Israel, Moskowitz, & Pedersen, 2018; Diallo, 2018). This was done to reduce the potential for spurious findings when analyzing the data and

to thereby allow for more reliable causal inferences (Asness, Frazzini, Israel, Moskowitz, & Pedersen, 2018).

Data Collection Instruments

The study used primary data collected through the use of a closed ended structured questionnaire. A questionnaire was selected for the study because it is a self-report measure which guarantees confidentiality and therefore likely to elicit more openness in response with regards to the kinds of information required from the respondents (Brace, 2018). The questionnaire assumed a five-point rating scale, from "1 (very low) to 5 (very high)."

To ensure the validity of the data collection instrument, the design of the questionnaire followed a two-stage process commonly used in survey-based research. First, literature was extensively reviewed to find out all the probable risk that could undermine the operational performance actors in the sachet water supply chain. The identified risks were then sent to, the actors in the sachet water supply chain and researchers for evaluation and checks(Watt,2007; McCormack, 2009; Tuncel & Alpan, 2010; Hahn & Kuhn, 2012; Smit & Watkins, 2012; Akorsu & Agyapong, 2012; Frimpong & Antwi, 2014; Nyamah *et al.,* 2014; Prempeh & Boateng, 2015; Avevor, 2016; Didonet, Simmons, Diaz-Villacencio & Palmer, 2016; Emezie 2017; Nyamah, Jiang, Feng, & Enchill 2017; Truong & Hara, 2018; Adjei, 2018; Hariharan, Suresh, & Nagarajan, 2018; Fadun, 2018; Lawal, 2018; Sarker, 2019).

The evaluated risk items which applied to actors in the sachet water supply chain in Ghana were then drafted into questionnaire based on their relevance,

wording and directions, clarity and format. Next, a face-to-face pre-test survey among some actors in the sachet water supply chain was done to test their understanding of the research instrument before the final questionnaire was drafted. The final version of the questionnaire consisted of 32 sub-categories of the six main risk sources (See Appendix B).

Since the intention of this research is to investigate the effects of risks on operational performance, it was necessary to include firm size and industry type as control variables. Respondents were asked to score the probability and consequence (impact) on a five-point Likert scale, with 1=very low to 5=very high. Next, the respondents indicated how disruptions as the results of the risks presented in this study affect their operational performance in meeting the expectation of customers. Finally, to address the issue of translational errors, technical words in the questionnaire were, explained to respondents who had no educational background by data collection assistants. Again, the data collection assistants were trained to avoid literal translations to preserve the integrity of the work. Data collection assistants also added end-notes post-translation to help understand improve overall quality of data gathered from respondents with no educational background.

Validity and Reliability of Instrument

To ensure content Validity the draft questionnaire was given to peers with good research knowledge and skills to review. Experts in the sachet water supply chain and academia also reviewed the draft questionnaire to ensure that the content were not ambiguous but easily understandable and applied to the risk issues being faced by the actors win the sachet water supply chain. Finally, the Cronbach alpha

which tests for reliability was analysed to determine the reliability of the research instrument. The Cronbach's alpha coefficients was higher than original 0.6 standard set by the authors who proposed the scale.

To ensure validity, questionnaires were pilot tested with twenty (20) actors in the sachet water supply chain in the Cape Coast Metropolis. The Cronbach Alpha was (0.893) which indicated that the data collection instrument was appropriate and thus measured what it was intended to measure, because per the original findings of the authors who proposed the Likert-like scale, 0.60 is the coefficient which is considered very relevant and capable of helping a researcher obtain the relevant data (Creswell & Creswell, 2014; Taber, 2018). The pre-test also helped in testing the consistency of the questions with data analysis techniques and it further helped in refining and rewording ambiguous statements and the order of questions restructured. In view of this, the validity and reliability of the research instrument were ensured and achieved.

Ethical Considerations

Some general agreements have been shared by researchers about what is proper and improper in the conduct of scientific inquiry (Saunders, Lewis & Thornhill, 2009). To ensure ethical clearance, the study obtained both permission and introductory letters from the Institutional Review Board and the Head of Department of the University. After obtaining permission, the respondents were adequately educated about what was being investigated and this heightened the chances of their participation. Also, the respondents were assured of complete anonymity and confidentiality. Confidentiality, for instance, was achieved by

assuring respondents that the study was pursuing a genuine academic exercise devoid of any deception and leak of information to the general public. To further assure respondent of ethics, the data collection assistants each showed them copies of the introductory letter.

Data Processing and Analysis

The raw data was subjected to editing and coding to check and verify errors before the process of data analyses was conducted (Sekaran, & Bougie, R. (2010); Zikmund, Babin, Carr, & Griffin, 2012). 2012). The process of data editing provided a check for data omission, reliability, and validity before coding and later transferring into the data analysis software (Blumberg *et al.*, 2008). The questionnaires collected from the respondents were coded and inputted into the IMB SPSS Statistics Version 25 (SPSS 25) for the processing of data. The data was cleaned by removing all entries with missing values and errors (Zikmund, 2012). The processes of data cleaning and screening required data to be coded, and checked for missing responses and values in the returned survey questionnaires (Tabachnick & Fidell, 2007; Hair *et al.*, 2006).These processes improved the accuracy of data analyses and ensured that assumptions for data analysis techniques were not violated (Tabachnick & Fidell, 2007; Hair *et al.*, 2006).

Checking the accuracy of data was important by verifying out-of range responses, values, means, and standard deviations in order to be credible (Tabachnick & Fidell, 2007). Using Nunnally and Bernstein (1994), traditional psychometric approaches of evaluation, the multi-item scale reliability and validity were tested. Again, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy

and the Bartlett test of sphericity were used to test the scales for normality and outliers. The result, which showed KMO value of 0.724 with the significance of Bartlett's test at 1 percent level, indicates the data set is fit for factor analysis. As proposed in Narasimhan and Jayaram (1998), a factor analysis for each construct was conducted to ensure the unidimensionality of the scales.

The indicator items were deleted if their factor loadings were smaller than 0.5 (Johnson & Wichern, 1998). Appendix C shows that all the measurement items have strong loadings on the construct they were supposed to measure thereby indicating unidimensionality. Reliabilities of all dependent variables were evaluated via item-to-total correlations and Cronbach's α coefficient (Nunnally and Bernstein, 1994). All constructs in this study are higher than the recommended threshold value of 0.60 (Flynn *et al.*, 1990). Therefore, the reliability of the construct is highly ensured. In addition, this evidence suggests that the measures included in this study possess a sufficient reliability and validity to proceed with hypothesis testing.

Next, based on the previous literature (Harland *et al.*, 2003; Christopher, Mena, Khan, & Yurt, 2011), the risk probabilities of occurrence and impact/consequences of loss were quantified. The probability and impact of the risk were assessed by transforming the scores (1=very low to 5=very high) given by the respondents to nonlinear quantitative values (i.e. ratings are quantified as 0.1, 0.3, 0.5, 0.7 and 0.9 for probability, 0.05, 0.10, 0.20, 0.40 and 0.80 for risk impact) and programmed into a risk matrix as proposed by Project Management Institute

(2013). Finally, to unearth the impact of the various risks on SMEs chain performance, a multiple regression model was employed to test the hypothesis.

The data was analysed using descriptive statistics and correlation and regression analysis. The results were presented in frequencies, percentages, means and standard deviations which were displayed in tables and figures. These analytical tools were chosen due to the objectives of the study and the variables of measurement. General assumptions of statistical tools include homogeneity of variance, linearity of data, independence of data, large sample (≥30) and normality of the data (Brown, 2014; Creswell & Creswell, 2014; Little & Rubin, 2014).

Chapter Summary

This chapter presented the research methods employed to achieve the purpose of this study. Specifically, the chapter discussed the key elements of research methods employed in the study such as research approach, design, study area, population, sampling procedure, data collection instrument, data collection procedures, data processing and analysis. Clearly, the study justified the use of quantitative research approach and descriptive research design. The chapter revealed that, both descriptive and inferential statistical tools such as percentages, frequencies, means, standard deviations, correlation and regression were used to analyse the data processed by SPSS (v.25) in bid to answer the research questions of the study. Finally, the assumptions underlying the use of statistical tools were also presented.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter discusses the results and presents the findings of the study. These results are guided by data collected through questionnaires. This chapter specifically entails sections in relation to: socio-demographic characteristics of respondents and SMEs in the sachet water supply chain, risks faced by actors in the sachet water supply chain and the effect of risk on performance of actors in the sachet water supply chain.

Socio-demographic Characteristics of Respondents

This section presented the specific personal characteristics of the respondents and the profile of the actors (SMEs) in the sachet water supply chain. The data was collected to help ascertain the demographic background of both the respondents and the SMEs in the sachet water supply chain. These background data included sex, educational qualification, employment status, and number of years in the service for the respondents, and firm size (number of employees), age of firm, ownership structure, and firm asset value (excluding land and building) for SMEs in the sachet water supply chain. The results are reported in Table 1.

From Table 2, majority of the respondents were males (149) and this represents (54.2%) of the 275 respondents used. Thus, (126) respondents are females representing (45.8%). This finding is contrary to earlier study by Kusi *et al.*, (2015), who found more females than males in the sachet industry. It is also justified and supported by current population statistics from Ghana Statistical

service as current population dynamics reveal that male population (50.9%) 14,844,866, is greater than that of the females (49.1%) 607,962. This implies that, the tides have turned and now there are more males than females in the sachet water supply chain. In terms of age, majority (98) of the respondents representing (35.6%) were within the ages of 36-45 years.

Table 2 also reveals that 97 of the respondents representing (35.3%) who were within the ages of 46-55 years. Again, 44 respondents representing (16.0%) were within the ages of 18-35 years and finally, 36 respondents representing (13.1%) were above the age of 55years. This means that, majority of the respondents in the working in SMEs within the sachet water supply chain were within their active working periods. This may be due to the rigorous nature of the sachet water work, which may not be suitable for the aged.

Table 2: Socio-demographic Characteristics of Respondents and SMEs

Demographic Information	Frequency	Percent
Sex		
Male	149	54.2
Female	126	45.8
Age bracket		
18-35 years	44	16.0
36-45 years	98	35.6
46-55 years	97	35.3
Over 55 years	36	13.1
Highest educational qualification		
No formal education	44	16.0
Below higher HND	71	25.8
HND/Equivalent	56	20.4
First degree	82	29.8
Post graduate degree	22	8.0
Position of respondent		
Owner	57	20.7

Manager	93	33.8
Owner-manager	125	45.5
Experience		
Less than 5 years	47	17.1
5-10 years	125	45.5
11-15 years	62	22.5
More than 15 years	41	14.9
Firm size (Number of employees)		
Less than 6	87	31.6
6-29	90	32.7
More than 29	98	35.6
Age of firm		
Less than 5 years	48	17.5
5-10 years	110	40.0
11-15 years	66	24.0
More than 15 years	51	18.5
Ownership structure		
Locally	176	64.0
Foreign	25	9.1
Total	275	100.0

Source: Field survey, Kaku (2019)

Table 2 also reveals that in terms of highest educational qualification, majority (82) of the respondents representing (29.8%) were first degree holders. Whereas 71 of the respondents representing (25.8%) were having certificates below HND. Respondents who were holders of HND/Equivalent and post graduate degree certificates were 56 and 22 respectively, representing (20.4%) and (8.0%). Finally, 44, of the respondents representing (16.0%), were not having any formal education at all. This means that, a combined majority of the respondents were academically inclined and thus can provide the relevant information needed to inform policies in the sachet water supply chain in Ghana. Regarding, current job positions, majority

(125) of the respondents representing (45.5%) were owner-managers and 93 respondents representing (33.8%) were managers.

Also, 57 of the respondents representing a total of (20.7%) were owners. Finally, in terms of number of years worked at respective position, Table 2 shows that, majority (125) of the respondents representing (45.5%) have worked for a period of 5-10years, 62 of them representing (22.5%) had worked for between 11-15 years, 47 of them representing (17.1%) had worked for less than 5 years, while the remaining 41 of them representing (14.9%) had worked for over 15 years. This implies that, majority of the workers in the sachet water supply chain were experienced enough and as such, had the required skills to handle the demands of their jobs. With regards to the profile of SMEs in the sachet water supply chain, Table 2 reveals that majority (98) of the firms, representing (35.6%), had a firm size of more than 29 employees.

Those that had between 6-29 employees were ninety (90), representing (32.7%). Finally, a total of eighty-seven (87) of the firms had a firm size of less than 6 employees, representing (31.6%). Age wise, majority (110) of the firms had been in operation for 5-10 years, representing (40.0%). This was followed by (66), who had also been in operation for 11-15 years, representing (24.0%). Also, fifty-one (51) of the firms had been in operation for more than 15 years, representing (18.5%), while the remaining forty-eight (48) had been in operation for less than 5 years, representing (17.5%). This implies that majority of the firms in the sachet water supply chain had been in operation for quite some time enough to have faced

the various risks which affect firms within the sachet water industry. This also implies that all of the firms were in the category of NBSSI's definition of SMEs.

Concerning the type of ownership structure of the firms, majority (176), of the SMEs in the sachet water supply chain were owned by locals, representing (64.0%). Whiles seventy-four (74) were operated or owned by both locals and foreigners, representing (26.9%). The remaining twenty-five (25) of the two hundred and seventy-five (275) firms were owned by foreigners, representing (9.1%). This implies most of the firms in the sachet water supply chain were owned by the indigenous people. Finally, in terms of asset value of the firms excluding land and buildings, majority (112), of them were having assets worth between GHS 10,001-GHS 5 million, representing (40.7%). Those that had asset value of between GHS 5,000-GHS 10,000, were ninety-two (92), representing (33.5%), while sixty-three (63) firms had asset value of between GHS 1,000-GHS 5,000, representing (22.9%). A few of them (8), had asset value of less than GHS 1,000, representing (2.9%). Thus, all of the firms were in the category of NBSSI's definition of SMEs.

Risks faced by actors in the sachet water supply chain

This section presents the study's results on the first research objective. This objective is set to help in identifying the key risk factors that decisively affects the actors in the sachet water supply chain in Ghana. To achieve this, the study obtained responses from the respondents using structured questionnaires. The data gathered were then analysed using descriptive tools such as means, standard deviations skewness and kurtosis. The results are specifically presented in the descriptive statistics of major sachet water supply chain risk in Ghana. It is to note that, the

higher the mean score of a given indicator, the higher that indicator determines risk faced by actors in the sachet water supply chain. The results are presented in Table 3, 4 and figure 2.

Table 3: Descriptive Statistics of major sachet water supply chain risk

				Skewness		Kurtosis	
Risk source	N	Mean	Std. D	Stat	Std. Error	Stat	Std. Error
Financial	275	3.87	.735	-1.245	.147	2.334	.293
Supply-related	275	3.97	.757	-.905	.147	1.320	.293
Demand-related	275	4.16	.593	-.773	.147	1.029	.293
Managerial &Operational	275	3.76	.908	-.927	.147	-.153	.293
Political	275	3.50	1.038	-.950	.147	.175	.293
Logistics & infrastructure	275	3.77	.927	-1.008	.147	.752	.293

Source: Field survey, Kaku (2019).

Table 3 reveals that, information was obtained from all 275 respondents on the six major risks in the sachet water supply chain. The demand-related risk variable had a mean of 4.16 and standard deviation of 0.593, followed by the supply-related risk with a mean of 3.97 and standard deviation of 0.757. The financial risk and logistics and infrastructure risk had means of 3.87 and 3.77, with corresponding standard deviations of 0.735 and 0.927 respectively. Also, management and operational risk had a mean of 3.76 and a standard deviation of 0.928, whiles political risk had the least mean of 3.50 and but the highest standard deviation of 1.038. This implies that of the six major risks sources identified demand-related risks were identified as the highest by respondents. The descriptive

statistics table also provides information concerning the distribution of scores on continuous variables (skewness and kurtosis).

This information necessary if these variables are to be used in parametric statistical techniques and in exploring the predictive ability of a set of independent variables on one continuous dependent measure in higher statistical analysis like multiple regression. (E.g. t-tests, analysis of variance). The Skewness value provides an indication of the symmetry of the distribution. Kurtosis, on the other hand, provides information about the 'peakedness' of the distribution. The respective skewness and kurtosis values were between 0.773 to -1.245 and -0.153 to 2.334, respectively. This implied that the scores varied a little from a perfectly normal distribution, however, with reasonably large samples, skewness will not 'make a substantive difference in the analysis' (Tabachnick & Fidell 2013, p. 80). Kurtosis can result in an under-estimate of the variance, but this risk is also reduced with a large sample (200+ cases: Tabachnick & Fidell 2013, p. 80).

Table 4: Risk Matrix for the SME actors in the sachet water Supply Chain

Impact Probability	Very low 0.05	Low 0.10	Medium 0.20	High 0.4	Very high 0.8
Very high 71-90%					FR4, FR6, DR2, SR1, LIR3, DR3, DR5, FR7, DR1, DR4, SR5, MOR3
High 50-70%				FR3, MOR2, PR1, PR2, LIR4	FR1, FR2, FR5, SR2, SR3, SR4, LIR1, LIR2, LIR5, MOR1, MOR4, MOR5
Medium 31-50%					
Low 11-30%			PR3		
Very low ≤ 10%					

Source: Field survey, Kaku (2019)

Table 4 presents the four by four matrix of risk in the sachet water supply to assess their probability and impact of occurrence. As revealed in earlier studies which cited risk's probability and impact as the main influential factors to determine risk magnitudes in supply chains (Tang,2006; Aqlan & Lam,2015a) the result of the risk matrix analysis also reveals dissimilarities in risks' probability and severity in the sachet water supply chain in Ghana as displayed in Figure 2. Risks such as FR4, FR6, DR2, SR1, LIR3, DR3, DR5, FR7, DR1, DR4, SR5, MOR3 FR1, FR2, FR5, SR2, SR3, SR4, LIR1, LIR2, LIR5, MOR1, MOR4, FR3, MOR2,

PR1, PR2, LIR4 and MOR5 constituted the highest risk sources in the Ghanaian sachet water supply chain. Whiles PR3 was the only risk source which emerged as moderate. This implies that of the indicators measuring the major risks in the sachet water supply chain, all but one had a high probability (50-70% chance) of occurring and causing an impact as high as 0.40 to 0.80 as shown in Table 4. These findings resonate similar ones discovered by Nyamah *et al.*, (2017) who studied supply chain risks and concluded that, risks vary in terms of probability, impact and thresholds.

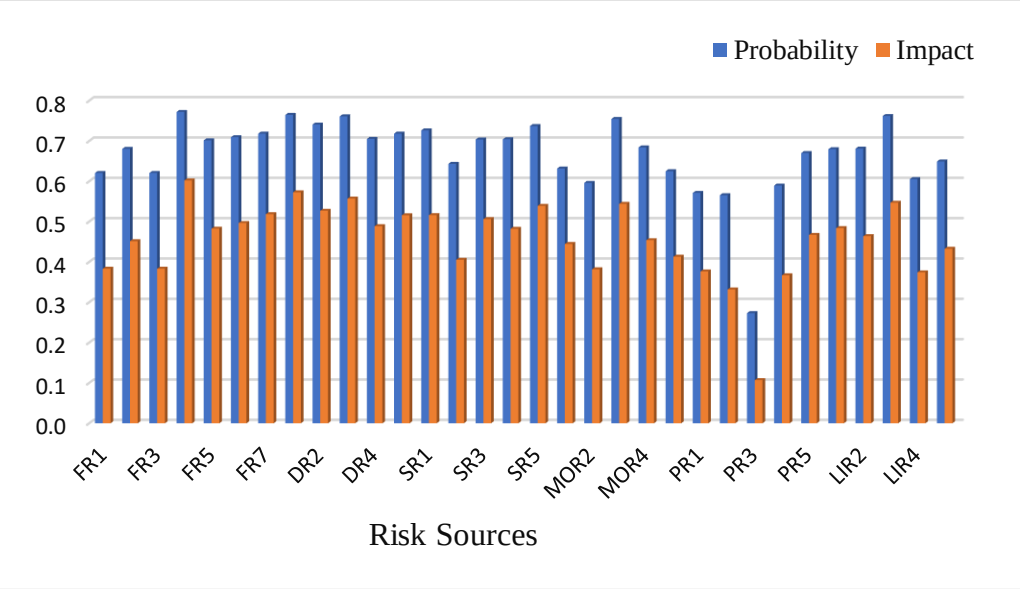

Figure 3: Risk probability and impact.
Source: Field survey, Kaku (2019)

Effect of risk on performance of actors in the sachet water supply chain

This section presents the second research objective in relation to the effect of risk on the operational performance of actors in the sachet water supply chain. Linear multiple regression was used to assess the ability of two control measures

(Firm size, Industry: FS, IS) to predict levels of change in Operational performance (Operf) and to establish cause and effect relationships between the variables understudy after controlling for the influence of social desirability. Preliminary analyses were conducted to ensure no violation of the assumptions of normality, linearity, multicollinearity and homoscedasticity.

The independent variables were represented by Financial (FRISK), Demand-Related (DRISK), Supply-Related (SRISK), Management and Operational (MORISK), Political (PORISK), Logistics and Infrastructure risk (LIRISK) while the dependent variable was represented by Operational performance (OPERF). The regression analysis was discussed using three tables comprising model summary, ANOVA and coefficient. The model was evaluated by the coefficient of determination denoted by R-square (R^2). This represented the proportion of variance in the dependent variable which is linearly accounted for by the independent variables (Cohen, 1992). Table 5 gave the model summary of the output.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.607[a]	.369	.350	.80502

a. Predictors: (Constant), LIRISK, FS, DRISK, IS, SRISK, MORISK, FRISK, PRISK

Source: Field survey, Kaku (2019)

The results from Table 5 shows the R- Correlation Coefficient, the R-Square- Coefficient of Determination, adjusted R squared, and the standard error. According to Ringle, and Sarstedt (2011), the coefficient of determination

represents the variation in the dependent variable that is accounted for by the independent(s) variable. R was the Pearson product moment correlation coefficient which indicated the strength and direction of the linear relationship between the dependent variable (Operational performance) and the independent variables (financial, demand-related, supply-related, management and operational, political, logistics and infrastructure risk).

Thus, the Adjusted R Square value of .350 indicates that about 35% of the variation in the operational performance of the sachet water supply chain in Ghana is accounted for by independent variables, the remaining variation in performance may be due to other factors not captured in this study. Thus, can further be implied that risk issues such as financial, demand-related, supply-related, management and operational, political, logistics and infrastructure risk, altogether account for about 35% of the variation in operational performance of actors in the sachet water supply chain of Ghana. In scholarly research that focuses on marketing issues, R^2 values of 0.75, 0.50, or 0.25 for dependents variables can, as a rough rule of thumb, be respectively described as substantial, moderate, or weak (Hair, Ringle, & Sarstedt, 2011; Henseler *et al.*, 2009). This leads to the conclusion the risk has a substantial variation on operational performance of actors in the sachet water supply chain in Ghana.

The R value represents the Pearson Correlation coefficient. The R value of 0.607 indicates a strong relationship between risk and operational performance. Cohen (1988) suggests the following guidelines for the interpretation of the

magnitude of correlation coefficient; r=.10 to .29 or r=–.10 to –.29 small, r=.30 to .49 or r=–.30 to –.4.9 medium, r=.50 to 1.0 or r=–.50 to –1.0 large. Per the criteria by Cohen (1988), it can be concluded that risk has a strong negative significant relationship with operational performance. Thus, actors in the sachet water supply chain in Ghana are encouraged to continuously find new ways of minimising or eliminating risk sources in their operations. Table 6 assesses the statistical significance of the regression model.

Table 6: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	100.702	8	12.588	19.424	.000[b]
	Residual	172.384	266	.648		
	Total	273.086	274			

a. Dependent Variable: OPERF
b. Predictors: (Constant), LIRISK, FS, DRISK, IS, SRISK, MORISK, FRISK, PRISK

Source: Field survey, Kaku (2019)

The results of the ANOVA from Table 6 indicate a statistically significant figure of p=.000, with an F-stat value of 19.424, as held up by Fidell, Tabachnick, Mestre and Fidell (2013), a significant level of less than or equal to .05 is necessary for social science research. If such a condition is met, then the independent variable does a good job explaining the variation in the dependent variable. In this analysis, the ρ-value is well below .05 (ρ = .000). Therefore, it can be concluded that the R and R^2 between risk and operational performance is significant and therefore risks can significantly influence the operational performance of actors within the sachet water supply chain. However, the ANOVA fails to indicate the extent of the effect.

Table 7 indicates the magnitude of the impact of risks on the operational performance of the actors in the sachet water supply chain.

Table 7: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	1.498	.505		2.967	.003		
	FS	.110	.063	.096	1.743	.082	.784	1.276
	IS	.479	.066	.405	7.308	.000	.774	1.292
	FRISK	-.252	.091	-.186	-2.787	.006	.533	1.875
	SRISK	-.253	.073	-.192	-3.449	.001	.767	1.305
	DRISK	-.083	.100	-.049	-.825	.410	.671	1.491
	MORISK	-.260	.092	-.237	-2.831	.005	.339	2.953
	PRISK	-.029	.078	-.030	-.372	.710	.360	2.780
	LIRISK	-.147	.064	-.137	-2.300	.022	.674	1.485

a. Dependent Variable: OPERF

Source: Field survey, Kaku (2019)

Finally, the Table in the SPSS output labelled coefficients (Table 7) provided information that was useful for understanding the regression equation and testing the research hypotheses. The study estimated the regression equation using the column marked unstandardized coefficient which implies that the study intends to predict and forecast. Generally, the major sachet water risk sources observed in this study explained 35 percent of sachet water supply chains' operational performance in Ghana (F=19.424; df=274), after controlling for firm size (FS) and industry (IS) which were both significant at 5 and 10 percent respectively (FS;β=0.096, t=1.743, p=0.000; IS; β=0.405, t=7.308, p=0.082).

Financial risks (FRISK) (such as poor cost analysis and pricing, difficulty in obtaining external loans, financial controls and payment procedures, changing

interest rates, fluctuating exchange rates, delays in accessing financial support and inadequate financial support) significantly affect the operational performance of actors in the sachet water supply chain in Ghana (β= -0.186, t= -2.787, p=0.006) (Table 6). Similarly, the results from the analysis reveals that the sachet water supply chain risks emerging from the supply side (SRISK) of the chain (such as frequent resource or raw material scarcity, supplier labour actions like strikes, long lead times, sub-standard goods from suppliers (supplier quality problems) and sudden default of a supplier e.g. due to bankruptcy) significantly undermine the performance of the chain (β= -0.192, t= -3.449, p=0.001) (Table 6).

Management and Operational risk sources (MORISK) (such as Constant forecast and planning errors, poor management decisions in asset allocation, poor-quality control due to poor supervision, disruption to productivity due to energy fluctuation, system or equipment failure and Inadequate skilled personnel) (β=−0.237, t=−2.831, p=0.005) and Logistics and infrastructural risks(LIRISK) (such as changes in transportation or energy cost, undependable transport, lack of/ inadequate or poor storage facilities for resources, unreliable transport system, incremental changes in energy cost, Labour disputes and conflicts with transport services e.g. strikes from GPRTU staff and problems or damages from supplies in transit) (β=−0.137, t=−2.300, p=0.022) not only serve as high scale threats to the chain's operations but significantly abate the overall performance of the chain, respectively.

These results justify why the study failed to reject hypotheses H_1, H_3, H_4, and H_6 (Table 8). These findings resonate with findings by Agyapong, Mmieh and

Mordi (2018), He and (Lu 2018), Emezie (2017) and Didonet, Simmons, Diaz-Villacencio and Palmer (2019) who discovered financial, supply-related, managerial and operational and logistics and infrastructural risks significantly influence operational performance.

From the analysis, it is evident that not all risks significantly weaken the operational performance of the sachet water chain in Ghana. For instance, demand-related (DRISK) (β=−0.049, t=−0.825, p=0.410), and political-related risks (PRISK) (β=−0.030, t=−0.372, p=0.710) do not significantly undermine the operational performance of actors in the sachet water chain in Ghana; hence, their corresponding hypotheses (H_2, and H_5) are rejected (Table 8). This finding is consistent with Peide and Wang (2008), Kim (2011) and Ocloo, Akaba and Worwui-Brown (2014) who posited that political and demand related risks do not significantly undermine operational performance.

The table in the SPSS output labelled coefficients (Table 7) provides information that is useful for understanding the regression equation. Under the column marked unstandardized coefficient and sub-column B, the numerical value for the first row, labelled (constant), is the value for the intercept (a) in the regression equation. The numerical value on the second row, labelled as Firm size (FS), Financial risk (FRISK), supply-related risk (SRISK), managerial and operational risk (MORISK) and logistics and infrastructural risk (LIRSIK) in this case (representing the independent variables), are the values for the slope (b) for the regression equation. Based on these results, the following regression equation is reported predicting operational performance based on their risk.

Y (OPERF) = 1.498 +0.110X (FS)+0.479X(IS)-0.252X(FRISK)-0.253X(SRISK)-0.260X(MORISK)-0.147X(LIRISK).

Taking the values for the slope and the intercept in the resulting regression equation, the following accessions can be made: According to the intercept, when there is no source of risks, thus, when it is zero, operational performance is positive thus improves by 149.8%, however according to the slope, the presence of risks such as financial, supply-related, managerial and operational and logistics and infrastructural will lead to an decrease in operational performance by 25.2%, 25.3%, 26% and 14.7% respectively after firm size and industry have been controlled for. Therefore, sources of risks such as financial, supply-related, managerial and operational and logistics and infrastructural have a significant effect on operational performance.

Table 8: Results of regression and hypothesis testing

Variables	Standardized Estimate	*t*-statistic	*P*	Hypothesis	Result
Control Variable					
Firm size	0.096	1.743	0.082*		
Industry	0.405	7.308	0.000**		
Independent Variable					
Financial	-0.186	-2.787	0.006**	H_1	Support
Supply-related	-0.192	-3.449	0.001**	H_2	Reject
Demand-related	-0.049	-0.825	0.410	H_3	Support
Management & Operational	-0.237	-2.831	0.005**	H_4	Support
Political	-0.030	-0.372	0.710	H_5	Reject
Logistics & Infrastructural	-0.137	-2.300	0.022**	H_6	Support
Model summary		F (274) = 19.424; R^2 = 0.35			

Notes: *, ** Significant at 0.10 and 0.05 levels respectively

Source: Field survey, Kaku (2019)

Chapter Summary

This chapter presented the results and discussion of the study's research objectives. The data obtained were analysed using mean, standard deviation and regression. In relation to the research objectives, the study's findings show that there are numerous risks sources faced by actors in the sachet water supply chain in Ghana including major ones like financial, supply-related, demand-related, managerial and operational, political and logistics and infrastructural risks which all had dissimilarities in their probability of occurring and severity. Per the

objectives the results further revealed that financial, supply-related, managerial and operational, and logistics and infrastructural risks had negative significant effects on the operational performance of the actors in the sachet water supply chain in Ghana.

However, demand-related risk and political risks though had negative effects on the operational performance of the actors in the sachet water supply chain in Ghana, were not statistically significant. The findings imply that risks are inevitable and differ in terms of impact and threat thresholds in Ghana's sachet water supply chain. The study's findings were also supported by previous studies. The next chapter focuses on the summary, conclusions and recommendations of the study.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter presents the summary of the main findings, conclusions drawn from the findings and recommendations for policy consideration and suggestions for further research.

Summary of the Work

The purpose of the study was to investigate risks faced by SMEs in the sachet water supply chain and its impact on their operational performance.

Based on the purpose for the study, the following specific objectives were developed to:

1. assess the risks faced by actors in the sachet water supply chain.
2. examine the effect of financial risk on operational performance of actors in the sachet water supply chain.
3. examine the effect of supply-related risk on operational performance of actors in the sachet water supply chain.
4. examine the effect of demand-related risk on operational performance of actors in the sachet water supply chain.
5. examine the effect of managerial and operational risk on operational performance of actors in the sachet water supply chain.

6. examine the effect of political risk on operational performance of actors in the sachet water supply chain.
7. examine the effect of logistics and infrastructural risk on operational performance of actors in the sachet water supply chain.

The study employed the quantitative research approach and the cross-sectional explanatory research design due to the purpose of the study. The structured questionnaire, a primary data collection instrument, was used to gather data from all the 370 SMEs (owners, managers and owner-managers) in the target population. However, 275 out of the total questionnaires (370) administered were reliable for the study and as such, obtained a response rate of (74.32%). The data obtained were processed using IMB SPSS Statistics Version 25 (SPSS 25) and analysed using descriptive tools such as frequencies, percentages, means and standard deviations. The results were presented in tables and discussed in Chapter four. The next section presents the summary of the study's key findings.

Key findings

This study provided an overview and relevant discussion on risks faced by SME's in the sachet water supply chain in Ghana and its impact on their operational performance within academic literature. It has brought to bear relevant information that could inform policies in relation to how SME's in the sachet water supply chain can assess risks and it impact on their operational performance in Ghana. Presented below are the key findings of the study. The findings are organised according to the research objectives.

In relation to the first research objective on the risks faced by actors in the sachet water supply chain, it is found that, there are numerous sources of risks faced by the actors in the sachet water supply chain. These risks were found to be inevitable and differ in terms of probability of occurring and impact-threat thresholds.

Yet of these numerous risk factors faced by actors in the sachet water supply chain, financial risks (such as changing interest rates, delays in accessing financial support, inadequate financial support, difficulty in obtaining external loans, fluctuating exchange rates), demand-related risks (such as unanticipated or very volatile customer demand, insufficient or distorted order information from customers, demand shortfall, latent demand, excess demand), logistics and infrastructure risks (such as inadequate or poor storage facilities for resources, unreliable transport system, incremental changes in energy cost, labour disputes and conflicts with transport services, problems or damages from supplies in transit) constituted some of the highest risk sources in the Ghanaian sachet water supply chain.

In addition supply related risk (such as frequent resource or raw material scarcity, long lead times, sub-standard goods from suppliers), managerial and operational risks (such as constant forecast and planning errors, poor management decisions in asset allocation, poor-quality control due to poor supervision, disruption to productivity due to energy fluctuation, system or equipment failure, inadequate skilled personnel) and political risks (such as unexpected interruption from trade disputes with other countries, government imposed transfer and

conversion policies during economic crises, frequent changes in the political environment due to the introduction of new laws, stipulations regarding business and currency valuation, manipulation of trade tariffs and labour laws) also constituted some of the highest risk sources in the Ghanaian sachet water supply chain.

However, political instability, wars, civil unrest or other socio-political crises like chieftaincy disputes which was part of political risks was considered as moderate because of it threat threshold. This implies that of the major risks in the sachet water supply chain, all but one had a high probability more than fifty percent chance (probability) of occurring and causing an impact as great as forty to eighty percent change in the operational performance of the actors in the sachet water supply chain. Managers should be weary of the inevitable nature of risks and their differences especially in terms of impact and threat thresholds. Thus, risk sources relating to the major six in the sachet water supply chain (financial, demand-related, supply-related, logistics and infrastructural, political and managerial and operational risk) constitute the key drivers undermining the operational performance of SMEs in Ghana's sachet water supply chain. Therefore, avoiding disruptions emerging from these key drivers could improve the operational performance of actors within this chain.

With regard to the second research objective on the effect of risk on performance of actors in the sachet water supply chain, it was found that after controlling for firm size and the nature of the industry risk financial risk sources (such as poor cost analysis and pricing, difficulty in obtaining external loans,

financial controls and payment procedures, changing interest rates, fluctuating exchange rates, delays in accessing financial support and inadequate financial support), supply-related risk sources (such as frequent resource or raw material scarcity, supplier labour actions like strikes, long lead times, sub-standard goods from suppliers (supplier quality problems) and sudden default of a supplier e.g. due to bankruptcy), managerial and operational risk sources (such as constant forecast and planning errors, poor management decisions in asset allocation, poor-quality control due to poor supervision, disruption to productivity due to energy fluctuation, system or equipment failure and Inadequate skilled personnel) and Logistics and infrastructural risks (such as changes in transportation or energy cost, undependable transport, lack of/ inadequate or poor storage facilities for resources, unreliable transport system, incremental changes in energy cost, labour disputes and conflicts with transport services and problems or damages from supplies in transit had a negative significant effect on the operational performance of the actors (SMEs) in the sachet water supply chain within the four selected metropolises.

However, demand-related risk sources (such as unanticipated or very volatile customer demand, insufficient or distorted order information from customers, demand shortfall, latent demand, excess demand) and political risk (such as unexpected interruption from trade disputes with other countries, government imposed transfer and conversion policies during economic crises, frequent changes in the political environment due to the introduction of new laws, stipulations regarding business and currency valuation, manipulation of trade tariffs

and labour laws), though had high threat thresholds, do not significantly undermine the operational performance of actors in the sachet water chain in Ghana.

This implies that actors (SMEs) in the sachet water supply chain though are faced with numerous risks including financial, supply-related, logistics and infrastructural, managerial and operational which seriously undermines their operational performance, they do not have a problem when it comes to political risks and demand for their product. Thus it may be inferred from the results of this research that, the arguably large percentage of Ghana's sachet water supply chain performance explained by the risk sources studied implies that actors could significantly improve their operational performance in the chain if they allocate their limited resources to mitigate the very high-rated risk sources such as financial, supply-related, logistics and infrastructural, managerial and operational.

Conclusions

The aim of the study was of the study was to investigate risks faced by actors in the sachet water supply chain and its impact on their operational performance. Seven specific objectives were therefore set to help investigate the issue. These objectives have been achieved to a large extent. For instance, with regard to objective one the study concludes that, actors in the sachet water supply chain in Ghana are not only operating in an unstable environment, but are also currently entangled with several sources of risk, which varies in thresholds and impact.

The study revealed that financial risk had a significant impact on the operational performance of actors in the sachet water supply chain, the study therefore concludes that financial risks such as difficulty in obtaining loans, delays

in accessing financial support and constantly fluctuating exchange rates seriously abates the operational performance of actors in the sachet water supply chain.

Supply-related risk was also found to have negative and significant impact on operational performance, thus, the study concludes that supply related risks such as frequent raw material or resource shortage, supplier quality problems, long lead times and sudden default of a supplier can hinder the operational performance of actors in the sachet water supply chain.

Further, managerial and operational risk was observed to have a negative significant impact on operational performance, therefore the study concludes that managerial and operational risks including constant planning and forecasting errors, inadequate skilled personnel, constant disruption to productivity due to energy fluctuation, system or equipment failure among others can seriously hamper the operational performance of actors in the sachet water supply chain.

Moreover, there was a negative significant impact on operational performance because of logistics and infrastructural risk. The study thus concludes that the existence of logistics and infrastructural risks such as problems with damages from supplies in transit, inadequate or poor storage facilities for products and unreliable transport systems and services can adversely inhibit the operational performance of actors in the sachet water supply chain.

Regarding demand-related risk, there was a negative but not significant impact on operational performance. Therefore, the study concludes that though issues of demand-related risks such as frequent volatile demand, no demand for products (demand shortfall) and consumer complaints about inability to purchase

product due to it costliness (latent demand), have the tendency to seriously hinder operational performance, they actually have no influence on operational performance of actors in the sachet water supply chain. This may be because of the fact that the market for the sachet water is that of a perfect competition, hence there is product abundance from the very high competition existing.

Finally, political risk was found to have a negative but not significant impact on operational performance. Thus, the study concludes that the presence of political risks including government imposed transfers and conversion policies during economic crises, frequent changes in political environment due to the introduction of new laws or stipulations regarding businesses, manipulation of trade tariffs, labour laws, levies and taxes among others can to some extent abate operational performance of actors in the sachet water supply chain. However, as far as the sachet water supply chain in Ghana is concerned these risks rarely do have any serious impact on the operational performance of actors in the sachet water supply chain because at end of the day it is the final consumer that bears the brunt of these political policies.

In a nutshell, Risk sources related to Logistics/Infrastructure, Supply, Managerial and Operational and Finance, are the prime or key drivers undermining Ghana's Sachet water supply chain operational performance. Therefore, avoiding disruptions emerging from these prime or key drivers could improve the operational performance of Ghana's Sachet water supply chain.

Recommendations

On the strength of the research findings and conclusions made, the following recommendations are hereby made. The problem at stake was that, risks are inevitable and differed in terms of impact and threat thresholds, thus need to be managed as they affect the operational performance of actors (SMEs) in the sachet water supply chain. Based on this, the study recommends that per the influential nature of the probability and impact of risks in determining their (risk) magnitudes and threat thresholds in Ghana's sachet water supply chain, managers are as a matter of advice encouraged to consistently identify and quantify risks thresholds/impact frequently as this will aid in developing prompt actions to mitigate the high-level risk sources whiles monitoring and developing contingency plans for the medium-level risk sources.

The study found that actors (SMEs) in the sachet water supply chain are faced with numerous risks including financial, supply-related, logistics and infrastructural, managerial and operational which seriously undermines their operational performance. To address these challenges, the study recommends that, owners, managers and owner-managers could significantly improve the operational performance of actors (SMEs) in the chain if they allocate their limited resources to mitigate the very high-rated risk sources such as financial, supply-related, logistics and infrastructural, managerial and operational.

Moreover, because the vulnerability of the financial strength of a supply chain member could easily affect an entire supply chain since they are all inter-

connected and depend on each other. The study further recommends that, there is the need for the managers to employ effective financial hedges and operational hedges to reduce the periodic change/uncertain interest/exchange rate policies to the acceptable level.

In addition, financial policy makers/government need to understand the operations of sachet water supply chain firms in order to innovate and develop financial products and interest rates to suit their operations.

Also, managers need to employ adequate and efficient forecasting systems to mitigate the supply-related risks to avoid disruptions of the three main flows (i.e. material, financial and information) of the chain in order to achieve better operational performance. Again, managers are advised to establish collaborative processes with suppliers especially ones which provide critical services.

Managers need to employ effective and efficient contingency measures like backup generators and power plants to mitigate the constant disruption to productivity due to energy fluctuation. Managers are also advised to frequently check and ensure regular maintenance of the systems or equipment to avoid system or equipment failure.

Last but not least, government and policy makers are advised to provide adequate infrastructural developments and stabilize the cost of energy to aid in materials, information and financial flow to eliminate risks emerging from logistics and infrastructure services.

Finally, managers could also contract third party logistics and infrastructure service providers to curtail some of the logistics and infrastructure-related risks hampering their operational performance.

Suggestions for Further Research

Although the study provides useful insight into risks faced by SMEs in the sachet water supply chain and its impact on their operational performance, the study did not cover issues of risk responses and how they (risk responses) come into mitigate the influence of the risks inherent within the supply chain. Thus, a further research could focus on incorporating the risks responses to complete the risk management process. Therefore, a broader-based study can look at, "Risk Management and Operational Performance: Evidence from sachet water supply chain in Ghana".

Also, the study was only limited to some selected metropolises in Ghana, thus a results and findings can only be generalizable to those metropolises. The study therefore recommends that, further research should focus on a broader based research by including other actors within the sachet water supply chain in the country as a whole. Therefore, a broader-based study can look at, "Risk and Operational Performance: Evidence from sachet water supply chain in Ghana".

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APPENDICES

UNIVERSITY OF CAPE COAST
COLLEGE OF HUMANITIES AND LEGAL STUDIES
DEPARTMENT OF MARKETING AND SUPPLY CHAIN MANAGEMENT
RESEARCH QUESTIONNAIRE

INTRODUCTION

I am a final year graduate student of University of Cape Coast studying Master of Commerce in Procurement and Supply Chain Management. This questionnaire is designed to solicit information on "***Risk and Operational Performance: Evidence the Sachet Water Supply Chain in Ghana"***. Your contribution to this research through the completion of this questionnaire would be very much appreciated. You are assured of confidentiality of information as you will **NOT** be required to provide names on the questionnaire. Information given by you would be used strictly for academic and research purposes only.
INSTRUCTION: Please tick {√} in response to the questions

SECTION A: PROBABILITY AND IMPACT OF RISK OCCURRING
On a scale 1-5, please rate the level of Probability and Impact of occurrence with the following sources of Risk associated with your firm. **With 1-Very Low and 5-Very High**

No.	Risk Source	1	2	3	4	5		1	2	3	4	5
		PROBABILITY						IMPACT				
	FINANCIAL RISK											
FR1	Our firm suffers a lot from poor cost analysis and pricing.											
FR2	Difficulty in obtaining external loans											
FR3	Poorly designed or implemented financial controls and payment procedures constantly affects the firm.											
FR4	We are constantly being affected by changing interest rates.											
FR5	We are constantly being affected by fluctuating exchange rates											
FR6	Delays in accessing financial support											
FR7	Inadequate financial support											

DEMAND-RELATED RISK												
DR1	We are frequently suffering from unanticipated or very volatile customer demand											
DR2	Sometimes insufficient or distorted information from customers about orders makes meeting their demands difficult											
DR3	The firms' new products sometimes get no demand at all (Demand shortfall)											
DR4	Consumers sometimes complain of inability to purchase product due to it costliness (Latent demand)											
DR5	Sometimes we get excess demand than we expect from our consumers.											
SUPPLY-RELATED RISK												
SR1	We suffer due to frequent resource or raw material scarcity											
SR3	Supplies usually take too long before we get them (Long lead times)											
SR4	We suffer due to sub-standard goods from suppliers (supplier quality problems)											
SR5	Sometimes sudden default of a supplier affects the firm (e.g. due to bankruptcy)											
MANAGERIAL AND OPERATIONAL RISK												
MR1	Constant forecast and planning errors disrupts our operations											
MR2	Consistently we suffer poor management decisions in asset allocation											
MR3	We also suffer frequently poor-quality control due to poor supervision											
MR4	There is constant disruption to productivity due to energy fluctuation, system or equipment failure.											
MR5	Inadequate skilled personnel											
POLITICAL RISK												
PR1	We suffer from constant interruption from trade disputes with other countries											
PR2	Government constantly imposes transfer and conversion policies during economic crises.											

PR3	There is consistent political instability, wars, civil unrest or other socio-political crises like chieftaincy disputes adversely affecting our firm											
PR4	There are frequent changes in the political environment due to the introduction of new laws, stipulations regarding business											
PR5	Currency valuation, manipulation of trade tariffs and labour laws affects our firm											
LOGISTICS AND INFRASTRUCTURE RISK												
LR1	Inadequate or poor storage facilities for our resources affects our business (infrastructure)											
LR2	The nature of the transport system is always highly unreliable											
LR3	Energy cost is always increasingly (incremental changes in energy cost)											
LR4	Labour disputes and conflicts with transport services example strikes from GPRTU staff is always eminent											
LR5	There are always problems or damages from supplies in transit.											

SECTION B: SUPPLY CHAIN PERFORMANCE

On a scale 1-5, please rate your level of agreement with how the sources of Risk affect your firms' Supply Chain Performance. **With 1-Least agree and 5-Highly agree**

No.	Operational Performance	1	2	3	4	5
Operf1	Risks affects us in terms of our ability to be reliable (Dependability: meeting quoted or anticipated delivery dates and quantities on a consistent basis)					
Operf2	Risks affects us in terms of our ability to respond fast (Speed: time between order receipt and customer delivery)					
Operf3	Risks reduces our delivery standard in terms of quality and wholesome deliveries (Qualities: number of faultless deliveries|)					

Operf4	Risks affects us in terms of our ability to quickly react to emergencies (Response: response to number of urgent deliveries)					
Operf5	We incur huge Costs because of risks					
Operf6	Risks reduces the quality of Information: information richness in carrying out delivery					

SECTION C: CONTROL VARIABLES

On a scale 1-5, please rate your level of agreement with how the sources of Risk affect your firms' Supply Chain Performance. **With 1-Least agree and 5-Highly agree**

No.	Firm Size	1	2	3	4	5
FS1	The firm has adequate number of employees to manage issues of risk					
FS2	The firm generates adequate sales volumes to mitigate risk					
FS3	The total assets of the firm are enough to handle issues of risks					
FS4	The firms' management has the require experience to manage risk related issues					
FS5	The firm has the needed capacity to detect risk issues prior to its occurrence					
	INDUSTRY					
IS1	The firm frequently changes practices to keep up in the industry					
IS2	The rate at which product/services get obsolete in the industry is very high					
IS3	The nature of competition in the industry is such that there is high dynamism and uncertainty					
IS4	The tough price competition in the industry causes a great deal of threat to the survival of the firm					
IS5	The industry is characterised b dwindling markets for products/services					

SECTION D: DEMOGRAPHIC INFORMATION ON RESPONDENTS

1. Sex
   Male [ ] Female [ ]
2. Age bracket:
   18 - 35 years [ ] 36-45 years [ ]
   46-55years [ ] Over 55 years [ ]
3. Indicate your highest education
   No formal education [ ] Below Higher HND [ ]
   HND/Equivalent [ ]
   First Degree [ ] Post Graduate Degree [ ]
4. Position of respondents:
   Owner [ ] Manager [ ] Owner/Manager [ ]
5. How many years have you been working in this capacity?
   Less than 5 years [ ] 5-10 years [ ]
   11-15 years [ ] More than 15 years [ ]
6. Category of SME
   Trading [ ] Craft [ ]
   Manufacturing [ ] Services [ ]
7. Firm size (Number of employees)
   Less than 6 [ ] 6-29 [ ] more than 29 [ ]
8. Age of Firm
   Less than 5 years [ ] 5-10 years [ ]
   11-15 years [ ] More than 15 years [ ]
9. Ownership structure
   Locally [ ] Foreign [ ]
   Locally/Foreign [ ]
10. Firm Asset Value (excluding land and building)
    Less than GHS 1000 [ ] GHS 50,000- GHS 500,000 [ ]
    GHS501,000 – GHS 1 million [ ] GHS 1 million – GHS 5 million [ ]

THANK YOU FOR PARTICIPATING

APPENDIX B

Financial Risk

Poor cost analysis and pricing.

Difficulty in obtaining external loans.

Financial controls and payment procedures.

Changing interest rates.

Fluctuating exchange rates.

Delays in accessing financial support. Inadequate financial support.

DEMAND-RELATED RISK

Unanticipated or very volatile customer demand Insufficient or distorted order information from customers. Demand shortfall

Latent demand

Excess demand than we expect from our consumers.

SUPPLY-RELATED RISK

Frequent resource or raw material scarcity

Supplier labour actions like strikes

Supplies usually take too long before we get them

(Long lead times)

We suffer due to sub-standard goods from suppliers

(supplier quality problems)

Sudden default of a supplier (e.g. due to bankruptcy)

Political Risk

Interruption from trade disputes with other countries Government imposed transfer and conversion policies during economic crises.

Political instability, wars, civil unrest or other sociopolitical crises like chieftaincy disputes. Frequent changes in the political environment due to the introduction of new laws, stipulations regarding business

Currency valuation, manipulation of trade tariffs and labour law.

LOGISTICS AND INFRASTRUCTURE RISK

Inadequate or poor storage facilities for our resources

(infrastructure)

Unreliable transport system

Energy cost is always increasing (incremental changes in energy cost)

Labour disputes and conflicts with transport services e.g. strikes from GPRTU staff is always eminent Problems or damages from supplies in transit.

MANAGERIAL AND OPERATIONAL RISK

Constant forecast and planning errors

Poor management decisions in asset allocation

Poor-quality control due to poor supervision Disruption to productivity due to energy fluctuation, system or equipment failure. Inadequate skilled personnel

Operational Performance

Risks affects us in terms of our ability to be reliable (Dependability: meeting quoted or anticipated delivery dates and quantities on a consistent basis)

Risks affects us in terms of our ability to respond fast (Speed: time between order receipt and customer delivery) Risks reduces our delivery standard in terms of quality and wholesome deliveries (Qualities: number of faultless deliveries|)

Risks affects us in terms of our ability to quickly react to emergencies (Response: response to number of urgent deliveries)

We incur huge Costs because of risks

Risks reduces the quality of Information: information richness in carrying out delivery

Control Variables

FIRM SIZE

The firm has adequate number of employees to manage issues of risk

The firm generates adequate sales volumes to mitigate risk

The total asset of the firm is enough to handle issues of risks

The firm's management has the required experience to manage risk-related issues

The firm has the needed capacity to detect and address risk issues prior to its occurrence

INDUSTRY

The firm frequently changes it marketing practices to keep up in the industry

The rate at which products/services get obsolete in the industry is very high

The nature of competition in the industry is such that there is high market dynamism and uncertainty

The tough price competition in the industry causes a great deal of threat to the survival of the firm.

The industry is characterized by dwindling markets for products/services

Appendix C: Indicator loadings and Cronbach Alpha

Items	Number of items	Cronbach's Alpha	Factor loading
Financial risks	4	0.814	
F4			0.72
F5			0.85
F6			0.874
F7			0.775
Demand-related risks	3	0.767	
D2			0.786
D3			0.899
D4			0.797
Supply-related risks	3	0.721	
S3			0.686
S4			0.924
S5			0.788
Managerial and Operational risks	5	0.924	
MOR 1			0.82
MOR2			0.744
MOR3			0.906
MOR4			0.889
MOR5			0.719
Political risks	3	0.645	
P1			0.846
P4			0.769
P5			0.696
Logistics and Infrastructure risks	3	0.725	
LIR2			0.713
LIR4			0.874
LIR5			0.819
Evaluate the risks affect ff. supply chain performance indicators			
Supply Chain Performance	4	0.879	
SCP2			0.823
SCP3			0.882

SCP4			0.91
SCP5			0.813
Indicate how the following statements apply to your firm			
Firm size	3	0.797	
FSI			0.771
FS2			0.942
FS3			0.836
Industry	3	0.769	
IS3			0.785
IS4			0.901
IS5			0.802