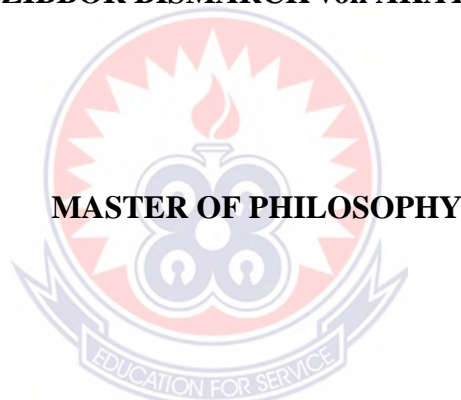


**UNIVERSITY OF EDUCATION, WINNEBA**

**INTELLECTUAL CAPITAL AND SUPPLY CHAIN PERFORMANCE: THE  
ROLES OF RESILIENCE AND TOP MANAGEMENT SUPPORT IN THE  
PHARMACEUTICAL INDUSTRY OF GHANA.**

**ZIBBOR BISMARCK von AKATEY**



**2025**

**UNIVERSITY OF EDUCATION, WINNEBA**

**INTELLECTUAL CAPITAL AND SUPPLY CHAIN PERFORMANCE: THE  
ROLES OF RESILIENCE AND TOP MANAGEMENT SUPPORT IN THE  
PHARMACEUTICAL INDUSTRY OF GHANA.**



**A thesis submitted to the School of Graduate Studies in partial  
fulfilment of the requirements for the award of the degree of  
Master of Philosophy  
(Procurement and Supply Chain Management)**

**Department of Procurement and Supply Chain Management  
School of Business**

**OCTOBER 2025**

## **COPYRIGHT**

All material contained within the thesis, including without limitation text, logos, icons, photographs and all other artwork, unless otherwise stated, is copyright material of the University of Education, Winneba. Use may be made of any material contained within the thesis for non-commercial purposes from the copyright holder. Commercial use of material may only be made with the express, prior, written permission of the University of Education, Winneba.



## DECLARATION

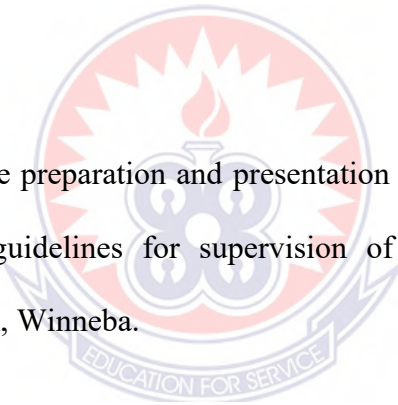
I, **Zibbor Bismarck von Akatey**, hereby declare that this thesis is the result of my own research under supervision and has not been presented by anyone for any academic award in this or any other university. All references used in the work have been duly acknowledged.

I bear sole responsibility for any shortcomings.

Signature: .....

Date: .....

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of thesis as laid down by the University of Education, Winneba.



Certified by:

**Dr. Mawuko Dza**  
(Supervisor)

.....  
Signature

.....  
Date

## **DEDICATION**

This work is dedicated to Myself, my wife Ama Esther Adutwumwaa, my children Senyo, Selorm, Seyram, Selikem and to the memories of the late Nene Ahortor Makaku V and Stella Eunice Akatey.



## ACKNOWLEDGEMENT

First, I would express my deepest thanks to the Mawugah Sogbolisa who helped me throughout this journey. May His name be praised.

I would also express my heartfelt and deepest gratitude to my competent, skilled and knowledgeable supervisor, Dr Mawuko Dza, for his invaluable, guidance, and patience throughout this research journey. His insights and expertise were instrumental in shaping this thesis. May the Lord continually bless him in all his endeavours.

Finally, I would express my utmost and warm appreciation to my family and thank everyone who contributed to this thesis directly or indirectly. Your support is deeply appreciated.

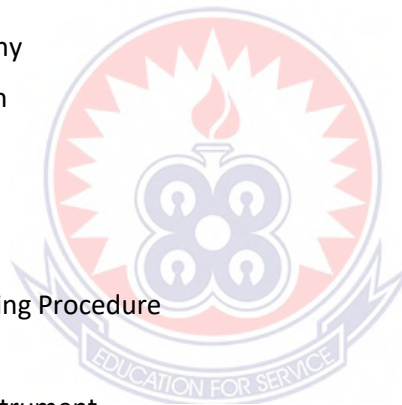


## TABLE OF CONTENTS

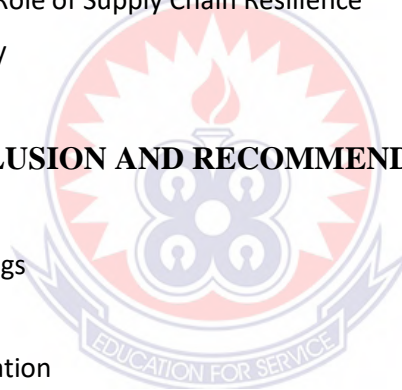
Content	Page
<b>COPYRIGHT</b>	<b>i</b>
<b>DECLARATION</b>	<b>ii</b>
<b>DEDICATION</b>	<b>iii</b>
<b>ACKNOWLEDGEMENT</b>	<b>iv</b>
<b>TABLE OF CONTENTS</b>	<b>v</b>
<b>LIST OF TABLES</b>	<b>viii</b>
<b>LIST OF FIGURES</b>	<b>ix</b>
<b>LIST OF ACRONYMS</b>	<b>x</b>
<b>ABSTRACT</b>	<b>xi</b>
<b>CHAPTER ONE</b>	<b>1</b>
<b>INTRODUCTION</b>	<b>1</b>
1.0 Background to the Study	1
1.1 Problem Statement	6
1.2 Purpose of the Study	10
1.3 Research Objectives	10
1.4 Research Questions	10
1.5 Scope of the Study	11
1.6 Significance of the Study	11
1.7 Limitations of the Study	12
1.8 Organisation of Study	13
<b>CHAPTER TWO</b>	<b>14</b>
<b>LITERATURE REVIEW</b>	<b>14</b>
2.0 Introduction	14
2.1 Conceptual Review	14
2.1.1 Intellectual Capital	15
2.1.3 Top Management Support	20
2.1.4 Supply Chain Performance	22
2.2 Theoretical Review	24
2.2.1 Knowledge-Based View Theory	25
2.2.2 Dynamic Capability Theory	27
2.2.3 Upper Echelon Theory	29
2.3 Empirical Review	31



2.3.1 Intellectual Capital and Supply Chain Performance	33
2.3.2 Supply Chain Resilience and Supply Chain Performance	37
2.3.3 Mediating Role of Supply Chain Resilience in the Nexus Between Intellectual Capital and Supply Chain Performance	41
2.3.4 Moderating Role of Top Management Support in the Nexus between Supply Chain Resilience and Supply Chain Performance	45
2.4 Research Gaps	50
2.5 Conceptual Framework and Hypothesis Development	53
2.5.2 Supply Chain Resilience and Supply Chain Performance	55
2.5.3 Moderating Role of Top Management Support	56
2.5.4 Mediating Role of Supply Chain Resilience	57
2.6 Chapter Summary	58
<b>CHAPTER THREE</b>	<b>60</b>
<b>RESEARCH METHODS</b>	<b>60</b>
3.0 Introduction	60
3.1 Research Philosophy	60
3.2 Research Approach	62
3.3 Research Design	64
3.4 Industry Context	65
3.5 Population	66
3.6 Sample and Sampling Procedure	67
3.7 Time Horizon	68
3.8 Data Collection Instrument	69
3.9 Measurement of Constructs	70
3.10 Reliability and Validity	71
3.11 Data Collection Procedure	72
3.12 Data Processing Tools	73
3.13 Data Processing and Analysis	74
3.14 Ethical Consideration	75
3.15 Chapter Summary	75
<b>CHAPTER FOUR</b>	<b>77</b>
<b>RESULTS AND DISCUSSION</b>	<b>77</b>
4.0 Introduction	77
4.1 Response Rate	77
4.2 Demographic Information	77
4.2 Descriptive Statistics of the Constructs	80



4.4 Model Specification	84
4.5 Indicator Loading Assessment	86
4.6 Reliability and Validity Assessment	89
4.7 Discriminant Validity	90
4.8 Collinearity Statistics Assessment	92
4.9 Coefficient of Determination ( $R^2$ )	93
4.10 Predictive Relevance Assessment	94
4.11 Effect Size ( $F^2$ ) Assessment	96
4.12 Assessment of Path Coefficients and Significance Level	98
4.13 Slope Analysis	101
4.14 Discussion of Findings	103
4.14.1 Intellectual Capital and Supply Chain Performance	103
4.14.2 Supply Chain Resilience and Supply Chain Performance	105
4.14.3 Moderating Effect of Top Management Support	107
4.14.4 The Mediating Role of Supply Chain Resilience	109
4.15 Chapter Summary	112
<b>CHAPTER FIVE</b>	<b>113</b>
<b>SUMMARY, CONCLUSION AND RECOMMENDATION</b>	<b>113</b>
5.0 Introduction	113
5.1 Summary of Findings	113
5.2 Conclusion	116
5.3 Managerial Implication	116
5.4 Theoretical Implication	118
5.5 Contribution to Knowledge	119
5.6 Limitations and Recommendations for Future Research	120
<b>REFERENCE</b>	<b>121</b>
<b>APPENDIX</b>	<b>140</b>



## LIST OF TABLES

<b>Table</b>	<b>Page</b>
1: Demographic Information	78
2: Descriptive Statistics of the Constructs	81
3: Indicator Loading Assessment	87
4: Construct Reliability and Validity	89
5: HTMT Values	91
6: Multicollinearity Statistics	92
7: Coefficient of Determination	94
8: Predictive Relevance	95
9: F-square statistics	97
10: Testing of Hypothesis	99



## LIST OF FIGURES

<b>Figure</b>	<b>Page</b>
1: Conceptual Framework	54
2: Model Specification	86
3: Final Mode	98
4: Slope Analysis	102



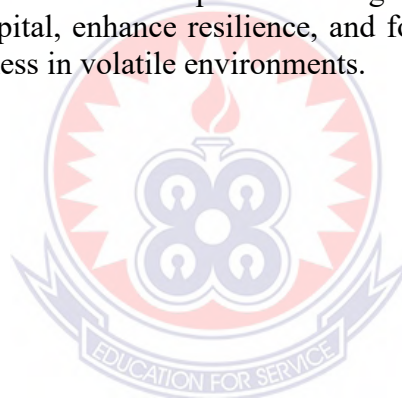
## LIST OF ACRONYMS

IC	Intellectual Capital
KBV	Knowledge-Based View
SCP	Supply Chain Performance
DCV	Dynamic Capability View
SCR	Supply Chain Resilience
UET	Upper Echelon Theory
TMS	Top Management Support



## ABSTRACT

This study examines the influence of intellectual capital on supply chain performance in Ghana's pharmaceutical industry, with a focus on the mediating role of supply chain resilience and the moderating role of top management support. Grounded in the Knowledge-Based View, Dynamic Capability Theory, and Upper Echelon Theory, the research explains how knowledge resources, adaptive capabilities, and managerial commitment interact to improve performance. A quantitative approach, explanatory design guided by post-positivist philosophy was employed, with data collected through structured questionnaires from 275 pharmaceutical firms registered with the Food and Drugs Authority. A total of 215 valid responses were analysed using Structural Equation Modelling in SmartPLS. The results indicate that intellectual capital has a significant impact on both supply chain resilience and performance. Supply chain resilience also positively affects performance and mediates the relationship between intellectual capital and performance, suggesting that resilience converts knowledge resources into operational benefits. Additionally, the study reveals that top management support amplifies the impact of resilience on performance, underscoring the strategic role of leadership in developing robust supply chains. The study contributes to theory by integrating knowledge-based, dynamic, and behavioural perspectives and offers practical insights for pharmaceutical firms to develop intellectual capital, enhance resilience, and foster strong managerial support to sustain competitiveness in volatile environments.



## CHAPTER ONE

### INTRODUCTION

#### 1.0 Background to the Study

Intellectual capital (IC) has emerged as a pivotal concept in contemporary organisational theory, representing the intangible resources that significantly contribute to value creation and sustainable competitive advantage. Broadly defined, IC encompasses the collective knowledge, skills, competencies, and intellectual assets possessed by individuals and embedded within organisational structures and relationships (Edvinsson & Malone, 1997; Stewart, 1997; Secundo et al., 2020). Scholars consistently conceptualise IC as comprising three interrelated components: human capital, which includes employees' expertise, experience, and innovative capacity; structural capital, referring to organisational processes, systems, and intellectual property; and relational capital, which involves networks, customer relationships, and external linkages (Bontis, 1998; Inkinen, 2015; Kianto et al., 2020). Unlike tangible resources, intellectual capital is inherently dynamic, context-specific, and difficult to imitate, making it a crucial source of strategic advantage in knowledge-driven economies (Xu & Li, 2020; Del Giudice et al., 2021). An expanding body of literature highlights that organisation proficient in identifying, measuring, and leveraging their intellectual capital are better positioned to innovate, enhance operational efficiency, and respond effectively to emerging business challenges (Martín-de-Castro et al., 2011; Kianto et al., 2020; Yaseen et al., 2022).

Given its intrinsic value and strategic relevance, intellectual capital has become even more critical in today's turbulent business environment, characterised by rapid technological advancements, globalisation, and heightened market volatility

(Gogan et al., 2016; Del Giudice et al., 2021). Modern organisations face persistent pressures to differentiate themselves through knowledge-based assets that foster innovation, agility, and superior stakeholder engagement (Secundo et al., 2020; Kianto et al., 2020). Consequently, intellectual capital functions not only as an internal resource but also as a strategic driver that shapes organisational adaptability and long-term resilience (Inkinen, 2015; Del Giudice et al., 2021). Studies suggest that intellectual capital exerts a positive influence on organisational performance, with firms possessing higher levels of human, structural, and relational capital frequently outperforming competitors in dynamic markets (Xu & Li, 2020; Yaseen et al., 2022; Al-Hakim et al., 2023). Moreover, as industries increasingly shift towards knowledge-intensive operations, the capacity to manage and capitalise on intellectual capital has become a critical determinant of strategic success and organisational sustainability (Secundo et al., 2020; Al-Hakim et al., 2023).

The Knowledge-Based View (KBV) states that knowledge is the most vital resource for firms to gain a sustainable competitive advantage by effectively managing knowledge resources (Grant, 1996; Del Giudice et al., 2021). Intellectual capital is crucial in supply chain management, impacting performance outcomes like operational, financial, and supply chain performance (SCP). SCP measures how well a company's supply chain meets its goals, including cost, responsiveness, flexibility, quality, and customer satisfaction (Beamon, 1999; Gunasekaran et al., 2004; Singh et al., 2021). SCP reflects a supply chain's ability to deliver products and services that meet or exceed customer expectations while optimising resources and reducing risks (Gunasekaran et al., 2004; Singh et al., 2021). Its importance has grown with increasing market unpredictability and customer demands, making supply chain excellence key for competitive advantage (Christopher, 2016; Ivanov, 2020).

Effective SCP improves efficiency, lowers costs, enables quick responses to market changes, and builds resilient networks against disruptions (Singh et al., 2021; Wieland, 2021). The KBV further suggests that intellectual capital enhances supply chain capabilities by promoting better information sharing, innovation, and problem-solving across the network (Del Giudice et al., 2021; Kianto et al., 2020).

The Dynamic Capability View (DCV) posits that competitive advantage arises not simply from owning strategic resources but from the firm's ability to integrate, build, and reconfigure those resources in response to environmental changes (Teece, 1997, 2007; Eisenhardt & Martin, 2000). The theoretical perspective highlights the importance of supply chain resilience (SCR) as the capacity of a supply chain to anticipate, prepare for, respond to, and recover from disruptions while maintaining operational continuity and safeguarding competitive performance (Pettit et al., 2013; Ivanov, 2020).

SCR serves as a dynamic capability that firms can leverage to translate intellectual capital into supply chain performance by enabling firms to deploy knowledge resources flexibly under conditions of volatility and uncertainty (Ambulkar et al., 2015; Wieland, 2021). For instance, high levels of human and relational capital facilitate rapid information sharing and collaborative problem-solving, which are essential during disruptions, while structural capital provides the systems and processes needed to reconfigure supply networks efficiently (Del Giudice et al., 2021; Kianto et al., 2020). Empirical studies have demonstrated that resilient supply chains achieve superior performance by minimising disruption impacts, maintaining customer service levels, and sustaining financial stability even amid crises such as pandemics, geopolitical tensions, or natural disasters (Pettit et al., 2013; Singh et al., 2021; Wieland, 2021).

Although SCR equips firms with the dynamic capability to transform intellectual capital into superior performance outcomes, the extent to which resilience yields tangible benefits is significantly shaped by the strategic vision and commitment of top management. The Upper Echelon Theory (UET), proposed by Hambrick and Mason (1984), posits that organisational outcomes reflect the values, experiences, and cognitive orientations of senior executives, who interpret complex situations and steer strategic choices accordingly (Hambrick, 2007; Hambrick & Finkelstein, 2023). From this perspective, dynamic capabilities like SCR are not deployed in isolation but depend heavily on top managers' willingness to prioritise and support initiatives that enhance flexibility and responsiveness (Wang et al., 2016; Yu et al., 2019).

Leaders who are proactive and strategically focused are more inclined to allocate resources, foster cross-functional collaboration, and embed resilience thinking into decision-making processes (Wang et al., 2016; Wieland, 2021). Conversely, without committed leadership, even well-developed resilience capabilities may fail to be fully implemented or leveraged during disruptions, undermining their potential to safeguard supply chain performance (Pettit et al., 2013; Yu et al., 2019). Moreover, in volatile environments, top managers' ability to make timely, informed decisions enables firms to adapt resilience strategies in response to emerging risks, thus maintaining operational stability and competitive positioning (Ivanov, 2020; Hambrick & Finkelstein, 2023). Therefore, top management support is not merely an organisational support function but a strategic force that shapes how resilience capabilities translate into sustained supply chain performance, highlighting its essential role in achieving competitive advantage amidst uncertainty.

The relevance of examining the interplay among IC, SCR, SCP, and TMS becomes particularly significant within Ghana's pharmaceutical industry. This sector

contributes fundamentally to both national economic development and public health objectives. The pharmaceutical sector in Ghana is pivotal not only for creating employment and adding value to local economies but also for ensuring access to essential medicines, thereby reducing dependence on imports and enhancing national health security (Ghana Ministry of Health, 2021; UNIDO, 2020). Local pharmaceutical manufacturers currently supply about 30% of the country's essential medicines, with policy ambitions under the National Pharmaceutical Policy to expand this capacity to improve health outcomes and promote industrialisation (Ministry of Health, 2021). Ghana's pharmaceutical industry contributes around 0.6% to the country's GDP, with plans to increase this to 2%. The industry is valued at over \$433 million, with local production meeting about 30% of domestic needs. In 2018, the sector contributed around 0.5% to Ghana's GDP and represented up to 13% of total healthcare expenditure (Nortey M,A et al 2025).

Ghana's pharmaceutical export destinations have mostly been neighboring West African countries. In 2019 the top 5 destination of Ghana's pharmaceutical export were: Côte d'Ivoire (24%), Liberia (24%), Burkina Faso (23%), Senegal (12%), and The Gambia (5%). Over the last decade, the industry has demonstrated strong growth potential with increased pharmaceutical sales from about US\$300million in 2012 to US\$589million in 2019. The market is expected to grow at a compound annual growth rate of 9.8 percent by 2024 with a gross pharmaceutical sale of about US\$620million. Fitch Solutions in 2021 estimates that sales will reach GHS6.55bn by 2030.

However, the industry faces challenges such as global supply chain disruptions, regulatory complexities, and competition from imports, which highlight the critical need for leveraging IC and developing dynamic capabilities like SCR, supported by

effective TMS, to sustain competitive SCP (UNIDO, 2020). This study, therefore, offers timely insights that not only contribute to academic discourse but also support Ghana's progress toward achieving SDG 3, which seeks to ensure healthy lives and promote well-being for all at all ages, and SDG 9, which focuses on building resilient infrastructure, promoting inclusive and sustainable industrialisation, and fostering innovation (United Nations, 2015).

### **1.1 Problem Statement**

The pharmaceutical industry is a crucial pillar of Ghana's economy and public health system, contributing significantly to employment, local manufacturing, and national health security (UNIDO, 2020; Ministry of Health, 2021). However, despite its strategic importance, the sector faces persistent challenges, particularly regarding the performance and resilience of its supply chains. Ghana remains heavily reliant on imported APIs and finished pharmaceutical products, with approximately 70% of essential medicines sourced externally (UNIDO, 2020; Ministry of Health, 2021; Pourraz, 2022). This dependency exposes the industry to global supply shocks, geopolitical tensions, logistical bottlenecks, and public health crises such as the COVID-19 pandemic, which led to medicine shortages and significant operational disruptions (Pharmaceutical Development Fund Report, 2022; World Bank, 2023). For example, during the pandemic, import delays of 6-8 weeks resulted in widespread stock-outs and escalating production costs for local manufacturers (UNIDO, 2020; World Bank, 2023). Moreover, recent global inflation and currency fluctuations have further increased procurement costs, straining manufacturers' working capital and threatening operational sustainability. In Ghana's pharmaceutical sector, the cedi's depreciation, exceeding 20% against the US dollar in early 2024, has driven up the cost of imported active pharmaceutical ingredients, packaging materials, and essential

machinery. According to the Pharmaceutical Manufacturers Association of Ghana, some local firms have experienced over a 35% rise in production costs, forcing them to scale down output or delay procurement cycles (PMAG, 2024; Bank of Ghana, 2024).

The consequences of these vulnerabilities extend far beyond operational inefficiencies, posing significant risks to public health, economic stability, and social welfare. Medicine shortages disrupt treatments for chronic and infectious diseases, elevate morbidity and mortality rates, and erode public trust in the healthcare system (WHO, 2022). Additionally, supply chain disruptions compromise the sector's economic contributions by causing production slowdowns, potential job losses, and declining investor confidence in local pharmaceutical ventures. The scarcity of essential medicines often drives significant price increases, disproportionately burdening low-income populations and exacerbating health inequalities, with some reports indicating price surges of over 30% during recent currency instability and global supply constraints (GPMA, 2023; WHO, 2022). Thus, fragile SCP in Ghana's pharmaceutical industry represents not merely a sectoral issue but a multidimensional challenge with critical implications for public health security, economic development, and social equity.

Ghana's pharmaceutical sector is characterised by dependency on imported drugs, volatile global markets, and regulatory complexity, leveraging IC is essential for fostering resilience, agility, and innovation (UNIDO, 2020; World Bank, 2023). Effectively utilising IC can help firms identify alternative sourcing strategies, optimise inventory management, improve demand forecasting, and strengthen stakeholder collaborations, all of which are crucial for mitigating disruptions and achieving sustainable SCP (Del Giudice et al., 2021; Wieland, 2021). Although the

KBV emphasises IC's significance, much of the existing research has focused on outcomes other than SCP, particularly in the pharmaceutical sector. For example, IC has been found to drive innovation in manufacturing and technology firms (Rehman et al., 2021; Zhang et al., 2017), enhance organisational agility in SMEs (Ahmed et al., 2022), and promote sustainable practices in industries such as textiles (Vale et al., 2022), wine (Marco-Lajara et al., 2022), banking (Chinnasamy et al., 2023), and hospitality (Sardo et al., 2018). While some studies have examined IC within the pharmaceutical industry, these have primarily focused on its influence on SCR (Mubarik et al., 2021; Yu et al., 2023), often conducted outside Ghana and rarely addressing its direct impact on SCP. Currently, no empirical research examines how IC specifically drives SCP in Ghana's pharmaceutical industry, where effective supply chains are critical for ensuring medicine availability and economic stability.

Moreover, the DCV asserts that firms achieve performance not merely through resources like IC but by developing dynamic capabilities such as SCR to adapt and thrive amid disruptions (Teece et al., 1997; Teece, 2018). Although studies confirm that SCR improves responsiveness and stability during crises like pandemics and geopolitical conflicts (Pettit et al., 2013; Ivanov, 2020; Wieland, 2021), and that IC provides crucial knowledge and relationships for building resilience (Del Giudice et al., 2021; Kianto et al., 2020), the literature remains largely silent on how SCR mediates the relationship between IC and SCP, especially within Ghana's pharmaceutical sector (Mubarik et al., 2021; Yu et al., 2023). Additionally, the UET posits that organisational outcomes are deeply influenced by top executives' experiences, values, and cognitive orientations, which shape how dynamic capabilities like SCR are deployed to enhance performance (Hambrick, 2007; Hambrick & Finkelstein, 2023). Without TMS, even well-developed SCR may fail to translate into

SCP because resilience initiatives risk lacking prioritisation, resources, and strategic integration (Ivanov, 2020; Wieland, 2021). It is argued that proactive leadership is essential for fostering collaboration, enabling swift decision-making, and embedding resilience within organisational culture, thereby maximising SCR's impact on SCP (Wang et al., 2016; Pettit et al., 2013). In the pharmaceutical sector, supply chain resilience mediates the relationship between proactive risk management practices and supply chain performance, ensuring consistent drug availability and compliance. At the same time, top management support moderates this relationship by amplifying the effectiveness of resilience-building initiatives, enabling firms to achieve stronger, more reliable, and responsive supply chains. In this regard the study seeks to examine the mediating role of supply chain resilience and moderating role of top management support in the supply chain performance in the pharmaceutical industry in Ghana.

Despite the theoretical recognition of top management support critical role the literature remains notably silent on how TMS moderates the relationship between IC and SCP. It is against the backdrop of these challenges and gaps, this study seeks to examine the effect of IC on SCP, as well as the roles of SCR and TMS in Ghana's pharmaceutical industry. In terms of theory and policy the study seeks to contribute to how the moderating influence of top management support aligns with the upper echelons theory, confirming that executives' commitment, vision, and strategic orientation significantly shape how dynamic capabilities are developed and deployed. Additionally how managers should institutionalise resilience-building practices, such as scenario planning, supplier diversification, inventory flexibility, and the adoption of digital monitoring systems that enable early detection of risks and swift recovery from disruptions.

## **1.2 Purpose of the Study**

The study aims to examine the effect of intellectual capital on supply chain performance, the roles of supply chain resilience and top management support in the pharmaceutical industry in Ghana.

## **1.3 Research Objectives**

- i. To examine the effect of intellectual capital on supply chain performance in the pharmaceutical industry in Ghana.
- ii. To assess the effect of supply chain resilience on supply chain performance in the pharmaceutical industry in Ghana.
- iii. To examine how top management support moderates the relationship between supply chain resilience and supply chain performance
- iv. To examine the mediating role of supply chain resilience in the relationship between intellectual capital and supply chain performance in the pharmaceutical industry in Ghana.

## **1.4 Research Questions**

- i. What is the effect of intellectual capital on supply chain performance in the pharmaceutical industry in Ghana?
- ii. What is the effect of supply chain resilience on supply chain performance in the pharmaceutical industry in Ghana?
- iii. What is the moderating effect of top management support in the relationship between supply chain resilience and supply chain performance?
- iv. What is the mediating role of supply chain resilience in the relationship between intellectual capital and supply chain performance in the pharmaceutical industry in Ghana?

### **1.5 Scope of the Study**

This study examines the effect of intellectual capital on supply chain performance, investigating the mediating role of supply chain resilience and the moderating role of top management support in this relationship within the pharmaceutical industry. Conceptually, the research is grounded in the Knowledge-Based View, the Dynamic Capability View, and the Upper Echelon Theory, exploring how knowledge resources, dynamic capabilities, and strategic leadership jointly influence supply chain outcomes. Geographically, the study was conducted in Ghana, which hosts a significant concentration of pharmaceutical manufacturing and distribution firms, making it a representative context for assessing the sector's supply chain dynamics.

### **1.6 Significance of the Study**

The findings of this study provide valuable insight to policymakers, the pharmaceutical industry, and academia. Specifically, this study is significant as it provides empirical evidence and practical insights into how intellectual capital, supply chain resilience, and top management support interact to influence supply chain performance within Ghana's pharmaceutical sector. The findings inform policy formulation aimed at strengthening the country's pharmaceutical supply chains, ensuring medicine security, and reducing dependency on imports. It is also guide regulatory authorities in designing targeted interventions and support mechanisms that enhance the resilience and sustainability of pharmaceutical operations, thereby contributing to national health security and economic development.

For the pharmaceutical industry, the study offers practical strategies on how firms can leverage intellectual capital to improve supply chain performance, particularly through building resilience and securing proactive support from top

management. It helps industry players better anticipate and respond to disruptions such as global supply shocks, currency volatility, and geopolitical risks. By translating theoretical concepts into actionable recommendations, the research enables pharmaceutical firms in Ghana to enhance operational efficiency, maintain consistent medicine availability, and secure a competitive advantage in a highly dynamic market environment.

From an academic perspective, this study contributes to advancing knowledge by integrating the Knowledge-Based View, the Dynamic Capability View, and the Upper Echelon Theory into the context of pharmaceutical supply chain management in an emerging economy. It fills critical gaps in the literature by exploring how supply chain resilience mediates, and top management support moderates, the relationship between intellectual capital and supply chain performance, areas that remain underexplored, particularly in Ghana. The study serves as a valuable reference for scholars and future researchers interested in intellectual capital, supply chain resilience, and strategic management in the pharmaceutical sector, fostering further research and theoretical development in these fields.

### **1.7 Limitations of the Study**

This study is limited by its exclusive use of a quantitative research approach and an explanatory research design, which, although suitable for testing the relationships among intellectual capital, supply chain resilience, top management support, and supply chain performance, may not capture the deeper contextual insights and nuanced experiences that qualitative methods could provide. Conducting the research solely within Ghana's pharmaceutical industry may also limit the generalisability of the findings to other countries or sectors with different operational contexts. In addition, reliance on structured questionnaires may restrict respondents'

ability to elaborate on complex issues beyond predefined questions, potentially reducing the richness of the data. Finally, the use of SMART PLS Structural Equation Modelling concentrates the analysis on statistical relationships, which may overlook contextual factors unique to individual firms. The study employed rigorous instrument validation, pre-testing, and expert review to strengthen the reliability of the data. At the same time, the use of a large and diverse sample across multiple firms within the industry enhances representativeness and reduces potential bias.

### **1.8 Organisation of Study**

This study is organised into five chapters. Chapter One provides an introduction, outlining the background, problem, objectives, significance, scope, limitations, and structure of the thesis. Chapter Two reviews relevant literature, presenting theoretical and empirical perspectives, the conceptual framework, and research gaps. Chapter Three explains the research methodology, including the design, population, sampling, data collection, analysis, and ethical considerations. Chapter Four reports and discusses the findings, while Chapter Five offers the summary, conclusions, and recommendation

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.0 Introduction

This chapter thoroughly examines the relevant literature on intellectual capital, supply chain resilience, top management support, and supply chain performance. The chapter is divided into theoretical review, conceptual review, empirical review, and conceptual framework. The primary source of the information in this section is mainly from peer-reviewed scholarly literature.

#### 2.1 Conceptual Review

A conceptual review synthesises and clarifies concepts, models, and frameworks related to a research problem, emphasising definitions and relationships among constructs (Jabareen, 2009; Torraco, 2005). Its significance lies in providing conceptual clarity, identifying gaps or inconsistencies, and laying a solid foundation for theory development and hypothesis formulation, ensuring that research is based on well-defined and logically coherent frameworks (Meredith, 1993; Snyder, 2019; Grant & Osanloo, 2014). This section of the study will explore concepts such as intellectual capital, supply chain resilience, top management support, and supply chain performance. Within the pharmaceutical industry, IC the knowledge, skills, and relational assets embedded in the organisation serves as the foundation for building competitive advantage. Yet, the translation of IC into tangible outcomes requires a system capable of absorbing shocks and adapting to uncertainty (Yu, Wet al 2023). Here, SCR plays a mediating role, channelling the value of IC into improved SCP by ensuring continuity of drug supply, regulatory compliance, and responsiveness to market demands resilience and the moderating influence of top management support in shaping pharmaceutical supply chain performance.

The strength of this pathway is further shaped by TMS, which acts as a moderator. When executives actively champion resilience-building initiatives, allocate resources, and align strategic priorities, the positive effect of IC on SCR and ultimately on SC are amplified. Conversely, limited support weakens this relationship, constraining the ability of intellectual capital to translate into resilient and high-performing supply chains (Ali, M et al 2023).

Thus, the integrated conceptual model positions IC as the driver, SCR as the mediator, and TMS as the moderator, all converging to influence SCP. This synthesis provides a coherent foundation for the study's hypotheses, which test the mediating effect of resilience and the moderating role of top management support in shaping pharmaceutical supply chain performance

### **2.1.1 Intellectual Capital**

Youndt, et al. (2004) conceptualise intellectual capital as the sum of all knowledge that can be leveraged by organisations in their search for a competitive advantage. Youndt, M.A.; et al 2004). Nahapiet and Ghoshal define intellectual capital as a type of knowledge and the cognitive ability of a social collective intellectual communities and organizations to gain a competitive advantage. (Nahapiet, J. et al 2008)

IC has become a key concept in organisational research, but it still sparks debates about its definition and scope. Essentially, IC is viewed as the collection of intangible assets like human, structural, and relational resources that help firms generate value beyond their physical inputs (Khalique et al., 2015; Bontis et al., 2018). Some scholars see IC as a knowledge-based idea reflecting a company's collective skills, systems, and networks (Hussinki et al., 2017; Kianto et al., 2017), while others see it as a hidden wealth that boosts competitiveness and innovation (Chahal & Bakshi, 2016; Goebel, 2015). This difference points to the ongoing debate over whether IC

should mainly be seen as a strategic resource built into organisational processes or as a measurable indicator of intangible worth. Still, there is general agreement that IC is a vital driver of long-term organisational success in knowledge-based economies (Khalique et al., 2015; Bontis et al., 2018; Soetanto & Liem, 2019).

Human capital, relational capital, and structural capital are the three main components of IC. Human capital includes the knowledge, skills, and abilities of employees, which drive innovation and organisational performance (Bontis, 1998; Subramaniam & Youndt, 2005). Relational capital covers the value gained from relationships with customers, suppliers, partners, and other stakeholders, promoting trust and long-term collaboration (Nahapiet & Ghoshal, 1998; Cabrita & Bontis, 2008). Structural capital signifies the institutionalised knowledge stored in processes, databases, patents, and organisational culture, enabling efficiency and growth (Edvinsson & Malone, 1997; Stewart, 1997). Collectively, these elements form a company's intangible assets, contributing to competitive advantage and sustainable development (Dumay & Garanina, 2013).

Beyond definition and measurement, the significance of intellectual capital lies in its proven influence on organisational performance. Empirical studies consistently confirm that IC improves financial results, productivity, and competitiveness (Hashim et al., 2015; Ozkan et al., 2017; Yaseen et al., 2016). However, its impact extends beyond economic metrics. Research shows IC promotes innovation by enabling knowledge creation and adoption (Dost et al., 2016), and also contributes to environmental sustainability when framed as “green IC” (Yusliza et al., 2020). Additionally, IC plays a vital role in resilience, with studies demonstrating its ability to strengthen supply chains against external shocks (Mubarik et al., 2022). These findings reinforce IC as a dynamic, value-creating asset that allows

organisations not only to thrive in competitive markets but also to adapt to changing environments.

IC has also been examined alongside various outcome variables, demonstrating its wide-ranging influence. Studies link IC to enhanced firm performance (Alrowwad et al., 2020), corporate social responsibility initiatives (Gangi et al., 2021), and sustainable business practices (Pedro et al., 2023). For example, relational capital improves customer loyalty and brand reputation, while human capital increases employee productivity and innovation. Additionally, IC supports digital transformation and organisational agility (Scuotto et al., 2022). These findings highlight IC's role both as a standalone asset and as a catalyst for organisational performance and success.

### **2.1.2 Supply Chain Resilience**

According to Ponomarov et al (2009), they define supply chain resilience as the adaptive capability of the supply chain to prepare for unexpected events, respond to disruptions, and recover from them by maintaining continuity of operations at the desired level of connectedness and control over structure and function. Barroso conceptualise supply chain resilience as the ability to react to the negative effects caused by disturbances that occur at a given moment in order to maintain the supply chain's objectives. (Barroso et al. 2011).

The concept of resilience started in ecology, where Holling described it as a system's ability to absorb disruptions and still keep going. This ecological perspective formed the basis for resilience in organisational studies and eventually in supply chain management. Early research in the 2000s used the term to explain how companies could handle disruptions like terrorist attacks, natural disasters, and geopolitical crises. Christopher and Peck as well as Sheffi and Rice were among the first to define

resilience in supply chains, emphasising its role in helping companies to “bounce back” after serious disruptions. Over time, the concept evolved beyond mere recovery to encompass readiness and flexibility, demonstrating a proactive approach. Systematic reviews, such as those by Hohenstein et al. (2015), Tukamuhabwa et al. (2015), and Kamalahmadi and Parast (2016), outlined its theoretical bases and connected it to organisational skills and resource-based views. More recently, the COVID-19 pandemic moved SCR research toward ideas of “viability” and “survivability,” highlighting that resilience is not just about quick recovery but also about maintaining operations and competitiveness during long-lasting global disruptions (Ivanov & Dolgui, 2020).

SCR is defined in multiple ways, with scholars converging around a set of capabilities that enable supply chains to prepare for, respond to, and recover from disruptions. A frequently cited definition is provided by Ponomarov and Holcomb (2009), who describe SCR as the adaptive capacity to prepare for unexpected events and restore operations efficiently. Tukamuhabwa et al. (2015) further refined this by integrating preparedness, responsiveness, and recovery into a holistic construct. Central to these definitions is the recognition that resilience is not merely about returning to a previous state but also about “bouncing forward” to a better state, aligning with socio-ecological theories (Brandon-Jones et al., 2014). SCR is multi-dimensional, incorporating absorptive, adaptive, and restorative capacities (Hosseini et al., 2019), indicating that resilience is a dynamic and evolving construct, not a static trait.

The literature consistently identifies a range of mechanisms and capabilities that build resilience in supply chains. Pettit, Fiksel, and Croxton (2010) provide a widely used framework that balances vulnerabilities (such as turbulence and supply

chain complexity) with capabilities (such as flexibility, collaboration, and visibility). Among these, redundancy through multi-sourcing, flexibility in production and logistics, and visibility enabled by digital technologies are frequently emphasised. Wieland and Wallenburg (2013) demonstrate that relational competencies such as trust and joint problem-solving strengthen resilience by enabling coordinated responses to disruptions. Studies stress the role of digitalisation, technologies such as IoT, analytics, and digital twins enhance real-time sensing, simulation, and reconfiguration, which are central to building resilient systems (Ivanov & Dolgui, 2020). Moreover, resilience is increasingly linked with sustainability, as firms seek to design supply chains that are not only robust to shocks but also socially and environmentally viable (Hohenstein et al., 2015). These findings collectively highlight that resilience is enacted through strategic, operational, and technological enablers that work in concert across supply networks.

The importance of SCR is strongly supported in both conceptual and empirical studies, as it is linked to firm survival, competitiveness, and sustainable performance. Liu et al. (2018) found that resilient supply chains contribute to customer satisfaction and financial outcomes, while Huo et al. (2024) showed that resilience directly enhances financial performance under turbulent conditions. Furthermore, studies highlight SCR's mediating role: it strengthens the performance benefits of collaboration, information sharing, and integration (Wieland & Wallenburg, 2013). The recognition that resilience is contingent, and its benefits become critical when uncertainty and turbulence are high, has pushed scholars to adopt perspectives from the RBV and dynamic capabilities theory (Brandon-Jones et al., 2014). For research, SCR remains a priority because global disruptions are intensifying, and firms increasingly face trade-offs between lean efficiency and resilient buffers. Supply

chain resilience has emerged not just as a survival mechanism but as a strategic imperative for long-term competitiveness and scholarly inquiry.

### **2.1.3 Top Management Support**

Top Management Support refers to the crucial role played by the management in the success of any project or technology adoption. It involves understanding the requirements and advantages of the adopted technology, providing the necessary resources, and creating an organizational strategy for its implementation (Mustafa O A et al 2017). TMS has long been recognised as a critical factor in organisational success, especially in implementing information systems and large-scale change initiatives. Early studies within the critical success factors tradition stressed the importance of senior executives demonstrating commitment by actively sponsoring, prioritising, and monitoring projects (Jitpaiboon, 2005). TMS is commonly defined as the visible and ongoing involvement of top executives in providing resources, setting strategic direction, and communicating the significance of an initiative (Birken, Lee, & Weiner, 2015). In the literature on Enterprise Resource Planning, Al-Fawaz, Drew, and Al-Fawaz (2008) described TMS as the most influential success factor, emphasising its dual role in leadership and resource provision. Over time, the definition of TMS has expanded beyond the IT field to encompass areas such as quality management, innovation, and digital transformation, while its core dimensions, executive sponsorship, resource allocation, and strategic alignment, remain central (Alsyouf, Ishak, & Abualqumboz, 2022; Boonstra, 2013). This study adopts this broader conceptualisation, viewing TMS as a multidimensional construct that fosters organisational performance through leadership commitment, provision of resources, and alignment of strategies, particularly in shaping supply chain resilience and performance within the pharmaceutical industry.

Conceptually, TMS influences organisational outcomes through several mechanisms. First, it functions as a strategic signal, indicating that an initiative is a corporate priority. Second, it facilitates resource mobilisation by providing funding, staffing, and technical expertise to support implementation. Third, it offers structural empowerment, such as creating steering committees and appointing project champions. Lastly, it delivers relational support by coordinating across departments and mediating conflicts (Al-Fawaz et al., 2008). Research indicates that top management engagement in activities like setting realistic goals, monitoring milestones, and communicating the vision enhances user participation and commitment (Stone, Aravopoulou, & Aravopoulou, 2021). Moreover, TMS plays a crucial role in facilitating training and user involvement, which are essential for routinisation and system assimilation (Xie, Qiao, & Wang, 2022). However, scholars caution that excessive or poorly directed support may lead to negative outcomes, such as rushed decisions, rigid structures, or undue political influence that impede learning (Elbanna, Sarker, & Rajapakse, 2022). Therefore, while TMS is vital, its effectiveness depends on the timing, quality, and governance of executive involvement.

Empirical evidence consistently shows that TMS is a crucial factor for project and organisational success. Research on ERP and IS projects indicates that strong executive involvement enhances project outcomes, system quality, user satisfaction, and long-term benefits (Butarbutar, Setiawan, & Surjasa, 2023; Boonstra, 2013). Systematic reviews rank TMS among the most important enablers of ERP implementation across various industries and settings (Qiao, Xie, & Wu, 2024). In small and medium enterprises, TMS is especially vital due to their limited managerial expertise and financial resources (Stone et al., 2021). In digital transformation efforts, Kraus et al. (2022) found that firms with strong top-level commitment are more likely

to succeed, especially when combined with effective change management. Recent global surveys reveal organisations are formalising TMS roles, like Chief Transformation Officers, highlighting its ongoing importance in today's rapidly evolving business environment. These findings confirm that TMS is not optional but essential for achieving sustainable organisational performance.

#### **2.1.4 Supply Chain Performance**

SCP is a multidimensional concept that has gained significant academic interest because of its role in linking operational efficiency, customer service, and strategic competitiveness. At its core, SCP shows the ability of supply chains to deliver products and services at the right cost, quality, time, and flexibility while effectively managing resources across the entire network (Beamon, 1999; Mentzer et al., 2001). Early research mainly focused on efficiency, often restricting SCP to costs and inventory considerations (Gunasekaran & Kobu, 2007). However, modern views highlight that SCP includes both effectiveness, the ability to satisfy customers through quality and reliability, and efficiency, the optimal use of assets and costs (Arzu Akyuz & Erman Erkan, 2010; Wong & Wong, 2011). The SCOR model, created by APICS (2017), adopts this broader understanding by defining SCP through five attributes: reliability, responsiveness, agility, cost, and asset management efficiency. This comprehensive approach recognizes that SCP is an integrated concept that reflects not only internal operations but also extends to collaboration among firms and value delivery across supply chain partners (Hofmann & Kotzab, 2010; Huo, Han, & Prajogo, 2016).

The measurement of SCP remains a critical and evolving area of research, with scholars proposing both quantitative and qualitative approaches. Gunasekaran, Patel, and Tirtiroglu (2001) provided one of the most influential frameworks,

categorising measures into strategic, tactical, and operational levels, highlighting the importance of aligning metrics with managerial responsibilities. Typical indicators include order fill rate, cycle time, inventory turnover, and return on assets. Shepherd and Günter (2006) reviewed existing performance measurement systems and found a tendency for firms to prioritise cost-based metrics while neglecting adaptability, collaboration, and resilience, dimensions now seen as vital in turbulent environments. The SCOR model standardises measurement across industries by offering KPIs such as perfect order fulfilment, order cycle time, cash-to-cash cycle time, and upside supply chain flexibility (APICS, 2017). Beyond these objective metrics, many empirical studies employ survey-based perceptual scales that capture firms' self-reported performance relative to competitors. For instance, Flynn, Huo, and Zhao (2010) measured SCP through operational performance (cost, quality, delivery, flexibility) and business performance (market and financial outcomes). This dual use of objective and perceptual metrics addresses the challenge of data availability while enabling cross-industry comparisons (Cuthbertson & Piotrowicz, 2011). More recent research also includes sustainability and resilience dimensions, framing SCP as a "Triple-E" construct that encompasses efficiency, effectiveness, and environmental impact (Dubey, Gunasekaran, & Papadopoulos, 2017; Brandenburg et al., 2019). In this study, SCP is conceptualised as the ability of a firm's supply chain to respond swiftly to market demands while maintaining efficiency in resource use and effectiveness in delivering value to stakeholders.

The significance of SCP in literature lies in its role between supply chain practices and overall firm performance. From the resource-based view (RBV), SCP represents the operational capability that turns supply chain resources into sustained competitive advantage (Barney, 1991; Huo et al., 2016). Empirical studies confirm

that SCP improves as firms adopt practices such as information sharing, supplier partnerships, lean processes, and collaborative planning (Li et al., 2006; Yu, Jacobs, Salisbury, & Enns, 2013). For example, Li et al. (2006) found that SCM practices significantly boost competitive advantage, which then enhances organisational performance. Similarly, Flynn et al. (2010) demonstrated that integration among suppliers, customers, and internal functions results in better SCP outcomes, leading to higher financial and market performance. Lee's (2004) "Triple-A" supply chain framework further emphasises that agility, adaptability, and alignment are crucial drivers of SCP, especially in dynamic markets. This idea has been reinforced in recent contexts like digital supply chains, where agility and real-time responsiveness improve resilience and sustainability (Queiroz et al., 2020; Ivanov, Dolgui, & Sokolov, 2022). Therefore, SCP is vital not only for operational excellence but also for strategic survival in volatile global environments.

## **2.2 Theoretical Review**

A theoretical review is a structured evaluation of key theories and models related to a research phenomenon, providing a foundation for understanding existing knowledge and guiding the development of new insights. It integrates theoretical perspectives, compares their assumptions, and assesses their relevance to the current study, helping to establish the research problem and justify the choice of conceptual framework (Swanson, 2013; Ridley, 2012). Therefore, a theoretical review is essential in ensuring that research is grounded in established ideas while advancing scholarly knowledge. This study will employ the knowledge-based view, dynamic capabilities, and upper echelon theories to explain the variables being examined.

### 2.2.1 Knowledge-Based View Theory

KBV is a theoretical extension of the RBV, which identifies resources as the basis for competitive advantage (Barney, 1991). While the RBV broadly categorises resources as valuable, rare, inimitable, and non-substitutable (VRIN), the KBV, articulated prominently by Grant (1996) and rooted in earlier work by Penrose (1959) and Nelson and Winter (1982), places knowledge at the centre of value creation. It argues that knowledge is not just another resource but the most strategically important one, especially in fast-changing and innovation-driven industries (Spender, 1996). According to this view, firms exist not merely to reduce transaction costs (as in Coase, 1937), but to combine and coordinate the specialised knowledge of individuals to solve complex problems, innovate, and adapt to evolving environments. This makes the KBV highly relevant in today's organisational research, where intangible assets and learning capabilities are key performance differentiators (Alavi & Leidner, 2001; Teece, 2000).

Several core assumptions underpin the KBV and differentiate it from the traditional RBV. First, knowledge is dispersed, specialised, and often tacit, making it difficult to articulate, codify, or transfer (Nonaka & Takeuchi, 1995; Polanyi, 1966). Second, firms are considered institutions that can better integrate and utilise knowledge than market mechanisms due to their capacity for social interaction, routines, and shared understanding (Grant, 1996; Conner & Prahalad, 1996). Third, the combination of knowledge heavily relies on organisational routines, social capital, and communication channels that facilitate knowledge sharing and recombination (Kogut & Zander, 1992; Nahapiet & Ghoshal, 1998). Fourth, knowledge assets are path-dependent and socially complex, meaning they are deeply rooted in firm-specific histories, cultures, and relationships, which makes them difficult to imitate (Winter,

2003; Eisenhardt & Martin, 2000). These assumptions emphasise the relevance of the KBV in explaining sustained competitive advantage through intellectual capabilities rather than physical or financial capital.

Empirical studies have used KBV across various fields and industries. In knowledge management, Gold, Malhotra, and Segars (2001) used the KBV to show that companies with strong knowledge infrastructure and process capabilities perform better in unstable environments. Similarly, Zack, McKeen, and Singh (2009) found that aligning knowledge strategy significantly predicts company performance. In manufacturing, Darroch (2005) showed that knowledge management practices based on KBV principles improve innovation and business outcomes. In healthcare, Choi and Lee (2003) demonstrated how different knowledge management styles affect organisational learning and effectiveness. In IT, Alavi and Leidner (2001) emphasised how knowledge creation and sharing systems influence strategic decision-making. These studies verify the KBV's usefulness in explaining performance differences by focusing on how knowledge is acquired, organised, and used.

Intellectual capital, comprising human capital (skills, experience), structural capital (databases, procedures, technologies), and relational capital (networks, trust, and collaboration), represents the knowledge-based assets that enable organisations to create value (Edvinsson & Malone, 1997; Bontis, 1999). According to the KBV, the firm's ability to capture, integrate, and apply these forms of capital across supply chain processes determines its capacity to innovate, coordinate effectively, and respond to uncertainty (Hult, Ketchen, & Arrfelt, 2007). For example, firms with well-developed human capital can quickly adapt to market changes, while strong structural capital enables real-time information sharing and decision-making. Relational capital fosters trust and collaboration among supply chain partners, which

in turn facilitates the seamless flow of knowledge and joint problem-solving (Li et al., 2006; Wu et al., 2006).

Moreover, the KBV highlights that superior supply chain performance stems not only from physical integration or cost efficiency, but from the strategic use of knowledge embedded in intellectual capital. Organisations that build and leverage knowledge-based capabilities, such as shared platforms, collaborative learning routines, and innovation networks, can reduce lead times, increase responsiveness, and enhance customer satisfaction (Sanders, 2008; Liao et al., 2011). Empirical studies have shown that supply chain learning, enabled by intellectual capital, leads to better forecasting, innovation diffusion, and strategic alignment (Yang, 2012; Hsu & Wang, 2010). Thus, through the lens of the KBV, intellectual capital acts as a dynamic resource that fuels continuous improvement and competitive supply chain performance. In this way, the KBV provides a cohesive theoretical basis for linking intangible knowledge assets to measurable operational outcomes.

### **2.2.2 Dynamic Capability Theory**

DCT emerged as a major advance over the RBV, shifting focus from static resource advantages to organisational adaptability in volatile environments. Developed by Teece, Pisano, and Shuen (1997), the theory argues that maintaining competitiveness requires firms to evolve their capabilities through strategic renewal and reconfiguration. This view introduces a process-driven approach to competitive advantage, where managerial and organisational agility are crucial for aligning firm resources with changing market conditions (Eisenhardt & Martin, 2000). The theory's core idea is that in dynamic markets, the ability to sense and respond to change matters more than simply having valuable but inert resources.

Central to DCT are three interconnected mechanisms that enable organisational adaptation: sensing environmental shifts, seizing new opportunities, and transforming internal structures (Teece, 2018). The sensing mechanism involves scanning the external environment for technological, competitive, and market changes, requiring strong information processing and analytical capabilities. Seizing involves mobilising resources to take advantage of identified opportunities, demanding quick strategic decisions and flexible resource allocation. The transforming component focuses on the ongoing renewal of organisational routines and structures to stay aligned with the changing business ecosystem (Schilke et al., 2018). These mechanisms together create an ongoing cycle of learning and adaptation that sets high-performing firms apart in volatile industries.

Empirical uses of DCT have shown its explanatory power in various business settings. In strategic management research, the theory has revealed how firms handle technological disruptions and industry changes (Helfat & Raubitschek, 2018). Supply chain researchers have used DCT to explain different organisational reactions to disruptions, demonstrating how dynamic capabilities help with both risk reduction and seizing opportunities (Wieland & Durach, 2021). Notably, the theory's application in digital transformation studies explains why some firms are better able to use emerging technologies for competitive gain (Warner & Wäger, 2019). These examples consistently emphasise DCT's importance in understanding how organisations adapt across different levels of analysis.

The theory provides unique insights into the link between supply chain resilience and performance by viewing resilience as an organisational capability rather than a fixed trait. DCT proposes that resilient supply chains develop through ongoing processes of environmental sensing, quick response mobilisation, and structural

adaptation (Pettit et al., 2019). This capability-based approach explains why some organisations sustain performance during disruptions while others struggle, highlighting the importance of learning mechanisms and knowledge integration in building adaptive capacity. Crucially, DCT considers supply chain resilience a dynamic capability that grows through experience and deliberate capability development efforts.

Regarding the relationship between intellectual capital and performance, DCT explains the mediating role of supply chain resilience. The theory suggests that intellectual capital acts as potential energy that needs dynamic capabilities to be turned into performance results (Teece, 2007). Human capital enhances sensing capabilities through employee expertise in risk identification, while structural capital supports seizing opportunities with efficient response systems. Relational capital aids in transformation by providing access to partner resources during recovery efforts. This view improves understanding of how knowledge resources lead to operational advantages, with supply chain resilience serving as the mechanism that activates the value of intellectual capital in turbulent environments.

### **2.2.3 Upper Echelon Theory**

UET was introduced by Hambrick and Mason (1984), signalling a paradigm shift in strategic management by emphasising how top executives' psychological and demographic traits influence organisational outcomes. Rooted in the behavioural theory of the firm (Cyert & March, 1963) and Simon's (1947) concept of bounded rationality, UET contends that complex environments cause executives to rely on their cognitive frames when making strategic choices. The core idea of the theory is that observable managerial traits, such as age, education, functional background, and tenure, serve as indicators of deeper cognitive and value systems that shape strategic

decisions (Hambrick, 2007; Wang et al., 2016). This perspective fundamentally challenges purely rational decision-making models by highlighting the importance of psychological and social factors in influencing organisational behaviour.

The theoretical framework of UET is based on three main principles supported by extensive empirical research. First, organisational environments have inherent ambiguity that allows for multiple valid interpretations (Hambrick & Mason, 1984; Nadkarni & Barr, 2008). Second, executives' cognitive limitations limit their ability to analyse all available information thoroughly (Simon, 1947; Powell et al., 2011). Third, strategic decisions ultimately reflect the values and experiences of the dominant coalition within the organisation (Finkelstein et al., 2009; Carpenter et al., 2004). These principles have been put into practice in many studies that demonstrate how executive traits influence various outcomes, from innovation strategies (Barker & Mueller, 2002) to international expansion decisions (Herrmann & Datta, 2005). The theory's predictive power has been extreme in situations that require complex strategic judgments under uncertainty (Hambrick, 2007; Crossland et al., 2014).

Contemporary applications of UET have greatly expanded its theoretical scope and empirical support. Recent meta-analyses confirm strong links between executive traits and strategic results (Wang et al., 2016; Neely et al., 2020). The theory has been effectively used to explain digital transformation efforts (Klarner & Raisch, 2013; Wrede et al., 2020), corporate social responsibility adoption (Huang & Watson, 2015; Tang et al., 2018), and organisational resilience in crises (Carmeli & Schaubroeck, 2008; Williams et al., 2017). Notably, studies that explore how top management team diversity influences innovation performance (Bantel & Jackson, 1989; Talke et al., 2011; Østergaard et al., 2011) and strategic change processes (Wiersema & Bantel, 1992; Zhang & Rajagopalan, 2010) stand out. These applications consistently

highlight UET's ability to explain how organisations respond to complex, uncertain situations where managerial discretion is high (Hambrick & Finkelstein, 1987; Crossland & Hambrick, 2011).

According to UET, top management support fundamentally shapes how organisational capabilities are developed and deployed (Hambrick & Mason, 1984; Hambrick, 2007). In the context of SCR, top management support determines whether resilience-building initiatives receive adequate resources and strategic priority (Pettit et al., 2019; Wieland & Durach, 2021). Executives with operations or supply chain experience are more likely to recognise SCR's strategic value, thereby strengthening its impact on performance through targeted investments in risk mitigation systems, supplier development programs, and flexible operational structures (Ambulkar et al., 2015; Scholten & Schilder, 2015). Conversely, management teams dominated by short-term financial orientations may underinvest in resilience, viewing it as a cost center rather than a strategic capability, thus weakening the SCR-SCP relationship (Bode et al., 2011; Brandon-Jones et al., 2014). This moderating effect is particularly strong in dynamic environments where executive interpretation of risk signals greatly influences resource allocation decisions (Craighead et al., 2020; Tukamuhabwa et al., 2015). Empirical studies confirm that organisations with strong executive support for SCR initiatives achieve significantly better performance during disruptions compared to those with weak support (Brandon-Jones et al., 2014; Kamalahmadi & Parast, 2016).

### **2.3 Empirical Review**

An empirical review critically examines existing studies based on observed or measured data to identify trends, gaps, and inconsistencies in knowledge. It establishes a foundation for new research, informs methodological choices,

strengthens theoretical and practical contributions, and enhances the credibility of a study by demonstrating awareness of prior evidence (Creswell & Creswell, 2018; Snyder, 2019; Booth et al., 2016). Direct Effect: IC comprising human, structural, and relational assets directly enhances SCP by improving knowledge sharing, regulatory compliance, and collaboration with stakeholders. Firms with strong IC can streamline processes and achieve efficiency gains without necessarily relying on resilience mechanisms. Mediated Effect via Supply Chain Resilience: At the same time, IC contributes to building SCR, which mediates the relationship between IC and SCP. The knowledge and relational networks embedded in IC enable firms to anticipate disruptions, adapt quickly, and maintain continuity of drug supply. Thus, while IC exerts a direct influence on SCP, its impact is also transmitted indirectly through SCR, which transforms intellectual assets into sustained performance under uncertainty.

The reviewed literature demonstrates that IC enhances organisational capabilities and can directly improve SCP. However, empirical evidence also suggests that this relationship is often contingent upon the presence SCR, which mediates the translation of intellectual assets into sustained performance under disruption. While studies highlight the importance of resilience, the specific mediating role of SCR in the pharmaceutical industry remains underexplored, particularly in contexts characterised by regulatory stringency and global supply dependencies. Furthermore, although TMS has been recognised as a critical enabler of innovation and strategic alignment, its moderating influence on the IC–SCR–SCP pathway has received limited empirical attention. This gap justifies the proposed hypotheses, which test both the direct and mediated effects of IC on SCP through SCR and the moderating

role of TMS in amplifying these relationships, thereby sharpening conceptual clarity and extending prior research into the pharmaceutical supply chain domain.

This section analyses the existing empirical literature related to the variables studied in the research, with a specific emphasis on the relationships established by the research model.

### **2.3.1 Intellectual Capital and Supply Chain Performance**

Within the context of operational performance in businesses, Chen and Chen (2021) investigate the advantages and consequences of intellectual capital, big data analytical capability (BDAC), and the combination of these two factors. In order to conduct a statistical analysis, data were collected from 257 senior managers working in Asian companies. The data were acquired using a quantitative technique, and statistical analysis was conducted using confirmatory factor analysis and structural equation modelling. In light of the findings, it was determined that intellectual capital has a beneficial effect on BDAC. Although BDAC enhances internal integration, it does not boost exterior integration. There is a significant improvement in operational performance brought about by both internal and external integrations, with internal integration serving as a major mediator between business data analysis coordination and operational performance.

Zhang et al. (2017) investigate the impact of intellectual capital on product innovation performance and the effects of economic and institutional contexts on this connection. Utilising the knowledge-based view and institutional theory, the researchers formulated and evaluated a model that connects intellectual capital, supplier knowledge integration, supply chain adaptability, and product innovation performance. Data were gathered from 300 Chinese firms and 200 Indian manufacturers, with analysis performed using multiple-group structural equation

modelling. The results indicate that intellectual capital improves product innovation performance both directly and indirectly through supplier knowledge integration; however, the impacts vary across different situations. In China, the influence of intellectual capital on product innovation performance was more pronounced, while in India, intellectual capital improved innovation performance indirectly by incorporating supplier expertise. Moreover, in both China and India, the integration of supplier expertise indirectly enhanced product innovation performance via supply chain adaptation.

In their study, Mubarik et al. (2021) investigate whether companies with higher levels of intellectual capital demonstrate superior performance in supply chain resilience compared to those with lower levels. Furthermore, they investigate the direct and indirect impacts of intellectual capital, which includes human, relational, and structural capital, on supply chain resilience through the process of supply chain learning. During the COVID-19 pandemic, data were collected from more than 159 processed food companies by means of a questionnaire that did not allow for open-ended responses. For the purpose of evaluating the hypotheses, partial least squares structural equation modelling, partial least squares multi-group analysis, and one-way analysis of variance were utilised. Supply chain learning was found to be a major mediating component in boosting the impacts of intellectual capital on resilience, according to the findings, which suggested that all aspects of intellectual capital had a significant impact on both supply chain learning and supply chain resilience. According to the findings, businesses with higher levels of intellectual capital demonstrated significantly higher levels of supply chain resilience compared to those with lower levels. The findings also revealed that structural capital was regarded as the most important factor in enhancing resilience.

Rehman et al. (2021) examines the correlation between intellectual capital and the creative performance of businesses. They emphasise the significance of management control systems and commercial strategies as mediators, together with the moderating influence of inventive skills. Data were gathered from managers of small and medium-sized enterprises via a structured questionnaire, yielding 415 valid replies from a total of 1,152 submissions. Consequently, structural equation modelling was employed to evaluate the hypotheses. The findings suggest that intellectual capital has a significant impact on management control systems, corporate strategies, and inventive performance. Moreover, it was shown that management control systems, corporate strategies, and innovation capabilities significantly enhanced creative performance. The study's findings indicated that the relationship between intellectual capital and inventive performance is affected by management control systems and corporate strategies. Similarly, innovation capabilities influence this relationship, so reinforcing the association between intellectual capital and the outcomes of innovation.

Similarly, Wang et al. (2021) analyse the influence that intellectual capital has on the performance of corporations, with a particular emphasis on the mediating impacts that innovation speed and quality could have. Drawing on insights from the existing body of literature on intellectual capital and innovation, the researchers developed a conceptual model and empirically tested it using structural equation modeling with data from 328 high-technology businesses in China. The findings indicate that human capital, structural capital, and relational capital all have a favourable association with the rate and quality of innovation, which ultimately leads to an improvement in both operational and financial performance. On the other hand, the effect of relational capital is only partially mediated, whereas the speed and

quality of innovation totally mediates the influence of human and structural capital on financial performance. Similarly, the rate of innovation and the quality of the innovations that are introduced act as a moderating factor in the relationship between intellectual capital and operational performance.

Rehman et al. (2021) investigates the impact of intellectual capital and knowledge management on competitive advantage in Pakistan's manufacturing industry. They find that innovativeness serves as a mediator, and the differentiation strategy acts as a moderator. Purposive random sampling was employed to collect data from 387 manufacturing companies using questionnaires. The postulated relationships were then tested using partial least squares structural equation modelling in conjunction with multiple regression analysis. Both intellectual capital and knowledge management were found to have a considerable impact on innovativeness and competitive advantage, as demonstrated by the findings. Furthermore, it was discovered that innovativeness not only directly increases competitive advantage but also acts as a mediator in the link between intellectual capital, knowledge management, and competitive advantage. Furthermore, the differentiation strategy significantly increased the connection between innovativeness and competitive advantage. This served to emphasize the significance of combining organizational knowledge, innovation, and business strategies to generate a sustainable competitive advantage.

Within Pakistan's manufacturing sector, Ali et al. (2021) investigate the influence of green intellectual capital on the adoption of green innovation. The researchers employed multiple regression analysis to investigate the claimed associations, using data from 235 companies involved in the textile, chemical, pharmaceutical, and steel industries. Green relational capital, despite having a positive

association with green innovation, did not demonstrate a significant effect, according to the findings. Green human capital and green structural capital, on the other hand, play a significant role in enhancing the adoption of green innovation. In addition to highlighting the critical significance of cultivating both the human and structural aspects of green intellectual capital to encourage environmentally responsible innovation practices in the manufacturing sector, these findings also suggest that relational networks may require more robust institutional or strategic support to make meaningful contributions.

### **2.3.2 Supply Chain Resilience and Supply Chain Performance**

Within the context of manufacturing companies in Ghana, Hamidu et al. (2023) investigate how supply chain disruptions, more especially supply disruption, catastrophic disruption, and infrastructure disruption, modulate the relationship between supply chain resilience and supply chain performance. Partial Least Squares Structural Equation Modelling was used to investigate the associations between the variables after data were gathered from 345 businesses located within the Accra metropolitan area. Additionally, a quantitative method and an explanatory design were utilised. A considerable improvement in supply chain performance was found to be associated with supply chain resilience, and the findings also demonstrated that overall supply chain interruptions had a beneficial moderating effect on this relationship. On the other hand, it was found that catastrophic interruptions had a negative impact on the relationship between resilience and performance, suggesting that different types of disruptions have distinct effects. Although large disruptions may mitigate the favorable effects that resilience has on performance, these findings highlight the importance of developing resilient capabilities.

Li et al. (2017) investigate how three essential aspects of supply chain resilience, preparedness, alertness, and agility, contribute to the improvement of enterprises' financial performance in environments characterized by fluctuations in business conditions. To evaluate the hypothesized effects of resilience dimensions on financial results, survey data were collected from 77 different companies. Measuring scales were constructed and evaluated for each of the resilience dimensions. Having readiness, which is a proactive capability, has a stronger benefit than the reactive capabilities of alertness and agility, according to the findings, which revealed that all three aspects of supply chain resilience considerably increase financial performance. When compared to relying exclusively on reactive solutions, these findings underscore the importance of focusing on proactive resilience strategies. These techniques enable businesses to anticipate and prepare for disruptions, ultimately leading to improved financial outcomes.

Asamoah et al. (2020) examine the factors and effects of supply chain resilience in small and medium-sized enterprises. They underscore the importance of social network interactions as a forerunner and customer-centric performance as an outcome of their findings. The study model was built and tested using survey data from 110 small and medium-sized firms (SMEs) in Ghana, employing the resource-based approach and social capital frameworks. The findings indicate a notable enhancement in supply chain resilience resulting from engagement with both internal and external social networks, leading to improved customer-oriented performance. Moreover, it was found that supply chain resilience can directly enhance customer-oriented performance and act as a mediator in the relationship between social network ties and performance outcomes. These findings underscore the importance of utilizing

social capital to enhance resilience and optimize customer-centric outcomes in small and medium-sized enterprises (SMEs).

Ruel and Baz (2021) examine the influence of supply chain catastrophe preparedness on supply chain resilience and robustness, and how these capabilities subsequently affect enterprises' financial performance during the COVID-19 pandemic. Utilizing the dynamic capacities perspective and the theory of organizational readiness for change, the researchers developed a theoretical model. They empirically verified it through structural equation modeling with data from 398 French firms. The findings validated that catastrophe preparedness is essential for fostering resilience and robustness in supply chains. Furthermore, supply chain resilience was found to enhance financial performance substantially; however, the impact of robustness on financial outcomes was not corroborated. These findings underscore the necessity of prioritising catastrophe preparedness and resilience-building methods to enhance economic performance during crises, while suggesting that robustness alone may not yield clear financial advantages.

Norman (2024) examines the factors that determine supply chain resilience, as well as the role that resilience plays in mediating the connection between these factors and supply chain performance. Using a quantitative research methodology, data were collected through questionnaires administered to a sample of 129 respondents, as determined by the G\*power program. The data were then processed to evaluate the claimed associations. According to the findings, artificial intelligence in the supply chain, adaptive capabilities, and collaboration all contribute to a significant and favourable improvement in supply chain performance and resilience. Furthermore, it was demonstrated that supply chain resilience has a favourable influence on supply chain performance, providing further evidence that it plays a mediating role. The

study highlights the value of integrating resilience and dynamic capabilities as strategies to improve the performance of companies and supply chains. It also provides organisations that are involved in manufacturing with practical insights and enriches the existing literature on resilience-driven performance.

Stentoft et al. (2023) study how business performance is affected by supply chain resilience and absorptive capacity, notably in terms of buffering the effects of environmental shocks such as COVID-19). Data collected from 174 Danish enterprises operating in the manufacturing, transportation, and logistics industries were analyzed through a questionnaire survey. Based on the study's findings, it can be concluded that both resilience and absorptive capacity have a favourable correlation with a firm's performance. However, the relationship between supply chain resilience and performance is partially mediated by crisis mitigation, but this is not the case for absorptive capacity. This is because crisis mitigation is something that can be mitigated. The findings of this study demonstrate that, although both talents are essential, supply chain resilience has a greater direct influence on crisis response and enhances the company's performance.

Altay et al. (2018) examine the impact of supply chain agility and resilience on performance within humanitarian supply chains, additionally exploring the moderating influence of organisational culture both pre-disaster and post-disaster phases. Rooted on the dynamic capability perspective, the research examined its hypotheses utilising partial least squares analysis on data gathered from 335 organisations in India via structured questionnaires. The results indicated that both supply chain agility and resilience substantially improve pre-disaster performance, with organisational control orientation amplifying the impact of resilience but not agility. In the post-disaster phase, supply chain resilience greatly enhanced

performance, whereas agility exhibited little impact, and a flexible cultural orientation favourably mitigated the associations between both capabilities and post-disaster performance. These findings underscore the distinct effects of agility and resilience throughout crisis phases and accentuate the influence of organisational culture on their efficacy.

Sadia et al. (2024) examines the combined impact of information technology and supply chain resilience on supply chain performance, emphasising the mediating influence of social, environmental, and economic sustainability elements within a developing nation framework. Data were gathered from 321 garment firms in Bangladesh, utilizing structural equation modelling to evaluate the given assumptions. The results indicated that information technology significantly enhances supply chain resilience; however, resilience alone does not immediately improve supply chain performance when sustainability issues are taken into account. Resilience was found to positively impact all three elements of sustainability, which collectively fully mediated the relationship between resilience and performance. The results underscore the essential importance of incorporating sustainability into resilience and technology initiatives, asserting that the trinity of social, environmental, and economic sustainability serves as the primary mechanism by which resilience enhances supply chain performance.

### **2.3.3 Mediating Role of Supply Chain Resilience in the Nexus Between Intellectual Capital and Supply Chain Performance**

Qader et al. (2022) investigates the impact of Industry 4.0 technologies on supply chain performance, additionally analysing the mediating influence of supply chain resilience and the moderating effect of supply chain visibility within this context. The study employed information processing theory and the resource-based

view to gather cross-sectional data from 458 respondents employed in the food, beverage, and pharmaceutical sectors via a closed-ended questionnaire. The data were analyzed using partial least squares structural equation modeling. The results indicate that Industry 4.0 technologies have a significant and positive impact on supply chain performance, with supply chain resilience serving as a critical mediating factor in this relationship. Furthermore, supply chain visibility was identified as a moderating factor in the relationship between Industry 4.0 and supply chain resilience, thereby enhancing the beneficial impact of technological adoption on resilience. This study demonstrates that the incorporation of Industry 4.0 technologies enhances supply chain resilience and performance, underscoring the critical role of visibility in utilising digital transformation for competitive advantage.

Bahrami et al. (2022) examines the influence of big data analytics capabilities on supply chain performance, highlighting the mediating roles of supply chain resilience and innovation. A cross-sectional design was utilised to gather data through survey responses from 187 individuals, which were analysed using partial least squares in SmartPLS3 to assess the given hypotheses. The results demonstrate that big data analytics skills enhance supply chain performance indirectly by strengthening resilience and fostering innovation inside the supply chain. This underscores the need to employ data-driven capabilities to enhance operational efficiency and foster adaptable and innovative supply chain strategies that yield superior performance outcomes.

Haq and Aslam (2023) examine the role of entrepreneurial leadership as a dynamic capability in enhancing supply chain performance by fostering supply network resilience, and they assess the moderating effect of supply chain orientation within this framework. The research, grounded in the dynamic capability's

framework, employed a survey methodology to collect data from manufacturing enterprises in Pakistan and assessed the proposed model using structural equation modelling. The findings supported the proposed theory, indicating that supply chain resilience mediates the relationship between entrepreneurial leadership and supply chain performance, suggesting that leadership enhances performance primarily by promoting resilience. The findings confirmed that supply chain orientation strengthens the relationship between entrepreneurial leadership and supply chain resilience, emphasising the importance of a collaborative supply chain approach in optimising leadership's impact on resilience and overall performance.

Asamoah et al. (2020) investigate the origins and effects of supply chain resilience in small and medium firms, emphasising the significance of social network interactions as a precursor and customer-oriented performance as a result. Utilising the resource-based view and social capital frameworks, the study created and evaluated a research model based on survey data from 110 SMEs in Ghana. The results indicated that both external and internal social network interactions substantially improve supply chain resilience, thus enhancing customer-oriented performance. Furthermore, supply chain resilience was identified as a direct enhancer of customer-oriented performance and as a mediator in the interaction between social network connections and performance results. The results underscore the strategic significance of utilising social capital to enhance resilience and optimise customer-centric outcomes in SMEs.

Seif and Jafari (2025) examine the influence of analytics capabilities on supply chain resilience and organisational performance, as well as the moderating role of supply chain integration. Utilizing the Dynamic Capability View and Contingency Theory, the research examined data from 165 Swedish companies across the

industrial, wholesale, and retail sectors. The findings indicated that supply chain resilience mediates the relationship between analytics competence and company performance, implying that analytics predominantly enhance outcomes by bolstering resilience. Notably, supply chain integration was observed to have an adverse effect on this relationship, contradicting the prevailing notion that integration invariably enhances performance. The findings suggest that although investment in advanced analytics is essential for fostering resilience and improving performance, excessive integration may diminish the advantages of analytics and resilience, particularly in intricate or disruptive contexts.

Through the lens of the resource-based view, Salam and Bajaba (2023) investigate the relationship between marketing and supply chain management alignment, supply chain resilience, and firm performance. Additionally, they investigate the role that absorptive capacity plays in shaping these connections. To conduct the study, hierarchical multiple regression and the PROCESS macro in SPSS 27 were utilized. The survey data were collected from 133 companies operating in the fast-moving consumer products sector in Saudi Arabia. The findings demonstrated that strategic alignment between marketing and supply chain management has a considerable and favourable impact on the resilience of supply chains, which in turn leads to an indirect improvement in the company's performance. Additionally, the presence of resilience in the supply chain acts as a mediator between alignment and performance. Additionally, it was found that absorptive capacity can substitute for the effect that supply chain resilience has on performance. This finding suggests that businesses lacking resilience can nevertheless achieve comparable results by utilizing absorptive capacity. Both mediation and moderation effects are highlighted in this

study, with a particular emphasis placed on the complementary roles that alignment, resilience, and absorptive capacity play in improving company performance.

#### **2.3.4 Moderating Role of Top Management Support in the Nexus between Supply Chain Resilience and Supply Chain Performance**

Lee et al. (2017) examines the connections between human resource development efforts, top management support, and employees' attitudes, specifically job satisfaction and organisational commitment, in the Korean context. Using data from the Korean Human Capital Corporate Panel survey, the researchers analysed 3,899 responses from 159 large companies with hierarchical multiple regression and regression-based path analysis. The results showed that human resource development efforts positively affected organisational commitment indirectly through job satisfaction, confirming its mediating role. Furthermore, job satisfaction was found to have a moderated mediation effect, strengthening the link between human resource development efforts and organisational commitment when combined with top management support. Additionally, top management support was shown to influence the relationship between human resource development efforts and employee attitudes, with higher levels of support enhancing both job satisfaction and organisational commitment. These findings underscore the importance of aligning human resource initiatives with leadership support to foster positive employee outcomes.

Chatterjee et al. (2023) investigates the impact of micro-level corporate social responsibility initiatives on a company's sustainability, while also examining the roles that CSR performance and top management support play as mediators in this relationship. The researchers built a conceptual model by drawing on previous literature and theoretical frameworks. This model was then evaluated using structural equation modelling with data from 327 respondents who were involved in corporate

social responsibility activities in Indian companies. The research revealed that efforts at the micro-level of corporate social responsibility (CSR) considerably increase CSR performance, which in turn adds to the sustainability of the organisation. Furthermore, it was found that the backing of senior management had a substantial moderating influence, which strengthened the connection between CSR performance and sustainability outcomes. The findings underscore the importance of aligning corporate social responsibility (CSR) initiatives with leadership support to enhance the effectiveness of these practices in achieving long-term sustainability.

Fareed and Su (2022) investigate the impact of project governance and top management support on project performance in public sector projects, and test whether top management support moderates the relationship between governance and performance, utilising resource dependence theory. A quantitative deductive approach was used, with data collected through structured questionnaires from 346 project managers, team members, and stakeholders. The results showed that both project governance and top management support have a significant and positive effect on project performance. Additionally, the study found that top management support acts as a quasi-moderator, strengthening the link between project governance and performance. These findings emphasise the need for strong governance structures paired with leadership support to improve performance outcomes in public sector projects.

Xue et al. (2024) investigated the relationship between organizational factors and the implementation of emerging information and construction management technologies by professionals in the architecture, engineering, and construction industry. The purpose was to examine how elements such as corporate norms, technological infrastructure, and management support influence technology adoption

and to identify the underlying mechanisms through which these relationships occur. Data were collected through an online questionnaire, yielding 507 valid responses. The researchers employed Mplus 8.0 software to conduct path analysis and bootstrapping techniques. The findings revealed that corporate normative pressure and the availability of supportive technological conditions directly enhanced professionals' implementation of emerging construction technologies. Additionally, perceived ease of use served as a mediating factor between technological conditions and implementation outcomes, while support from top management played a moderating role by strengthening the influence of organizational elements.

Chatterjee et al. (2023) investigates the connection between green human resource management practices and organisational sustainability, additionally analysing the moderating influence of top management team support. This study seeks to elucidate the conditions that enable green human resource strategies to effectively contribute to sustainability outcomes, acknowledging the mixed results reported in prior research on this topic. The researchers utilised established theoretical frameworks to create a conceptual model, which was subsequently tested through partial least squares structural equation modelling. Data were gathered from 372 human resource managers representing diverse organisations. The results indicated a positive correlation between green human resource management and sustainability, with the effect notably amplified in the presence of support from the top management team. The study found a significant positive association between improved sustainability practices and enhanced organisational performance, underscoring the strategic importance of integrating environmental objectives into human resource functions.

Chatterjee et al. (2024) investigates the impact of deep learning technological capabilities on smart manufacturing systems, emphasising the moderating influences of technology turbulence and support from senior management teams. The study recognized the increasing significance of deep learning in improving predictive maintenance, quality control, and anomaly detection, and it filled a gap in the literature regarding its impact on the productivity and sustainability of manufacturing companies. A conceptual model was constructed and evaluated with partial least squares structural equation modelling, based on established ideas and previous research. Data were collected from 473 people employed in manufacturing companies. The results indicated that deep learning technology substantially enhances the efficacy of smart manufacturing systems. Moreover, the findings indicated that both the support from the top management team and the degree of technological volatility positively modulate this link, amplifying the effect of deep learning on operational outcomes.

Shee et al. (2018) investigated the influence of cloud-based technology on supply chain integration and its resultant effects on supply chain performance and corporate sustainability, framed by the resource-based perspective. The research defined supply chain integration as a multidimensional construct, including supplier, internal, and customer integration, and examined how these dimensions, facilitated by cloud technology, improve performance outcomes. Data were gathered through a cross-sectional survey of 105 Australian retail enterprises, and structural equation modeling was utilized to examine the hypothesized links. The results demonstrated that cloud-based technology markedly improves supply chain integration, hence positively affecting supply chain performance and promoting business sustainability. The study also revealed that top management support influences the relationship

between supplier and internal integration, as well as performance, but not that between customer integration and performance. These findings underscore the strategic significance of cloud technology and management assistance in enhancing supply chain performance.

Uddin and Jayaram (2025) examined how external pressures, specifically buyer and competition pressures, drive supplier implementation of manufacturing automation, and how this implementation affects workforce upskilling, with a focus on the moderating role of top management support. Using stakeholder theory and the resource-based view, the study employed structural equation modeling and hierarchical regression analysis to analyze data collected from a close-ended questionnaire administered to 201 readymade garment firms in Bangladesh. The results showed that both buyer and competition pressures significantly influence suppliers' adoption of manufacturing automation. Additionally, the implementation of automation was found to have a positive impact on workforce upskilling, highlighting its strategic potential for human capital development. The study also revealed that top management support enhances the effect of buyer and competition pressures on automation adoption but does not significantly moderate the relationship between automation implementation and workforce skill development. These findings highlight the intricate relationships between external stakeholder demands, internal strategic responses, and organizational capacity development.

Fareed et al. (2023) investigates the connection between transformational leadership and project success, with a particular emphasis on the moderating influence of top management support. A post-positivist philosophical framework guided this study, which employed a cross-sectional, time-lagged survey design to collect quantitative data from 273 project managers, team members, and stakeholders in

Pakistan's public sector. The study used structured questionnaires and utilised factor analysis and hierarchical regression for data analysis. The results indicated that both transformational leadership and top management support have a significant and positive influence on project success, independently. The findings notably validated that support from top management strengthens the connection between transformational leadership and project success. The results underscore the necessity of synchronising leadership approaches with the frameworks of organisational support to enhance project results.

#### **2.4 Research Gaps**

Existing literature confirms that intellectual capital, comprising human, structural, and relational components, plays a crucial role in driving various organizational outcomes, such as innovation (Zhang et al., 2017; Rehman et al., 2021), competitive advantage (Rehman et al., 2021), supply chain resilience (Mubarik et al., 2021), knowledge integration (Zhang et al., 2017), green innovation (Ali et al., 2021), and operational and financial performance (Wang et al., 2021). Chen and Chen (2021) further argue that intellectual capital enhances big data analytical capabilities, which in turn improve internal supply chain integration. However, while these studies confirm the strategic value of intellectual capital in general organizational and manufacturing contexts, few have directly examined its influence on supply chain performance, particularly in pharmaceutical supply chains, where supply reliability, regulatory compliance, and agility are essential. Additionally, most current research focuses on developed or Asian regions (e.g., China, India, Pakistan), with little to no attention given to Sub-Saharan Africa, where pharmaceutical systems face persistent supply chain challenges, including frequent stock-outs, long lead times, and infrastructural inefficiencies. This geographic and sectoral gap limits the applicability

of previous findings (Mubarik et al., 2021; Rehman et al., 2021; Wang et al., 2021) and the need to examine how intellectual capital impacts supply chain performance in Ghana's pharmaceutical industry, where human and knowledge resources could be used to address systemic deficiencies.

Similarly, supply chain resilience has become a crucial capability in reducing the negative effects of disruptions and enhancing organizational performance (Li et al., 2017; Hamidu et al., 2023; Norman, 2024; Stentoft et al., 2023). Its dimensions, preparedness, agility, alertness, and adaptive ability, have been associated with financial (Li et al., 2017; Ruel & Baz, 2021), customer-focused (Asamoah et al., 2020), and sustainability-related performance outcomes (Sadia et al., 2024). However, most studies focus on general manufacturing or consumer goods supply chains in developed countries (Norman, 2024; Altay et al., 2018), overlooking the specific resilience needs of pharmaceutical supply chains, particularly in low-resource settings. Pharmaceutical supply chains are vulnerable to infrastructure failures, regulatory obstacles, and fluctuations in demand, making resilience essential for reliable service delivery (Hamidu et al., 2023). While Asamoah et al. (2020) examined resilience in Ghanaian SMEs, the pharmaceutical sector remains critically under-researched despite its societal importance. Additionally, studies such as those by Sadia et al. (2024) and Bahrami et al. (2022) suggest that resilience may not directly impact performance unless it is mediated through sustainability or innovation. Therefore, an analysis tailored to the context is urgently needed to understand how resilience affects performance in Ghana's pharmaceutical supply chains, specifically to assess whether resilience directly supports supply continuity, responsiveness, and compliance within this vital sector.

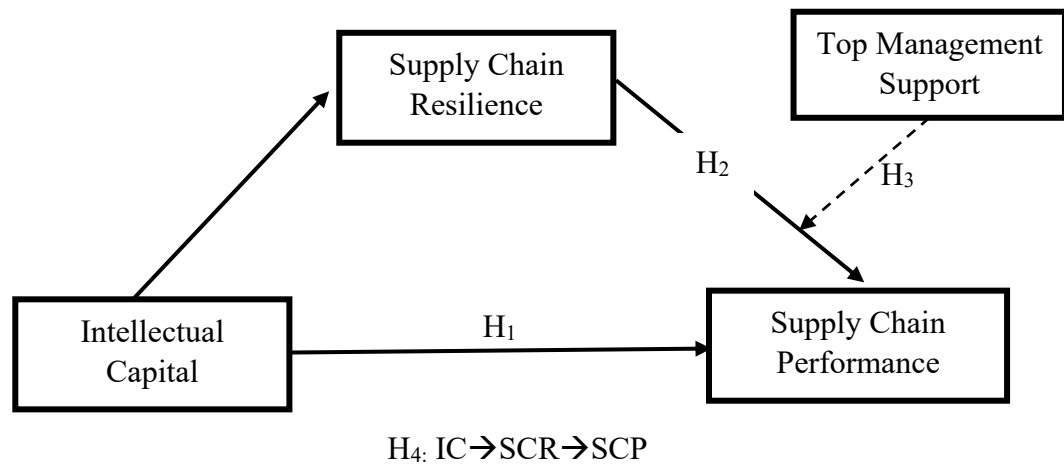
A growing number of studies have begun to explore resilience as a mediating capability through which organizational competencies affect supply chain performance (Bahrami et al., 2022; Qader et al., 2022; Haq & Aslam, 2023; Seif & Jafari, 2025). These works suggest that technological and leadership capabilities improve supply chain performance indirectly through resilience. For example, Qader et al. (2022) demonstrate that Industry 4.0 technologies enhance supply chain performance through resilience, while Bahrami et al. (2022) show that big data analytics capabilities improve performance through resilience and innovation. However, no known study directly examines how intellectual capital translates into improved supply chain performance through resilience mechanisms, despite theoretical signals from resource-based and dynamic capability views that such a pathway is likely (Wang et al., 2021; Rehman et al., 2021). Mubarik et al. (2021) provides preliminary evidence that intellectual capital influences resilience through learning, but they do not assess its downstream effect on performance. Furthermore, Seif and Jafari (2025) caution that excessive integration may weaken the analytics–resilience–performance chain, pointing to the need for careful contextual validation. Thus, there is a critical gap in understanding whether intellectual capital fosters resilience, which then enhances supply chain performance, particularly in pharmaceutical firms that operate under tight regulatory, logistical, and market constraints. Investigating this mediating role will provide fresh theoretical insights and help Ghanaian pharmaceutical firms strategically deploy their knowledge assets for resilient and high-performing supply chains.

Although several studies emphasize the importance of top management support in facilitating organizational success (Fareed & Su, 2022; Fareed et al., 2023; Chatterjee et al., 2023; Xue et al., 2024), its role as a moderator between supply chain

resilience and performance has not been adequately explored. Chatterjee et al. (2023) found that top management team support enhances the effect of green human resource management on sustainability, while Fareed et al. (2023) demonstrated that it strengthens the relationship between transformational leadership and project success. In the context of emerging technologies, Xue et al. (2024) and Chatterjee et al. (2024) confirm that leadership backing amplifies implementation outcomes. Nevertheless, within the supply chain literature, especially in relation to resilience capabilities, this moderating role remains fragmented. Although She et al. (2018) and Uddin and Jayaram (2025) discuss the influence of top management on integration and automation decisions, their impact on resilience-led performance outcomes is rarely tested, particularly in environments like Ghana, where leadership commitment often compensates for institutional or infrastructural gaps. Given that resilience-building requires strategic resource allocation, cross-functional coordination, and long-term planning, all of which are management-driven, the absence of empirical testing of top management support in the resilience-performance relationship in pharmaceutical supply chains presents a vital research gap. Addressing this can reveal the boundary conditions under which resilience initiatives are most effective, especially in the face of chronic disruptions and regulatory volatility.

## **2.5 Conceptual Framework and Hypothesis Development**

A conceptual framework was proposed to examine the relationships between intellectual capital, supply chain resilience, top management support, and supply chain performance. The study used four variables: an independent variable (intellectual), a mediator (supply chain resilience), a moderator (top management support), and a dependent variable (supply chain performance). The tenets of the KBV, DCT, and UET theories underpinned the relationships between these variables.



**Figure 2.1: Conceptual Framework**

### 2.5.1 Intellectual Capital and Supply Chain Performance

The KBV emphasizes knowledge as the most strategically important resource for a company's success, especially in sectors that are knowledge-intensive and constantly changing (Grant, 1996; Spender, 1996). Intellectual capital, which includes human capital (employee skills), structural capital (systems, processes, and databases), and relational capital (networks and trust), represents the collective knowledge stored within an organization (Edvinsson & Malone, 1997; Bontis, 1999). According to KBV, these intangible assets enhance supply chain performance by fostering innovation, improving coordination, and increasing responsiveness (Hult, Ketchen, & Arrfelt, 2007; Alavi & Leidner, 2001). Human capital supports effective risk assessment and decision-making; structural capital guarantees efficient operations and knowledge documentation; and relational capital facilitates smooth collaboration with supply chain partners (Nahapiet & Ghoshal, 1998; Wu et al., 2006). Consequently, companies that strategically utilize intellectual capital can achieve shorter lead times, greater operational flexibility, and increased customer satisfaction, which are key measures of supply chain performance (Sanders, 2008; Liao et al., 2011).

Although the positive link between intellectual capital and organizational performance has been well documented across various sectors, such as manufacturing (Chen & Chen, 2021), innovation management (Zhang et al., 2017), and SMEs (Rehman et al., 2021), its specific influence on supply chain performance remains underexplored, especially within pharmaceutical supply chains in emerging markets. Studies by Wang et al. (2021) and Mubarik et al. (2021) confirm that intellectual capital enhances innovation and resilience, which in turn support performance. However, these insights mainly come from Asian and industrialized contexts. Considering the operational fragilities and compliance requirements in Ghana's pharmaceutical sector, intellectual capital could be a crucial factor in improving supply chain operations by reducing stock-outs, fostering supplier collaboration, and responding effectively to regulatory changes. Still, no empirical study has tested this relationship in such a setting, highlighting a significant research gap. Hence, this study hypothesises that;

H1: Intellectual capital has a positive impact on supply chain performance in Ghana's pharmaceutical industry.

### **2.5.2 Supply Chain Resilience and Supply Chain Performance**

Supply chain resilience is viewed as a dynamic capability that enables firms to anticipate, respond to, and recover from disruptions (Pettit et al., 2019; Teece, 2007). Resilience encompasses preparedness, agility, and adaptive capacity, elements essential for maintaining supply continuity and performance amid environmental shocks (Wieland & Durach, 2021). Especially in the pharmaceutical sector, where disruptions can jeopardise product availability and public health, resilient supply chains are vital for maintaining high service levels, regulatory compliance, and operational efficiency (Scholten & Schilder, 2015; Brandon-Jones et al., 2014).

Empirical studies consistently demonstrate that supply chain resilience is positively linked to performance outcomes. Li et al. (2017) found that proactive resilience capabilities improve financial results, while Hamidu et al. (2023) show that resilience enhances performance even in the face of infrastructure and catastrophic disruptions. Similarly, Norman (2024) and Stentoft et al. (2023) argue that resilience improves responsiveness, customer satisfaction, and profitability. However, most of this research focuses on general manufacturing, logistics, or humanitarian supply chains, with limited attention to pharmaceutical contexts, particularly in Sub-Saharan Africa. The Ghanaian pharmaceutical industry, which frequently faces supply delays, inventory shortages, and infrastructural constraints, urgently requires resilience-focused strategies to ensure uninterrupted medicine supply. Despite this need, empirical evidence on how resilience affects supply chain performance in this sector remains scarce. Hence, this study hypothesises that;

H2: Supply chain resilience positively enhances supply chain performance in Ghana's pharmaceutical industry.

### **2.5.3 Moderating Role of Top Management Support**

The UET suggests that strategic decisions and resource allocations mirror the cognitive values and interpretations of top executives (Hambrick & Mason, 1984; Hambrick, 2007). In supply chain resilience, top management support significantly influences the level of focus and resources dedicated to resilience-building initiatives, such as risk assessments, training, redundancy strategies, and supplier collaboration (Pettit et al., 2019; Wieland & Durach, 2021). Managers with backgrounds in operations or risk management are more likely to view resilience as a strategic priority, thereby enhancing its impact on performance (Scholten & Schilder, 2015; Ambulkar et al., 2015). Conversely, executives with short-term or financially focused

orientations may underinvest in resilience, limiting its potential benefits (Brandon-Jones et al., 2014; Bode et al., 2011). Therefore, top management support can act as a boundary condition that influences how effectively resilience capabilities are converted into performance outcomes.

Empirical studies support this theoretical perspective. Chatterjee et al. (2023) find that top management support enhances the impact of green HRM on sustainability outcomes. Fareed & Su (2022) and Fareed et al. (2023) show that such support strengthens the link between governance structures and project performance. In the supply chain field, Uddin & Jayaram (2025) and Shee et al. (2018) demonstrate that executive backing influences the adoption and effectiveness of automation and integration strategies. Despite this evidence, the moderating role of top management support in the resilience–performance relationship remains relatively unexplored, particularly in regulated and disruption-prone sectors such as pharmaceuticals. Given the strategic importance of resilience in Ghana’s pharmaceutical supply chains, where operational vulnerability is increased by policy and infrastructure issues. This study hypothesises that;

H3: Top management support moderates the nexus between supply chain resilience and supply chain performance (H3).

#### **2.5.4 Mediating Role of Supply Chain Resilience**

While the KBV argues that knowledge resources, such as intellectual capital, create value through coordination and learning (Grant, 1996; Alavi & Leidner, 2001), DCT emphasizes that knowledge alone is insufficient unless it is translated into adaptive capabilities, like resilience (Teece, 2007; Eisenhardt & Martin, 2000). Supply chain resilience functions as a dynamic capability that enables firms to transform intellectual resources into actionable outcomes. Human capital enhances

risk sensing and forecasting, structural capital provides codified systems for swift responses, and relational capital facilitates collective recovery through trusted partnerships (Ambulkar, Blackhurst, & Grawe, 2015; Pettit et al., 2019). Therefore, supply chain resilience may serve as the mechanism through which intellectual capital enhances performance by enabling firms to remain stable and responsive in volatile environments.

Although prior studies have highlighted the individual influence of intellectual capital (Wang et al., 2021; Rehman et al., 2021) and resilience (Hamidu et al., 2023; Ruel & Baz, 2021) on performance, limited research has examined resilience as a mediator. Studies by Bahrami et al. (2022) and Qader et al. (2022) demonstrate that resilience mediates the effect of big data and Industry 4.0 on supply chain performance, while Haq & Aslam (2023) show a similar pathway for entrepreneurial leadership. However, no study to date has tested whether intellectual capital enhances performance through resilience, despite theoretical support from both KBV and DCT. In high-risk sectors, such as pharmaceuticals, particularly in Ghana, where supply chains are often disrupted, resilience is crucial in translating knowledge assets into tangible supply chain outcomes. Hence, this study hypothesises that;

H4: supply chain resilience positively mediates the nexus between intellectual capital and supply chain performance in Ghana's pharmaceutical industry (H4).

## **2.6 Chapter Summary**

This chapter provided a well-structured and comprehensive foundation for the study by presenting a theoretical review, conceptual review, empirical review, identification of research gaps, and the development of the conceptual framework and hypotheses. The theoretical review examined three relevant theories, KBV, DCT, and UET, to explain how intellectual capital, supply chain resilience, and top management

support influence supply chain performance. The conceptual review clarified the key constructs and their dimensions, ensuring a clear understanding of how they interact within the study's context. The empirical review summarized findings from recent studies across various industries, identifying methodological gaps and contextual limitations, particularly the lack of research in Ghana's pharmaceutical sector. The chapter identified specific research gaps and established the justification for the current study. It concluded with the development of a conceptual framework and the formulation of hypotheses.



## CHAPTER THREE

### RESEARCH METHODS

#### 3.0 Introduction

This study examines the effect of intellectual capital on supply chain performance, with a focus on the mediating role of resilience and the moderating influence of top management support within the pharmaceutical industry. Chapter Three describes the methodological framework used to investigate these relationships. It includes the research philosophy and design, the target population, sample size, and sampling methods. The chapter also explains the data collection techniques, measurement tools, and analytical procedures employed. Additionally, it addresses considerations related to reliability, validity, and ethical research practices. The chapter ends with a summary of the main methodological choices that support the study.

#### 3.1 Research Philosophy

Research philosophy refers to the set of beliefs and assumptions that shape how knowledge is developed, interpreted, and applied within a study. It encompasses the ontological, epistemological, and methodological perspectives that shape how researchers perceive reality, gather evidence, and interpret findings (Creswell & Creswell, 2018; Saunders, Lewis, & Thornhill, 2019). Essentially, research philosophy functions as the lens through which a study is conducted, guiding the choice of research design, data collection methods, and analytical approaches. A clear understanding of the underlying philosophy is therefore crucial to ensure that the research process remains coherent, logically organized, and aligned with the study's objectives.

Several established philosophical paradigms are present in research, including positivism, post-positivism, interpretivism, and pragmatism. Positivism emphasizes objectivity, measurable facts, and value-free inquiry, and is often associated with the natural sciences (Cohen, Manion, & Morrison, 2018). In contrast, interpretivism focuses on subjective meanings and the social construction of reality, prioritizing qualitative exploration over quantification. Pragmatism adopts a flexible approach, valuing practical solutions and integrating both quantitative and qualitative methods as needed (Morgan, 2014). Between these paradigms is post-positivism, which upholds the importance of empirical observation and measurement but recognizes that reality can never be fully comprehended due to the inherent limitations of human inquiry (Phillips & Burbules, 2000).

This study adopts a post-positivist approach, aiming to examine the effect of intellectual capital on supply chain performance, with resilience serving as a mediating variable and top management support as a moderating factor in the pharmaceutical industry. Post-positivism acknowledges that, although quantitative measures can identify patterns and relationships, the resulting knowledge remains tentative and open to refinement (Creswell & Plano Clark, 2018). This perspective aligns with the study's use of statistical analysis to test hypothesized relationships, while also accommodating contextual interpretation. Such a balanced epistemological stance is particularly suitable for exploring the complex and evolving nature of supply chain systems in the pharmaceutical sector, where both measurable performance indicators and contextual factors must be taken into account.

Furthermore, the selection of post-positivism is strengthened by its strong compatibility with explanatory research designs and its focus on testing and refining theories. The study builds on established theoretical frameworks to explore the

relationship between intellectual capital, resilience, and top management support, utilizing rigorous data collection and analysis methods to validate these concepts. At the same time, post-positivism's openness to contextual factors ensures that results are understood within the practical realities of the pharmaceutical industry, which is influenced by regulatory constraints, market changes, and organizational culture (Saunders et al., 2019). This philosophical approach provides a solid foundation for generating credible, empirically based, and practically useful insights.

### **3.2 Research Approach**

A research approach refers to the overall plan and procedures for conducting a study, from broad assumptions to detailed methods of data collection, analysis, and interpretation (Creswell & Creswell, 2018; Saunders, Lewis, & Thornhill, 2019). It provides the strategic direction that links the research philosophy to the specific design and techniques used in addressing the research questions. Broadly, research approaches can be categorized into three main types: quantitative, qualitative, and mixed-methods. Each approach reflects distinct assumptions about the nature of reality (ontology), the nature of knowledge (epistemology), and the appropriate strategies for generating and validating that knowledge. Therefore, selecting an appropriate approach is essential to ensuring that the methods align with the study's objectives and philosophical stance.

Quantitative research is characterized by the systematic collection and analysis of numerical data to identify patterns, relationships, or trends (Bryman, 2016). It is rooted in the positivist and post-positivist traditions, emphasizing objectivity, reliability, and the measurement of variables using standardized instruments (Creswell & Creswell, 2018). In contrast, qualitative research focuses on exploring meanings, experiences, and interpretations, often using open-ended data collection methods such

as interviews and observations (Denzin & Lincoln, 2018). Mixed-methods research integrates both quantitative and qualitative approaches to provide a more comprehensive understanding of a research problem (Creswell & Plano Clark, 2018). The choice among these approaches depends on the nature of the research questions, the type of data required, and the intended analytical techniques.

This study employs a quantitative research approach, aiming to investigate the relationships between intellectual capital, supply chain performance, resilience, and top management support in the pharmaceutical industry through statistical testing. Quantitative methods are suitable for testing hypotheses, measuring variables, and determining the strength and direction of relationships in a manner that facilitates replication and generalization (Babbie, 2021). Since the study is grounded in the post-positivist philosophy, the quantitative approach supports the objective measurement of constructs through validated survey instruments and the use of inferential statistics to draw conclusions. This is particularly important in supply chain research, where numerical indicators such as performance metrics, resilience indices, and managerial support levels can be systematically analyzed to produce evidence-based insights.

Furthermore, the quantitative approach is justified by its ability to provide a high degree of precision, reliability, and comparability across different organizational contexts. The use of structured questionnaires enables the collection of standardized data from a large sample, enhancing the statistical power of the analysis and allowing findings to be generalized to the broader population of pharmaceutical firms (Saunders et al., 2019). Additionally, quantitative research facilitates the application of advanced analytical techniques, such as regression analysis and structural equation modelling, to test complex models involving mediating and moderating effects. This capacity to rigorously examine theoretical relationships ensures that the study not

only contributes to academic literature but also offers actionable recommendations for improving supply chain performance in the pharmaceutical sector.

### **3.3 Research Design**

Research design refers to the overall plan or blueprint that outlines how a study will be conducted to answer the research questions and achieve its objectives (Creswell & Creswell, 2018; Saunders, Lewis, & Thornhill, 2019). It provides a structured framework that links the research philosophy and approach to the specific methods of data collection and analysis, ensuring coherence and logical sequencing throughout the research process. Broadly, research designs can be categorized into three main types: exploratory, descriptive, and explanatory. Exploratory designs focus on gaining preliminary insights into a relatively unknown phenomenon, while descriptive designs aim to portray characteristics or events as they exist systematically. Explanatory designs, in contrast, are used to investigate cause-and-effect relationships by determining the extent to which changes in one variable influence changes in another (Babbie, 2021).

This study employs an explanatory research design, aiming to investigate the relationships between intellectual capital and supply chain performance, with resilience serving as a mediator and top management support as a moderator, in the pharmaceutical industry. The explanatory design is particularly suitable for testing theoretical propositions and identifying the underlying mechanisms that link independent and dependent variables (Robson & McCartan, 2016). By employing this design, the study can move beyond merely describing associations to establishing whether and how intellectual capital contributes to improved supply chain performance, and how resilience and top management support influence this relationship. This aligns with the post-positivist stance of the research, which

emphasizes empirical testing of hypotheses while acknowledging the probabilistic nature of causal inferences.

Moreover, the explanatory design is justified by its compatibility with the quantitative research approach adopted in this study. It enables the use of structured data collection instruments and advanced statistical techniques, such as regression analysis and structural equation modeling, to rigorously test hypothesized relationships and examine mediating and moderating effects (Hair et al., 2019). This level of analytical precision is crucial for generating robust and generalizable findings that can inform both theory and practice within the pharmaceutical supply chain context. Additionally, the design's structured nature ensures methodological rigor, while its focus on causal explanation makes it particularly valuable for providing actionable insights to industry stakeholders seeking to enhance performance through strategic management of intellectual capital.

### **3.4 Industry Context**

The study will be conducted within Ghana's pharmaceutical industry, a vital sector in both the national economy and healthcare system. The industry comprises a mix of local manufacturers, importers, and distributors that produce or supply a wide range of dosage forms, including tablets, syrups, injectables, and topical preparations (Food and Drugs Authority [FDA], 2024). Valued at over US\$433 million, the sector makes a significant contribution to Ghana's industrial output and provides employment opportunities across various sectors, including manufacturing, logistics, quality control, and retail distribution. Despite its growth, local manufacturing currently meets only about 30% of the country's pharmaceutical demand, with the rest covered through imports. This structural gap underscores the need for efficient and

resilient supply chains to enhance production capacity and reduce dependence on foreign markets.

The strategic importance of Ghana's pharmaceutical sector makes it a relevant setting for exploring the relationship between intellectual capital, resilience, and top management support in enhancing supply chain performance. Production centers in cities such as Accra, Kumasi, and Takoradi benefit from proximity to regulatory agencies like the FDA and the Ministry of Health, as well as access to transportation infrastructure and a concentration of skilled labor. At the same time, the industry faces operational challenges, including compliance with regulations, disruptions in global supply chains, and fluctuating market conditions. Studying this sector provides an in-depth understanding of how organizational capabilities can be leveraged to enhance supply chain resilience and performance, yielding findings that can inform policy and practice in Ghana and other emerging economies with similar healthcare and industrial contexts.

### **3.5 Population**

In research, the population refers to the entire set of individuals, organizations, events, or objects that share specific characteristics relevant to a particular study (Creswell & Creswell, 2018; Saunders, Lewis, & Thornhill, 2019). It represents the entire group about which the researcher intends to draw conclusions and from which a sample is selected. Clearly defining the population is crucial because it sets the boundaries of the study, ensures the data is representative, and guides the choice of appropriate sampling methods (Babbie, 2021). A well-defined population also enhances the validity and generalizability of the results by making sure all members meet the criteria directly linked to the research objectives.

For this study, the population includes all pharmaceutical firms registered with the Food and Drugs Authority (FDA) in Ghana as of 2024. According to the FDA's official register, there are 275 licensed pharmaceutical firms across the country, including manufacturers, importers, and distributors. This diverse group encompasses a range of entities, from large indigenous manufacturers to multinational companies involved in importing and distributing medicines. While these firms operate nationwide, a significant number are concentrated in the Greater Accra Region, the country's primary hub for pharmaceutical manufacturing and distribution. Defining the population in this way ensures that the study encompasses the entire industry scope, allowing for a comprehensive assessment of how intellectual capital, resilience, and top management support influence supply chain performance in Ghana's pharmaceutical sector.

### **3.6 Sample and Sampling Procedure**

Sampling is the process of selecting a subset of a population for study, allowing researchers to make conclusions about the entire group (Ritchie et al., 2013). A sample is defined as a portion of the population that shares specific characteristics relevant to the research goals (Zikmund et al., 2013). According to Bambale (2014), sampling involves identifying and choosing units from the population to gather data that can lead to valid and reliable conclusions. Sampling techniques are generally categorized into two main types: probability and non-probability methods. Probability sampling employs random selection, ensuring that each member of the population has a known and equal chance of being included. This enhances representativeness and supports the generalization of findings, making it particularly suitable for quantitative research (Creswell, 2014; Bryman & Bell, 2022). Conversely, non-probability sampling does not rely on random selection, which can increase bias; however, it may

be practical in exploratory studies or when working with hard-to-reach populations (Etikan et al., 2016; Saunders et al., 2019).

This study will employ census sampling, a probability method that involves including every member of the population in the research (Pandey & Pandey, 2021). Census sampling is most suitable when the population is small enough to be fully enumerated, as it eliminates sampling error and guarantees complete representativeness (Tyrer & Heyman, 2016). In this context, the population includes all 275 pharmaceutical firms registered with the Food and Drugs Authority (FDA) in Ghana as of 2024. The decision to use census sampling is based on the manageable size of the population and the need for comprehensive coverage of the industry. By including all registered firms, whether they are manufacturers, importers, or distributors, the study will cover the entire spectrum of operational types and strategic practices. This approach will provide a detailed and accurate assessment of how intellectual capital, resilience, and top management support influence supply chain performance across the sector. Although census sampling requires more time and resources, its ability to deliver complete and highly reliable data makes it the most appropriate choice for achieving the study's goals.

### **3.7 Time Horizon**

This study will use a cross-sectional approach to data collection, which involves gathering data from the target population at a single point in time or within a short period. A cross-sectional time horizon provides a “snapshot” of a phenomenon, allowing the researcher to examine variables and their relationships without tracking changes over time (Saunders et al., 2019). This design is especially suitable for the current research, which aims to analyse the relationships between intellectual capital, resilience, top management support, and supply chain performance across Ghana's

pharmaceutical industry. The cross-sectional approach offers notable advantages for this study. It enables the collection of comprehensive data from all 275 pharmaceutical firms in a relatively short time, making it efficient in terms of both time and resources. This is particularly important in business and management research, where longitudinal studies may be impractical due to costs and operational constraints (Zikmund, 2013). Additionally, cross-sectional studies are helpful in identifying patterns, correlations, and potential causal links between variables, supporting the explanatory nature of this research (Bhattacharjee, 2012).

### **3.8 Data Collection Instrument**

The study used a structured questionnaire as the main data collection tool, selected for its suitability to the quantitative research approach, explanatory design, and census sampling method. Explanatory studies need systematically organized tools to gather accurate, measurable data on relationships between variables (Maxwell, 2012). A questionnaire is defined as a set of questions designed to collect information from respondents in a consistent and standardized way (Malhotra & Birks, 2007). While questionnaires can include both closed-ended and open-ended items, this study mainly relied on closed-ended questions to maintain objectivity, consistency, and ease of analysis, with a small number of open-ended questions to let respondents elaborate when needed (Singer & Couper, 2017).

Questionnaires are widely recognized in business and management research for their efficiency in collecting standardized data from large respondent groups, making them cost-effective, time-efficient, and easy to administer (Malhotra & Birks, 2007). In this study, questionnaire items were adapted from validated sources in the literature on intellectual capital, supply chain resilience, top management support, and supply chain performance, ensuring content validity. The instrument was divided into

five sections: Section A gathered demographic and organizational details; Section B focused on intellectual capital; Section C assessed supply chain resilience; Section D examined top management support; and Section E measured supply chain performance. Responses for Sections B to E were recorded on a five-point Likert scale, ranging from 1 (“Strongly Disagree”) to 7 (“Strongly Agree”), to capture varying levels of agreement with each statement. The structured questionnaire was chosen for its advantages over other methods, including ease of administration, consistency of responses, cost-effectiveness, and the ability to protect respondent confidentiality. To ensure high-quality data, procedures for testing validity and reliability were implemented before the full-scale deployment.

### **3.9 Measurement of Constructs**

The measurement items for this study were adapted from established literature to ensure theoretical grounding, empirical validity, and contextual relevance to Ghana’s pharmaceutical industry. Intellectual capital was measured using items adapted from Subramaniam and Youndt (2005) and Zhang et al. (2017), capturing human, structural, and relational capital. Supply chain resilience was assessed using items from Brandon-Jones et al. (2014) and Dubey et al. (2023), focusing on the ability to anticipate, respond to, and recover from disruptions. Top management support items were adapted from Lin (2010) to measure senior leadership support and resource allocation toward supply chain initiatives. Supply chain performance was evaluated using items from Beamon (1999) and Hallikas et al. (2020), covering efficiency, responsiveness, and operational effectiveness. All items were reviewed and refined to match the operational realities of the pharmaceutical sector. Reliability was confirmed using Cronbach’s alpha and composite reliability, with all constructs

exceeding the 0.70 threshold recommended by Hair et al. (2017), indicating strong internal consistency and suitability for the study's objectives.

### **3.10 Reliability and Validity**

To ensure the quality of this study, careful attention was paid to the validity and reliability of the research instrument. Validity refers to the extent to which an instrument accurately measures what it is intended to measure, allowing for accurate inferences (Cook & Reichardt, 1979). Reliability, on the other hand, relates to the instrument's ability to produce consistent results over time when used in the same context with the same participants (Yilmaz, 2013). In survey research, reliability is often evaluated through internal consistency, with Cronbach's alpha being the most common metric. According to Hair et al. (2017), a Cronbach's alpha value above 0.70 indicates acceptable reliability.

In addition to Cronbach's alpha, composite reliability was used to assess the reliability of constructs, with a recommended minimum of 0.70 (Hair et al., 2017). The outer loadings of indicators were examined, with values above 0.70 considered reliable (Hair et al., 2012). Items with loadings between 0.40 and 0.70 were retained only if they were supported by both acceptable composite reliability and convergent validity. Convergent validity was evaluated using the average variance extracted (AVE), with values above 0.50 indicating that the construct explains more than half of the variance of its indicators (Hair et al., 2017). Discriminant validity was assessed using the Fornell-Larcker criterion and the heterotrait-monotrait ratio (HTMT). The Fornell-Larcker criterion requires that the square root of each construct's AVE is greater than its correlations with other constructs (Henseler et al., 2015; Voorhees et al., 2016), while HTMT values should not exceed 0.90 (Henseler et al., 2015).

Content validity was ensured by adapting measurement items from established literature and conducting expert reviews to confirm that the questions comprehensively covered the study constructs (Almanasreh et al., 2019). The questionnaire was pre-tested with selected procurement professionals, peers, and supervisors to identify and correct spelling errors, ambiguous wording, or unclear items. This iterative process of development, refinement, and review ensured that the instrument was both valid and reliable, thereby strengthening the credibility of the study's findings.

### **3.11 Data Collection Procedure**

To facilitate an efficient data collection process, an introductory letter was sent to all pharmaceutical companies in Ghana, clearly explaining the study's objectives and purpose. This initial communication helped respondents understand the research context and encouraged them to provide accurate and relevant information. The researcher personally assisted participants during the completion of the questionnaire, which typically took between 20 and 45 minutes, providing ample time for clarification and thoughtful responses. Questionnaires were distributed directly to the companies and collected at mutually agreed-upon times to minimize disruption to daily operations. Effective communication was maintained by exchanging contact details with designated representatives from each company. Follow-up reminders were sent at least once to encourage timely completion, particularly given the respondents' busy schedules. The combination of clear instructions, personal support, flexible scheduling, and proactive follow-up resulted in a high response rate and a timely return of questionnaires. These strategies ensured that the data collection process was smooth, well-coordinated, and aligned with the operational realities of Ghana's pharmaceutical industry.

### 3.12 Data Processing Tools

Data analysis for this study was conducted using SPSS version 26 and SmartPLS-SEM 4. Completed questionnaires from all pharmaceutical firms in Ghana were first coded and cleaned in SPSS to ensure accuracy and consistency. The dataset was then saved as a comma-separated values (CSV) file and imported into SmartPLS-SEM 4 for advanced statistical analysis. SmartPLS-SEM 4 was selected because it is well-suited for testing hypotheses in complex structural models involving multiple latent variables and interconnected paths—requirements central to this study, which examines the relationships between intellectual capital, supply chain resilience, top management support, and supply chain performance in Ghana's pharmaceutical industry (Hair et al., 2017).

SmartPLS employs a variance-based approach that does not require normally distributed data, making it particularly suitable for real-world business and management research, where normality is often violated (Hair et al., 2019). This flexibility was especially relevant given the diverse operational contexts of pharmaceutical firms across the country. The software also enables the simultaneous assessment of multiple relationships, including mediating and moderating effects, thereby providing a comprehensive understanding of the study model. In this research, the bootstrapping procedure in SmartPLS was employed to assess the significance of path coefficients and indicator loadings, thereby ensuring the robustness and reliability of the results (Hair et al., 2017). Additionally, SmartPLS offers strong predictive capabilities, making it a valuable tool for generating insights that not only confirm theoretical relationships but also provide actionable recommendations for improving supply chain performance in the sector.

### 3.13 Data Processing and Analysis

Data collected from all pharmaceutical firms in Ghana was carefully prepared to ensure accuracy and eliminate entry errors. Each completed questionnaire was assigned a unique identification number to facilitate sorting and tracking of non-responses. Questionnaires were reviewed for completeness, coded, and entered into SPSS version 26, where demographic data were analyzed using frequencies, percentages, means, and standard deviations. The cleaned dataset was then saved as a comma-separated values (CSV) file and imported into SmartPLS-SEM 4 for advanced statistical analysis.

Both reflective and formative measurement models were used to assess the validity and reliability of the study constructs. Factor loadings were required to exceed 0.70, composite reliability to be above 0.70, and the average variance extracted (AVE) to be greater than 0.50 (Hair et al., 2017). Discriminant validity was evaluated using the Fornell-Larcker criterion, where the square root of AVE must be higher than the correlation with other constructs (Henseler et al., 2015; Voorhees et al., 2016), and the heterotrait-monotrait ratio (HTMT), with acceptable values below 0.90 (Henseler et al., 2015). A bootstrapping procedure with 5,000 resamples was employed to determine the significance of path coefficients, with results assessed using t-statistics and p-values.

Structural equation modeling (SEM) was then applied to analyze the relationships among the exogenous variable (intellectual capital), the mediating variable (supply chain resilience), the moderating variable (top management support), and the endogenous variable (supply chain performance). This approach facilitated the simultaneous testing of multiple relationships, aligning with the study's explanatory design. Descriptive statistics provided an overview of the participating

firms' demographic profiles. At the same time, inferential analysis in SmartPLS generated robust evidence to address the research objectives and test the hypotheses outlined in Chapter One.

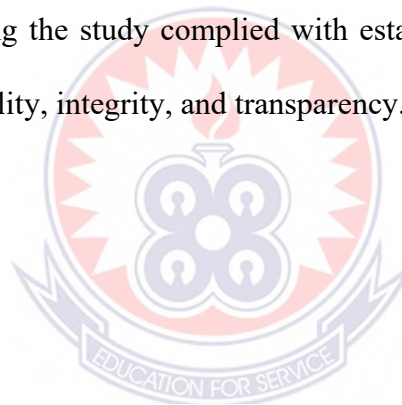
### **3.14 Ethical Consideration**

Ethical considerations played a crucial role in this study, ensuring adherence to recognized research standards and upholding the integrity of the process (Saunders, Lewis, & Thornhill, 2007). A formal introductory letter was sent to the management of all participating pharmaceutical firms in Ghana, requesting permission to conduct the research and outlining the study's purpose, objectives, and importance. Before distributing the questionnaires, representatives from each firm were thoroughly briefed on the study's scope, methodology, and expected outcomes to foster transparency and informed participation. The questionnaire included a clear statement assuring the confidentiality of all responses. Participants were informed that the data collected would be used exclusively for academic purposes, that their responses would be handled respectfully and securely, and that they should avoid including any identifying information, such as names. They were also assured that participation was voluntary and they could withdraw at any time without penalty. Although no monetary or material compensation was offered, the potential benefits of the research, particularly its relevance to enhancing supply chain performance in Ghana's pharmaceutical industry, were explained. To maintain academic integrity, all sources used in the study, whether paraphrased, summarized, or directly quoted, were properly cited.

### **3.15 Chapter Summary**

This chapter presented the research methods and procedures employed in the study. It began with a discussion of the research philosophy, specifically the post-

positivist philosophy, chosen for its alignment with the study's objectives and its recognition that knowledge is provisional yet grounded in empirical evidence. Post-positivism values objective measurement while allowing for contextual interpretation. The chapter also outlined the explanatory research design, data collection procedures, and statistical methods. The research population, comprising all 275 pharmaceutical firms registered with the Food and Drugs Authority (FDA) in Ghana, and the census sampling approach were described, along with an assessment of the research instrument's validity and reliability. The Statistical Package for the Social Sciences (SPSS version 26) and SmartPLS-SEM 4 were identified as the main analytical tools for data processing and hypothesis testing. Finally, the chapter addressed ethical considerations, ensuring the study complied with established research standards and maintained confidentiality, integrity, and transparency.



## CHAPTER FOUR

### RESULTS AND DISCUSSION

#### 4.0 Introduction

This study examines the effect of intellectual capital on supply chain performance, with particular emphasis on the mediating role of resilience and the moderating influence of top management support within Ghana's pharmaceutical industry. This chapter delineates and discusses the primary findings, commencing with the descriptive statistics of the respondents. The proposed hypotheses were evaluated using Smart PLS-SEM. Detailed results and their respective discussions are provided in the following sections.

#### 4.1 Response Rate

A total of 275 questionnaires were administered to pharmaceutical firms operating in Ghana. Out of these, 227 were returned, representing an initial response rate of 82.5%. However, twelve questionnaires were found to be incomplete and were therefore excluded from the analysis. Consequently, 215 valid responses were retained for data entry and subsequent analysis, resulting in an effective response rate of 78.2%. This rate is considered highly satisfactory for empirical research and supports the reliability and representativeness of the data collected (Pielsticker & Hiebl, 2020). The strong response rate further enhances the credibility and robustness of the study's findings.

#### 4.2 Demographic Information

This section presents the demographic characteristics of the respondents who participated in the study. The demographic information provides essential context for interpreting the study's findings by illustrating the composition of the sample across key attributes, including gender, age, educational background, years of experience

within the firm, and annual revenue. The summary of these characteristics is presented in Table 1.

**Table 4.1: Demographic Information**

Demographic	Category	Frequency	Percentage
Gender	Male	132	61.4
	Female	83	38.6
Age	Below 30 years	24	11.2
	31–35 years	47	21.9
	36–40 years	63	29.3
	41–45 years	48	22.3
	46–50 years	21	9.8
	Above 50 years	12	5.6
	Educational Background	Secondary	14
First Degree		108	50.2
Master's Degree		80	37.2
Ph.D./Doctorate		13	6
Years Firm Has Been in Operation	Less than 1 year	5	2.3
	1–5 years	28	13
	6–10 years	56	26
	11–15 years	64	29.8
	16–20 years	40	18.6
	21 years & above	22	10.2
	Firm's Annual Revenue (GHS)	Less than 500,000	39
500,000 – 1,000,000		88	40.9
Above 1,000,000		88	40.9
<b>Total</b>		<b>215</b>	<b>100</b>

Source: Field Survey (2025)

The demographic profile of respondents presented in Table 1 indicates that the pharmaceutical workforce in Ghana is predominantly male (61.4%) compared to female (38.6%). This reflects a gender imbalance typical of Ghana's manufacturing and industrial sectors, where males often dominate leadership and technical roles. The age distribution shows that the majority of respondents fall within the 36–40 years (29.3%) and 41–45 years (22.3%) categories, suggesting a workforce comprised mainly of mid-career professionals with substantial experience and managerial competence. This age structure is advantageous for the pharmaceutical industry, as it combines technical expertise, institutional knowledge, and the maturity needed to oversee quality control, regulatory compliance, and supply chain coordination. Conversely, the relatively smaller proportion of respondents aged below 30 years (11.2%) highlights the limited presence of younger professionals, possibly due to the specialised qualifications and technical expertise required in pharmaceutical operations.

In terms of educational attainment, the findings reveal a highly educated sample, with a majority of respondents holding a first degree (50.2%) and a master's degree (37.2%). This educational profile highlights the intellectual intensity of the pharmaceutical sector, where scientific knowledge, managerial expertise, and analytical skills are essential for maintaining operational efficiency and driving innovation. Furthermore, most firms have been in operation for 11–15 years (29.8%) and 6–10 years (26.0%), indicating an industry characterized by organizational maturity and accumulated experience. Regarding financial strength, a combined 81.8% of firms reported annual revenues exceeding GHS 500,000, with 40.9% earning between GHS 500,000 and 1,000,000 and another 40.9% earning above GHS 1,000,000. This demonstrates a financially stable and competitively resilient sector

within Ghana's industrial landscape. The demographic characteristics suggest that the respondents represent a knowledgeable, experienced, and economically viable segment of the pharmaceutical industry, thereby enhancing the credibility, reliability, and generalizability of the study's findings.

#### **4.2 Descriptive Statistics of the Constructs**

The descriptive statistics for the constructs were examined using measures such as the mean, standard deviation, skewness, and kurtosis. Each construct was operationalised through multiple items measured on a seven-point Likert scale (ranging from 1 to 7), capturing the perceptions and assessments of pharmaceutical firms in Ghana. The detailed results are presented in Table 2.



**Table 4.2: Descriptive Statistics of the Constructs**

		Mean	Min	Max	SD	kurtosis	Skewness
<b>Intellectual Capital</b>							
IC_1	Our firm has strong relationships with key customers and suppliers.	3.967	1	7	1.054	0.193	0.017
IC_2	We maintain long-term partnerships that support supply chain learning and innovation.	4.033	2	7	1.032	0.097	0.293
IC_3	Our supply chain partners share valuable knowledge and expertise with us.	4.014	1	7	1.027	0.131	-0.002
IC_4	Our supply chain employees possess high levels of competence and expertise.	4.023	2	7	1.014	-0.209	0.007
IC_5	Our organisation invests significantly in training and knowledge development.	3.986	1	6	1.032	-0.420	0.002
IC_6	Employees are empowered to make decisions and innovate within supply chain functions.	4.005	1	7	1.045	0.234	0.212
IC_7	Our firm has well-documented supply chain processes and best practices.	4.005	1	7	1.059	-0.177	0.156
IC_8	Our databases and IT systems effectively support supply chain decision-making.	4.005	2	7	1.041	-0.205	0.215
IC_9	Organisational routines help retain critical supply chain knowledge.	4.005	1	7	1.037	0.330	0.319
<b>Supply Chain Resilience</b>							
SCR_1	Our supply chain can quickly recover from disruptions (e.g., delays, shortages).	3.981	2	7	1.061	-0.270	0.202
SCR_2	We have contingency plans in place to respond effectively to unexpected supply chain disruptions.	3.972	1	7	1.020	-0.066	-0.050
SCR_3	We collaborate with suppliers to manage and mitigate risks.	3.967	2	7	1.049	-0.157	0.236
SCR_4	We have multiple (redundant) sources for our critical supplies.	4.028	2	7	1.020	0.028	0.155
SCR_5	We can quickly adapt our sourcing, manufacturing, and distribution	4.000	2	7	1.048	-0.118	0.293

	strategies in response to disruptions.							
	We continually learn from past disruptions to enhance our future resilience.	3.995	1	7	1.054	-0.133	0.033	
SCR_6								
SCR_7	Our supply chain adapts well to changes in the environment.	3.995	2	7	1	-0.242	0.319	
	<b>Top Management Support</b>							
TMS_1	Top management provides strong support for supply chain initiatives.	4.005	2	6	1.028	-0.486	0.120	
	Leaders allocate adequate resources to enhance supply chain performance.	4.028	2	6	1.020	-0.531	-0.030	
TMS_2								
TMS_3	Senior managers actively participate in decision-making within the supply chain.	3.995	2	6	1.037	-0.457	-0.016	
TMS_4	Our leadership prioritises supply chain agility and responsiveness.	4.014	1	7	1.05	0.137	0.118	
	Top management encourages collaboration across departments and partners.	4.005	1	7	1.059	0.006	0.109	
TMS_5								
TMS_6	There is a clear strategic vision from top leadership regarding supply chain goals.	4.023	1	7	1.032	0.283	0.030	
	<b>Supply Chain Performance</b>							
SCP_1	Our supply chain operations are cost-effective.	3.986	2	7	1.014	0.361	0.514	
SCP_2	We are able to reduce inventory holding and transportation costs.	4.037	1	7	1.025	0.339	0.160	
SCP_3	Our supply chain can quickly respond to changes in customer demand.	4.005	2	7	1.045	-0.339	0.114	
SCP_4	We fulfil urgent orders promptly and efficiently.	4	2	7	1.021	-0.112	0.291	
SCP_5	We have the flexibility to adapt to market and customer dynamics.	3.986	2	7	1.018	0.14	0.321	
SCP_6	Our products/services consistently meet customer expectations.	3.977	1	7	1.018	0.134	0.127	
SCP_7	There are a few quality-related complaints from customers.	4.005	2	7	1.014	0.164	0.341	
SCP_8	Our supply chain ensures consistent product and service delivery.	3.981	1	7	0.993	0.306	0.238	
Source:	Field				Survey			(2025)

The descriptive results in Table 2 show that all indicators for Intellectual Capital (IC\_1–IC\_9) recorded relatively high mean values, ranging from 3.967 (IC\_1) to 4.033 (IC\_2), indicating that respondents generally agreed that intellectual resources are well-established across the surveyed firms. The standard deviations for these indicators ranged narrowly between 1.014 and 1.059, indicating a high level of consensus among participants. The skewness and kurtosis values, which mostly fall between -0.420 and 0.330 and -0.209 and 0.330, respectively, confirm that the data are approximately normally distributed. These results imply that the sampled pharmaceutical firms possess strong relational and human capital capabilities—manifested in competent employees (IC\_4, M = 4.023, SD = 1.014), active knowledge sharing (IC\_3, M = 4.014, SD = 1.027), and structured organisational routines (IC\_9, M = 4.005, SD = 1.037). The closeness of the mean values around 4.0 reflects the industry’s emphasis on employee expertise, documented processes, and collaborative learning, all of which are essential components of intellectual capital supporting supply chain efficiency.

For Supply Chain Resilience (SCR\_1–SCR\_7), the mean values ranged from 3.967 (SCR\_3) to 4.028 (SCR\_4), with standard deviations ranging from 1.000 to 1.061, reflecting consistent perceptions of firms’ adaptive capabilities. The slightly negative skewness values for indicators such as SCR\_2 (-0.050) and SCR\_3 (-0.157) suggest a mild leaning toward agreement, implying that most firms demonstrate proactive risk management and collaborative recovery strategies. Similarly, kurtosis values between -0.270 and 0.028 indicate near-normal data distribution. These results highlight that firms in Ghana’s pharmaceutical sector exhibit moderate to high resilience, characterised by preparedness, learning from disruptions, and supply redundancy. For example, SCR\_4 (M = 4.028, SD = 1.020) and SCR\_5 (M = 4.000,

SD = 1.048) demonstrate that firms can flexibly adjust their sourcing and manufacturing strategies, a crucial capacity in an environment prone to supply chain disturbances and import dependencies.

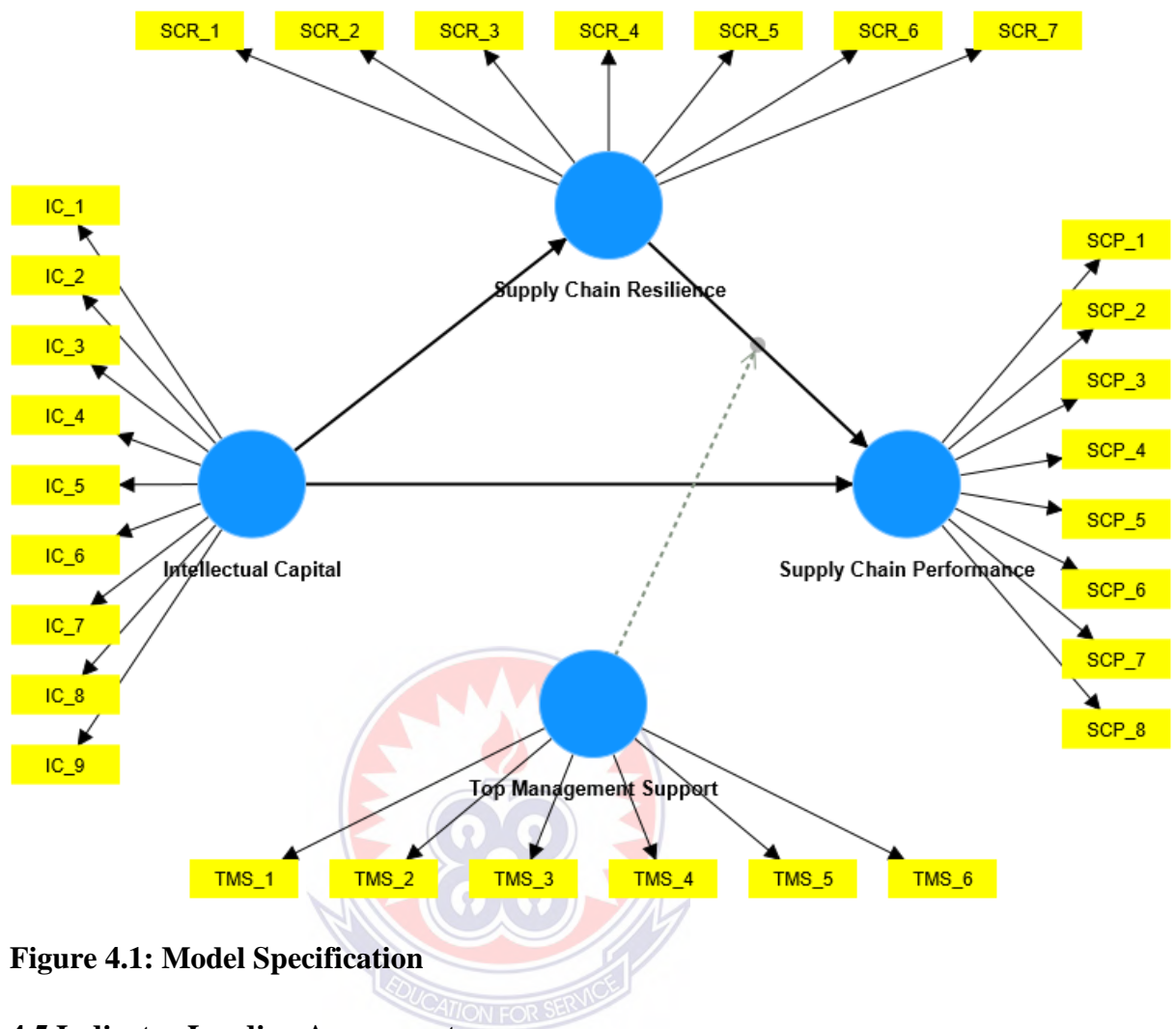
Regarding Top Management Support (TMS\_1–TMS\_6) and Supply Chain Performance (SCP\_1–SCP\_8), the descriptive results also demonstrate generally positive assessments. Mean values for top management support ranged from 3.995 (TMS\_3) to 4.028 (TMS\_2) with standard deviations between 1.020 and 1.059, indicating stable perceptions of leadership involvement and resource commitment. The skewness values, mostly ranging from –0.531 to 0.283, suggest a slight inclination toward agreement, underscoring strong leadership support for supply chain initiatives. Similarly, the supply chain performance indicators recorded mean scores between 3.977 (SCP\_6) and 4.037 (SCP\_2) with standard deviations ranging from 0.993 to 1.045, reflecting a consistently favourable evaluation of performance outcomes. The positive skewness values, especially SCP\_1 (0.514) and SCP\_7 (0.341), indicate that most firms rate their performance above average in terms of cost efficiency, responsiveness, and product quality. The findings suggest that intellectual capital, resilience, and top management support are strongly perceived and likely to exert positive and significant effects on supply chain performance within the Ghanaian pharmaceutical context.

#### **4.4 Model Specification**

The model specification in Partial Least Squares Structural Equation Modeling (PLS-SEM) is a critical stage that defines both the measurement and structural components of the research framework. The measurement model describes how each latent variable is represented by its observed indicators, distinguishing between reflective and formative constructs (Garson, 2016). Conversely, the structural model

specifies the hypothesized causal relationships among these latent variables, outlining the direction and strength of influence within the conceptual framework. Accurate model specification ensures that theoretical concepts are appropriately operationalized, thereby enhancing the reliability and validity of the empirical results.

As illustrated in Figure 2, the proposed model comprises four key latent constructs: Intellectual Capital, Supply Chain Resilience, Top Management Support, and Supply Chain Performance. Each construct, represented by blue circles, signifies a latent variable that cannot be directly observed but is measured through its reflective indicators, represented by yellow rectangles. Specifically, Intellectual Capital is measured by nine indicators (IC\_1–IC\_9), Supply Chain Resilience by seven indicators (SCR\_1–SCR\_7), Top Management Support by six indicators (TMS\_1–TMS\_6), and Supply Chain Performance (SCP) by eight indicators (SCP\_1–SCP\_8). The structural model specifies that Intellectual Capital influences Supply Chain Performance both directly and indirectly through Supply Chain Resilience. At the same time, Top Management Support moderates the relationship between Intellectual Capital and Supply Chain Resilience.



**Figure 4.1: Model Specification**

#### 4.5 Indicator Loading Assessment

Indicator loading assesses the extent to which an observed variable effectively reflects its underlying latent construct (Hair et al., 2018). According to Hair et al. (2018), loadings with values above 0.708 are considered satisfactory, as they indicate that the indicator shares substantial variance with the latent construct and, therefore, exhibits strong item reliability. This threshold is grounded in the principle that the squared loading (i.e., the indicator's commonality) should explain at least 50% of the variance in the observed measure, thereby confirming the indicator's adequacy in representing the construct. Assessing indicator loadings is thus a critical step in validating the measurement model, as it ensures that the observed variables accurately

capture the theoretical dimensions of the latent constructs. This verification strengthens the empirical foundation of the model and enhances confidence in the subsequent structural analysis (Cheah et al., 2024; Sarstedt & Cheah, 2024). The results of the indicator loadings are presented in Table 3.

**Table 4.3: Indicator Loading Assessment**

Constructs/Indicators	Indicator			
	Loadings	T statistics	P values	VIF
<b>Intellectual Capital</b>				
IC_1	0.742	21.621	0.000	1.828
IC_2	Deleted	-	-	-
IC_3	0.733	22.775	0.000	1.725
IC_4	0.720	21.483	0.000	1.695
IC_5	0.796	35.198	0.000	2.102
IC_6	0.746	20.882	0.000	1.830
IC_7	0.805	32.892	0.000	2.151
IC_8	0.790	29.921	0.000	1.977
IC_9	0.732	19.924	0.000	1.783
<b>Supply Chain Performance</b>				
SCP_1	0.887	61.513	0.000	3.570
SCP_2	0.855	41.855	0.000	2.899
SCP_3	0.814	36.098	0.000	2.484
SCP_4	0.793	28.382	0.000	2.258
SCP_5	0.889	55.422	0.000	3.653
SCP_6	0.873	52.178	0.000	3.252
SCP_7	0.897	60.761	0.000	3.943
SCP_8	0.779	25.658	0.000	2.097
<b>Supply Chain Resilience</b>				
SCR_1	0.789	28.612	0.000	2.013
SCR_2	0.725	21.351	0.000	1.693
SCR_3	0.760	25.179	0.000	1.802
SCR_4	0.770	24.687	0.000	1.869
SCR_5	0.789	28.390	0.000	1.985
SCR_6	0.727	21.742	0.000	1.681
SCR_7	0.776	26.416	0.000	1.902
<b>Top Management Support</b>				
TMS_1	0.810	32.741	0.000	1.915
TMS_2	0.794	26.996	0.000	1.853
TMS_3	0.703	18.684	0.000	1.432
TMS_4	0.814	33.332	0.000	1.930
TMS_5	0.784	30.150	0.000	1.702

TMS_6	Deleted	-	-	-
-------	---------	---	---	---

Source: Field Survey (2025)

The results in Table 3 confirm that the majority of indicators across the four constructs, Intellectual Capital, Supply Chain Performance, Supply Chain Resilience, and Top Management Support, exhibited satisfactory loadings above the recommended threshold of 0.708 (Hair et al., 2018), demonstrating strong indicator reliability. For Intellectual Capital, eight of the nine indicators recorded loadings ranging from 0.720 (IC\_4) to 0.805 (IC\_7), all of which were significant at  $p < 0.001$ , with T-statistics exceeding 19.9, confirming their robustness. The indicator IC\_2 was deleted because its loading value fell below 0.708, indicating insufficient contribution to the latent construct. The corresponding variance inflation factor (VIF) values, which ranged from 1.695 to 2.151, were all below the conservative cut-off of 3.3, indicating the absence of multicollinearity issues. Similarly, all indicators for Supply Chain Resilience demonstrated strong loadings, ranging from 0.725 (SCR\_2) to 0.789 (SCR\_1 and SCR\_5), with significant T-statistics above 21.3 and VIFs well below 2.1, affirming the reliability and discriminant validity of the construct.

For Supply Chain Performance, all eight indicators demonstrated exceptionally high loadings, ranging from 0.779 (SCP\_8) to 0.897 (SCP\_7), with very high T-statistics (ranging from 25.7 to 61.5) and significant p-values ( $p < 0.000$ ), confirming excellent indicator reliability and construct validity. The VIF values ranged from 2.097 to 3.943, remaining within acceptable limits and thus confirming the absence of multicollinearity among the indicators. The Top Management Support construct also displayed satisfactory loadings, ranging from 0.703 (TMS\_3) to 0.814 (TMS\_4), with all indicators statistically significant at  $p < 0.001$ . However, TMS\_6 was deleted because its loading fell below the recommended threshold of 0.708, indicating a weak association with the latent construct. The remaining indicators, with

VIF values ranging from 1.432 to 1.930, confirmed good internal consistency and the absence of redundancy. The results in Table 3 affirm that the retained indicators across all constructs demonstrate strong reliability and internal consistency, providing a robust foundation for the subsequent evaluation of the measurement and structural models.

#### 4.6 Reliability and Validity Assessment

Internal consistency reliability assesses the extent to which a set of indicators consistently represents the same underlying construct. Traditionally, this has been evaluated using Cronbach's alpha, which estimates reliability based on inter-item correlations. However, Cronbach's alpha may underestimate reliability in PLS-SEM because it assumes that all indicators contribute equally to the construct. To address this limitation, the present study employed composite reliability, which accounts for varying indicator loadings and provides a more accurate measure of internal consistency. A composite reliability value exceeding 0.70 is generally considered acceptable, indicating adequate construct reliability. The combined evaluation of indicator loadings and composite reliability thus ensures that each construct is measured with precision and consistency, reinforcing the robustness and validity of the measurement model (Cheah et al., 2024; Sarstedt & Cheah, 2024). The results of the internal consistency and reliability assessment are presented in Table 4.

**Table 4.4: Construct Reliability and Validity**

	Cronbach's alpha	(rho_a)	Composite reliability	Average variance extracted (AVE)
Intellectual Capital	0.894	0.897	0.915	0.576
Supply Chain Performance	0.944	0.947	0.954	0.721
Supply Chain Resilience	0.880	0.881	0.907	0.582

Top Management Support	0.841	0.843	0.887	0.612
------------------------	-------	-------	-------	-------

Source: Field Survey (2025)

As shown in Table 4, all constructs demonstrate satisfactory levels of reliability and convergent validity. The Cronbach's alpha values range from 0.841 for Top Management Support to 0.944 for Supply Chain Performance, exceeding the recommended threshold of 0.70 and confirming strong internal consistency across all constructs. Similarly, the composite reliability (CR) values, which provide a more precise estimate of reliability, are all above 0.887, further confirming that the indicators consistently measure their respective latent variables. The Average Variance Extracted (AVE) values also meet the minimum criterion of 0.50, ranging from 0.576 for Intellectual Capital to 0.721 for Supply Chain Performance, indicating that each construct explains more than 50% of the variance in its indicators. Collectively, the results confirm that the constructs exhibit high reliability and adequate convergent validity, ensuring that the measurement model is both robust and conceptually sound.

#### 4.7 Discriminant Validity

Discriminant validity is an essential aspect of construct validity that confirms the distinctiveness of each construct within a model (Hair et al., 2011). It ensures that the constructs capture unique conceptual dimensions rather than overlapping with one another, thereby reducing the risk of multicollinearity and enhancing the credibility of the measurement model (Fornell & Larcker, 1981). In this study, discriminant validity was evaluated using the Heterotrait-Monotrait (HTMT) ratio, which is recognized as a more rigorous and reliable approach compared to the traditional Fornell-Larcker criterion. The HTMT assesses the degree of correlation between indicators of different constructs (heterotrait) relative to those within the same construct

(monotrait) (Henseler et al., 2015). According to Hair et al. (2019), HTMT values below 0.85 indicate satisfactory discriminant validity. The HTMT results for this study are presented in Table 5.

**Table 4.5: HTMT Values**

	IC	SCP	SCR	TMS	TMS x SCR
Intellectual Capital [IC]					
Supply Chain Performance [SCP]	0.693				
Supply Chain Resilience [SCR]	0.675	0.714			
Top Management Support [TMS]	0.459	0.634	0.647		
Top Management Support x Supply Chain Resilience [TMS x SCR]	0.25	0.305	0.268	0.123	

Source: Field Survey (2025)

As presented in Table 5, all Heterotrait-Monotrait (HTMT) values fall well below the conservative threshold of 0.85, confirming satisfactory discriminant validity among the study's constructs. The HTMT values range from 0.123 to 0.714, indicating that each construct is empirically distinct and captures a unique conceptual dimension within the model. Specifically, the association between Intellectual Capital and Supply Chain Performance yielded an HTMT value of 0.693, while the relationship between IC and Supply Chain Resilience showed a similar value of 0.675, suggesting moderate but conceptually meaningful relationships. The correlations between Top Management Support and other constructs, ranging from 0.459 with IC to 0.647 with SCR, also fall within acceptable limits, indicating that leadership support remains a distinct construct within the framework. Furthermore, the interaction term TMS × SCR demonstrates low HTMT values, ranging from 0.123 to 0.305, reflecting minimal overlap with other variables. The results confirm that discriminant validity has been established, reinforcing that the constructs are

theoretically and empirically distinct and that multicollinearity is not a concern in the model.

#### 4.8 Collinearity Statistics Assessment

Collinearity occurs when two or more predictor variables in a regression model exhibit a high degree of intercorrelation, allowing one variable to be linearly predicted from another with considerable accuracy (Cheah et al., 2023). Such redundancy can inflate standard errors, distort regression coefficients, and ultimately lead to biased interpretations of the relationships between variables. Assessing collinearity is therefore critical to ensuring the robustness and validity of model estimations (Hair et al., 2017). Within the context of PLS-SEM, collinearity diagnostics are crucial for confirming that the structural paths are free from redundancy among predictor constructs. This study employed the Variance Inflation Factor (VIF) to assess collinearity, as it is the most widely accepted statistical measure for detecting multicollinearity. According to Hair et al. (2018), VIF values below 3.3 indicate that collinearity is not a concern and that the predictors contribute uniquely to the model. The results of the collinearity assessment are presented in Table 6.

**Table 4.6: Multicollinearity Statistics**

	VIF
Intellectual Capital -> Supply Chain Performance	1.605
Intellectual Capital -> Supply Chain Resilience	1.000
Supply Chain Resilience -> Supply Chain Performance	1.962
Top Management Support -> Supply Chain Performance	1.468
Top Management Support x Supply Chain Resilience -> Supply Chain	1.085

---

Performance

---

Source: Field Survey (2025)

As presented in Table 6, the Variance Inflation Factor (VIF) values for all predictor constructs are well below the recommended threshold of 3.3, confirming the absence of multicollinearity issues in the model. Specifically, the path from Intellectual Capital to Supply Chain Performance had a VIF value of 1.605. In contrast, the path from Intellectual Capital to Supply Chain Resilience had the lowest value of 1.000, indicating complete independence from other predictors. The Supply Chain Resilience to Supply Chain Performance path exhibited a slightly higher VIF of 1.962, still comfortably within the acceptable range, suggesting moderate but non-problematic correlation with other variables. Similarly, Top Management Support and its interaction term (Top Management Support  $\times$  Supply Chain Resilience) recorded VIF values of 1.468 and 1.085, respectively, further affirming that multicollinearity is not present. The results indicate that the predictor constructs are statistically independent, ensuring that the estimated path coefficients are stable, reliable, and free from redundancy within the PLS-SEM model.

#### **4.9 Coefficient of Determination ( $R^2$ )**

The Coefficient of Determination ( $R^2$ ) represents the proportion of variance in an endogenous construct that is explained by its exogenous predictors. It provides a measure of the model's explanatory power, indicating how effectively the independent variables account for variations in the dependent variable (Hair et al., 2017). Higher  $R^2$  values suggest that the model possesses greater predictive accuracy and explanatory strength, whereas lower values imply limited explanatory capability. In general, an  $R^2$  value approaching 1.0 signifies that a substantial portion of the variance in the dependent construct is explained by the model's predictors, reflecting

a strong structural model with robust explanatory power (Hair et al., 2017). The results of the R<sup>2</sup> analysis are presented in Table 7.

**Table 4.7: Coefficient of Determination**

	R-square	R-square adjusted
Supply Chain Performance	0.582	0.574
Supply Chain Resilience	0.361	0.358

Source: Field Survey (2025)

As presented in Table 7, the Coefficient of Determination (R<sup>2</sup>) values indicate that the model demonstrates substantial explanatory power. The R<sup>2</sup> value for Supply Chain Performance is 0.582, with an adjusted value of 0.574, suggesting that approximately 57.4% of the variance in supply chain performance is explained by its predictor variables, Intellectual Capital, Supply Chain Resilience, Top Management Support, and the interaction term (Top Management Support × Supply Chain Resilience). This reflects a moderately strong predictive capability, indicating that these factors collectively exert a meaningful influence on performance outcomes. Similarly, the R<sup>2</sup> value for Supply Chain Resilience is 0.361 (adjusted 0.358), implying that Intellectual Capital accounts for about 36% of the variance in resilience. This demonstrates that firms' intellectual resources substantially contribute to their ability to adapt and recover from supply chain disruptions. The R<sup>2</sup> values confirm that the structural model possesses satisfactory explanatory strength, with the predictor variables effectively capturing the key drivers of resilience and performance in Ghana's pharmaceutical supply chains.

#### **4.10 Predictive Relevance Assessment**

PLS-Predict offers a robust procedure for evaluating a model's out-of-sample predictive power, providing insight into how effectively the model can forecast new

observations not included in the estimation process. This approach is especially valuable in applied research contexts where the goal extends beyond explanation to the accurate prediction of future outcomes (Shmueli et al., 2016). By examining predictive performance metrics such as the Root Mean Square Error (RMSE) and the Mean Absolute Error (MAE), researchers can assess the model's capability to generate reliable predictions under real-world conditions, where new data may differ from the data used for estimation. The results of the PLS-Predict analysis are presented in Table 8.

**Table 4.8: Predictive Relevance**

LV prediction Summary					
	Q <sup>2</sup> predict	RMSE	MAE		
Supply Chain Performance	0.525	0.698	0.549		
Supply Chain Resilience	0.352	0.815	0.65		
MV Prediction Summary					
	Q <sup>2</sup> predict	PLS-SEM_RMSE	PLS-SEM_MAE	LM_RM SE	LM_M AE
SCP_1	0.452	0.753	0.600	0.789	0.620
SCP_2	0.388	0.805	0.648	0.840	0.663
SCP_3	0.313	0.870	0.703	0.906	0.724
SCP_4	0.302	0.857	0.697	0.891	0.716
SCP_5	0.416	0.781	0.650	0.827	0.686
SCP_6	0.400	0.792	0.636	0.821	0.651
SCP_7	0.403	0.787	0.652	0.830	0.677
SCP_8	0.327	0.818	0.657	0.856	0.678
SCR_1	0.217	0.943	0.774	0.954	0.780
SCR_2	0.194	0.922	0.734	0.939	0.754
SCR_3	0.198	0.945	0.773	0.910	0.738
SCR_4	0.212	0.911	0.712	0.895	0.720
SCR_5	0.221	0.929	0.744	0.934	0.745
SCR_6	0.171	0.964	0.785	0.948	0.766
SCR_7	0.206	0.895	0.732	0.903	0.732

Source: Field Survey (2025)

As shown in Table 8, the results of the PLS-Predict analysis demonstrate strong out-of-sample predictive performance for both endogenous constructs, Supply

Chain Performance and Supply Chain Resilience. The  $Q^2_{predict}$  values for SCP (0.525) and SCR (0.352) are well above zero, indicating that the model possesses substantial predictive relevance. The Root Mean Square Error (RMSE) and Mean Absolute Error (MAE) values for SCP (0.698 and 0.549, respectively) are lower than those for SCR (0.815 and 0.650), suggesting that the model predicts supply chain performance more accurately than resilience. At the measurement-variable level, the PLS-SEM RMSE and MAE values for SCP indicators (e.g., SCP\_1: RMSE = 0.753, MAE = 0.600) are consistently lower than their corresponding linear model (LM) values (e.g., SCP\_1: RMSE = 0.789, MAE = 0.620), indicating superior predictive accuracy of the PLS-SEM model. Similarly, the resilience indicators (SCR\_1–SCR\_7) show PLS-SEM RMSE and MAE values that are comparable to or slightly lower than those of the LM benchmark, further confirming the model's reliable predictive capability. The findings confirm that the PLS-SEM model exhibits meaningful predictive power and outperforms the linear benchmark in forecasting new observations, highlighting its robustness and practical applicability within the context of Ghana's pharmaceutical supply chains.

#### **4.11 Effect Size ( $F^2$ ) Assessment**

Effect size, commonly expressed as Cohen's  $f^2$ , evaluates the magnitude of an exogenous variable's influence on an endogenous variable by assessing the change in the coefficient of determination ( $R^2$ ) when that predictor is included or excluded from the model (Hair et al., 2020). Unlike significance testing, which focuses on the presence of relationships, the  $f^2$  statistic provides insight into their practical strength and substantive importance. According to Cohen's (1988) guidelines,  $f^2$  values of 0.02, 0.15, and 0.35 correspond to small, medium, and large effects, respectively. This measure enables researchers to determine the relative contribution of each predictor to

the overall model, highlighting which variables exert substantial influence on the endogenous constructs and which have comparatively modest effects. The results of the effect size analysis are presented in Table 9.

**Table 4.9: F-square statistics**

	f-square
Intellectual Capital -> Supply Chain Performance	0.177
Intellectual Capital -> Supply Chain Resilience	0.565
Supply Chain Resilience -> Supply Chain Performance	0.087
Top Management Support -> Supply Chain Performance	0.116
Top Management Support x Supply Chain Resilience -> Supply Chain Performance	0.031

Source: Field Survey (2025)

The findings presented in Table 9 show that Intellectual Capital has the most substantial impact on the model, particularly on Supply Chain Resilience, with an  $f^2$  value of 0.565, indicating a large effect in line with Cohen's (1988) benchmarks. This suggests that intellectual resources, such as employee expertise, knowledge sharing, and organisational learning, play a decisive role in strengthening firms' adaptive capabilities. The effect of Intellectual Capital on Supply Chain Performance is also notable, with an  $f^2$  of 0.177, reflecting a medium effect, thereby confirming its importance in enhancing operational efficiency and competitiveness. In contrast, the path from Supply Chain Resilience to Supply Chain Performance shows a small effect ( $f^2 = 0.087$ ), implying a moderate but still meaningful contribution of resilience to performance outcomes. Top Management Support exhibits a small to medium effect ( $f^2 = 0.116$ ), indicating that leadership commitment and strategic direction have a positive influence on supply chain outcomes, albeit to a lesser extent than intellectual

capital. Finally, the interaction term Top Management Support  $\times$  Supply Chain Resilience records a small effect ( $f^2 = 0.031$ ), suggesting a limited moderating influence.

#### 4.12 Assessment of Path Coefficients and Significance Level

Assessing path coefficients is essential for understanding the strength and direction of relationships among constructs in a structural model. These coefficients, analogous to regression weights, quantify the extent to which variations in an exogenous variable influence an endogenous variable (Hair et al., 2017). Their statistical significance is typically evaluated using the bootstrapping procedure in PLS-SEM, which estimates standard errors and confidence intervals through repeated resampling. In this study, significance testing was conducted using 10,000 bootstrap samples and a two-tailed test, following the recommendations of Hair et al. (2014). A t-statistic greater than 1.96 and a p-value less than 0.05 were considered indicators of statistically significant relationships, suggesting that the observed effects are unlikely to have occurred by chance. The results of the path coefficient analysis are summarized in Table 10 and illustrated in Figure 3.

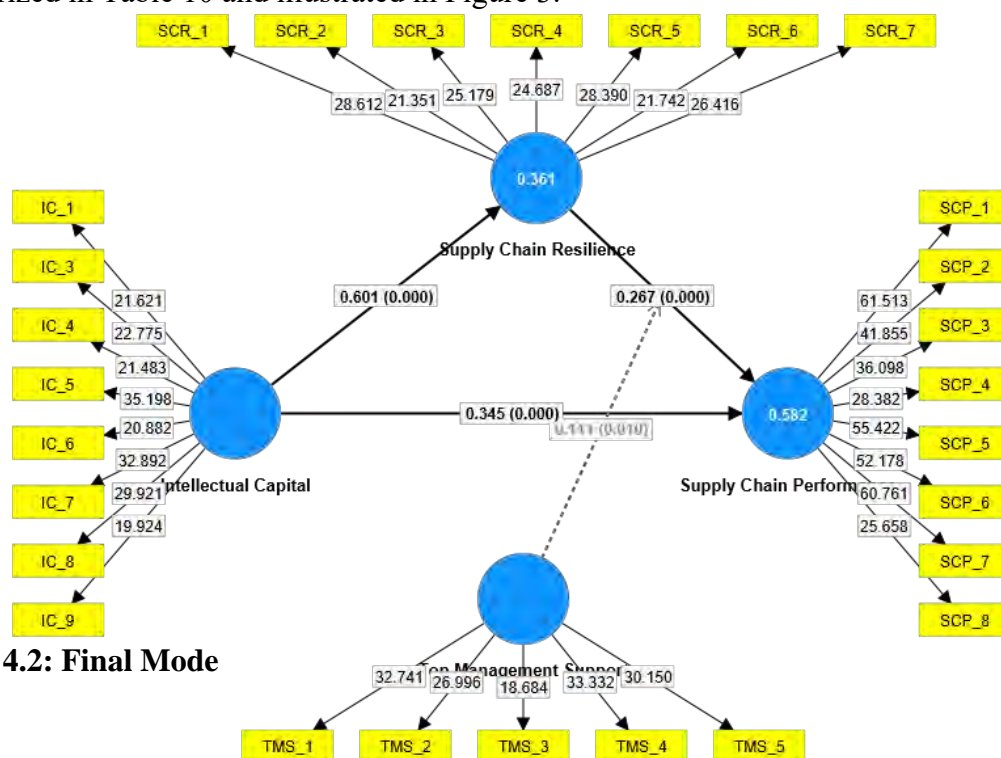


Figure 4.2: Final Mode

**Table 4.10 Testing of Hypothesis**

	$\beta$	Confidence Interval		T statistics	P values	Decision
		2.50%	97.50%			
<i>Direct Effect</i>						
<b>H1:</b> Intellectual Capital -> Supply Chain Performance	0.345	0.233	0.449	6.146	0.000	Accept
Intellectual Capital -> Supply Chain Resilience	0.601	0.512	0.681	13.883	0.000	
<b>H2:</b> Supply Chain Resilience -> Supply Chain Performance	0.267	0.139	0.397	3.996	0.000	Accept
Top Management Support -> Supply Chain Performance	0.267	0.166	0.366	5.235	0.000	
<i>Moderating Effect</i>						
<b>H3:</b> Top Management Support x Supply Chain Resilience -> Supply Chain Performance	0.111	0.024	0.195	2.578	0.010	Accept
<i>Mediating Effect</i>						
<b>H4:</b> Intellectual Capital -> Supply Chain Resilience -> Supply Chain Performance	0.160	0.081	0.251	3.711	0.000	Accept

Source: Field Survey (2025)

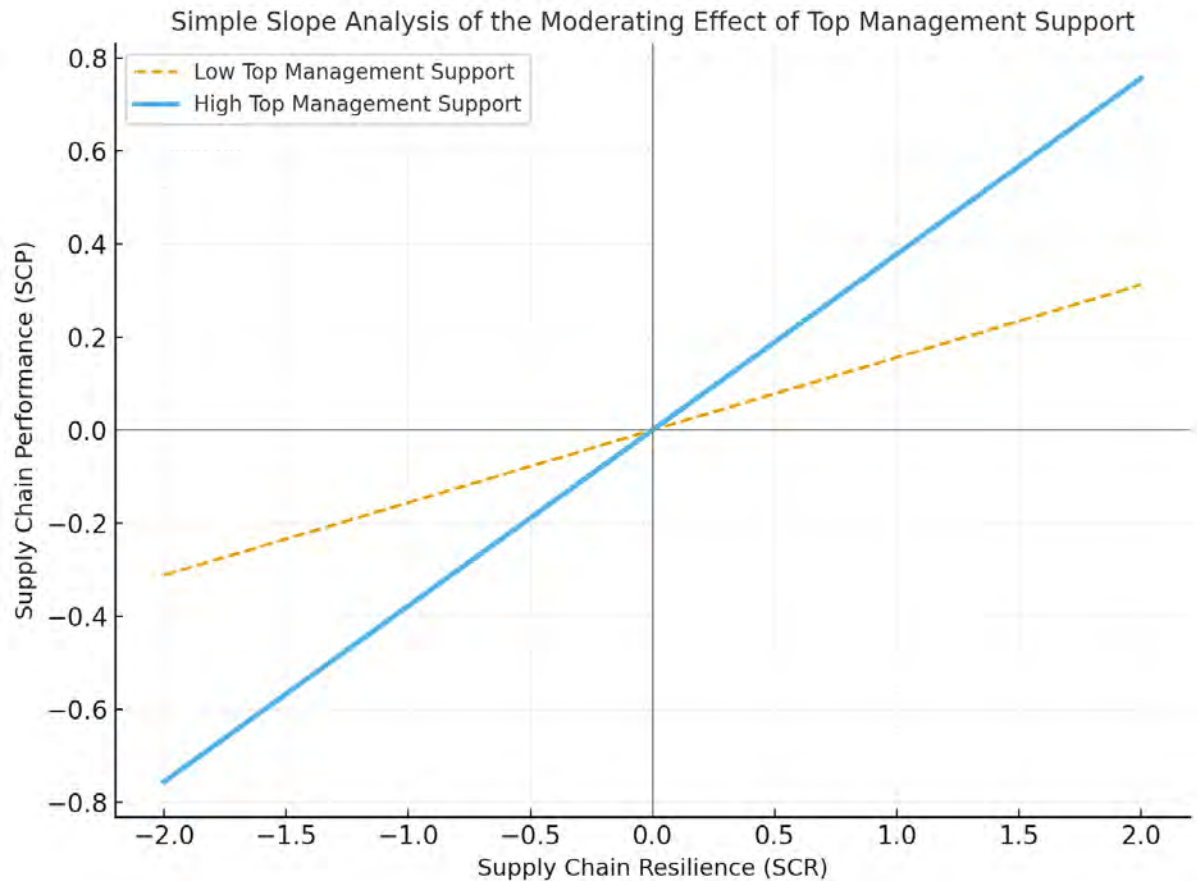
As presented in Table 10, all hypothesized relationships in the structural model were found to be positive and statistically significant, confirming the robustness of the proposed framework. Specifically, the direct effect of Intellectual Capital on Supply Chain Performance is significant ( $\beta = 0.345$ ,  $t = 6.146$ ,  $p = 0.000$ ,  $CI = [0.233, 0.449]$ ), indicating that firms with intellectual capital tend to enhance their supply chain performance. Likewise, Intellectual Capital shows a positive and significant effect on Supply Chain Resilience (SCR) ( $\beta = 0.601$ ,  $t = 13.883$ ,  $p = 0.000$ ,  $CI = [0.512, 0.681]$ ), suggesting that knowledge-based capabilities significantly enhance a firm's ability to anticipate and recover from supply disruptions. The path from Supply Chain Resilience to Supply Chain Performance is also statistically significant ( $\beta = 0.267$ ,  $t = 3.996$ ,  $p = 0.000$ ,  $CI = [0.139, 0.397]$ ), implying that resilient supply chains are better positioned to maintain efficiency and customer satisfaction during external shocks. Furthermore, Top Management Support has a significant influence on Supply Chain Performance ( $\beta = 0.267$ ,  $t = 5.235$ ,  $p = 0.000$ ,  $CI = [0.166, 0.366]$ ), indicating that leadership commitment, resource allocation, and strategic direction are crucial drivers of performance within pharmaceutical firms.

Additionally, the model further demonstrates a significant moderating and mediating relationship. The moderating effect of Top Management Support  $\times$  Supply Chain Resilience on Supply Chain Performance is statistically significant ( $\beta = 0.111$ ,  $t = 2.578$ ,  $p = 0.010$ ,  $CI = [0.024, 0.195]$ ), showing that managerial engagement enhances the positive impact of resilience on performance outcomes. This indicates that when leadership actively supports resilience initiatives, such as contingency planning, capacity building, and risk management, the performance benefits of resilience are strengthened. Additionally, the mediating effect of Supply Chain Resilience in the relationship between Intellectual Capital and Supply Chain

Performance is significant ( $\beta = 0.160$ ,  $t = 3.711$ ,  $p = 0.000$ ,  $CI = [0.081, 0.251]$ ), confirming that intellectual capital improves supply chain performance both directly and indirectly by fostering adaptability and responsiveness. For the pharmaceutical industry, these findings suggest that investing in intellectual capital, promoting resilience, and maintaining strong top management support are crucial to achieving and sustaining supply chain efficiency. Firms that cultivate skilled human capital, encourage knowledge sharing, and institutionalize proactive resilience strategies will be better equipped to navigate regulatory, logistical, and market challenges, thereby enhancing their long-term competitiveness and service reliability.

#### **4.13 Slope Analysis**

To further examine the nature of the moderating effect of top management support on the relationship between supply chain resilience and supply chain performance, a simple slope analysis was conducted. This analysis illustrates how variations in the level of top management support influence the strength of the relationship between supply chain resilience and performance outcomes. The resulting pattern of interaction is presented in Figure 4, which depicts the moderating slope.



**Figure 4.3: Slope Analysis**

As illustrated in Figure 4, the slope analysis reveals that top management support significantly strengthens the positive relationship between supply chain resilience and supply chain performance. The slope representing high levels of top management support is notably steeper than that of low support, indicating that when leadership is actively engaged, through resource allocation, strategic guidance, and encouragement of adaptive practices, the impact of resilience on performance outcomes becomes considerably stronger. This finding suggests that in the pharmaceutical industry, managerial support serves as a crucial catalyst that converts resilience capabilities into tangible performance improvements. Firms that invest in visible leadership engagement, empower decision-making, and integrate resilience strategies into organizational planning are therefore more likely to achieve sustained

efficiency, responsiveness, and competitive advantage in their supply chain operations.

#### **4.14 Discussion of Findings**

This section presents the study's findings in relation to its objectives

##### **4.14.1 Intellectual Capital and Supply Chain Performance**

The findings indicate that Intellectual Capital exerts a positive and significant influence on Supply Chain Performance, affirming that knowledge-based assets are central to achieving operational excellence. The findings indicate that an increase in intellectual capital (comprising human, relational, and structural capital) will enhance the supply chain performance of the pharmaceutical industry by 34.5%. This implies that intellectual capital, embodied in skilled professionals, efficient internal systems, and collaborative relationships, enables firms to manage inventory accurately, ensure product quality, and respond swiftly to regulatory and market changes. The result implies that firms that institutionalise learning, codify operational knowledge, and nurture strategic partnerships outperform those that rely solely on physical or financial resources.

This outcome is consistent with empirical research demonstrating that intellectual capital strengthens organizational and supply chain capabilities. Chen and Chen (2021) found that intellectual capital enhances internal integration, thereby improving coordination and performance. Also, Wang et al. (2021) reported that human, structural, and relational capital jointly foster innovation and operational effectiveness. Similarly, Rehman et al. (2021) found that intellectual capital influences management control systems and strategic decisions, leading to improved innovation outcomes. These studies collectively emphasize that knowledge-driven capabilities facilitate agility, coordination, and process improvement. Within Ghana's

pharmaceutical sector, where firms face challenges such as supply disruptions and import dependency, such capabilities enable efficient procurement, timely drug distribution, and compliance with regulatory standards, thus translating knowledge into measurable performance gains.

Further support arises from research that links intellectual capital to learning and adaptability. Mubarik et al. (2021) demonstrated that intellectual capital enhances resilience through supply chain learning, while Zhang et al. (2017) showed that supplier knowledge integration mediates the relationship between intellectual capital and innovation performance. These findings align with the present study, suggesting that Ghanaian pharmaceutical firms leverage intellectual capital to build adaptive and learning-oriented supply chains. Well-developed structural capital enables systematic information sharing, while strong relational capital fosters trust among partners; both are critical for anticipating disruptions and sustaining operations. The ability to learn from experience and integrate supplier knowledge contributes to long-term performance stability and continuous improvement.

The findings resonate with the tenets of the KBV, highlighting that firms achieve superior performance by mobilizing and combining dispersed knowledge through human expertise, routines, and technological systems (Nonaka & Takeuchi, 1995; Nahapiet & Ghoshal, 1998). In this sense, intellectual capital acts as a dynamic capability that transforms knowledge into strategic outcomes. For pharmaceutical firms in Ghana, developing human capital through ongoing professional training, strengthening structural capital via digital platforms, and deepening relational capital through trust-based collaboration can substantially enhance supply chain performance. The findings thus reinforce the theoretical assertion that knowledge assets are the foundation of sustainable competitive advantage, as well as the practical

reality that intellectual capital is a decisive driver of supply chain performance in knowledge-intensive industries, such as the pharmaceutical sector.

#### **4.14.2 Supply Chain Resilience and Supply Chain Performance**

The results show that Supply Chain Resilience has a positive and significant effect on Supply Chain Performance, indicating that firms with greater adaptive capacity, flexibility, and recovery mechanisms achieve superior operational outcomes. This relationship suggests that an increase in resilience will enhance the supply chain performance of the pharmaceutical industry by 26.7%. This indicates that resilience enables firms to anticipate disruptions, maintain stability during crises, and swiftly restore normal operations, thereby enhancing efficiency, reliability, and customer satisfaction. In the pharmaceutical industry, this finding suggests that firms capable of adjusting their sourcing strategies, managing supply chain disruptions, and learning from past disruptions are better positioned to ensure continuous drug availability and compliance with health regulations. Strengthening resilience through risk assessment, supplier diversification, and information-sharing systems is therefore essential for sustaining supply chain performance in an environment characterized by import dependency, regulatory fluctuations, and logistics challenges.

The finding is consistent with Hamidu et al. (2023), who demonstrated that resilience significantly enhances performance among Ghanaian manufacturing firms, even in the face of varying types of disruptions. Similarly, Li et al. (2017) identified preparedness, alertness, and agility as critical dimensions of resilience that drive financial performance, with proactive preparedness exerting the most decisive influence. These studies collectively suggest that resilience enhances firms' ability to stabilize operations, maintain supplier coordination, and ensure product availability, particularly in volatile environments. In the pharmaceutical industry, resilience is

particularly crucial due to the sector's reliance on imported raw materials, stringent regulatory requirements, and the necessity for an uninterrupted drug supply. Firms that proactively invest in contingency planning, supplier diversification, and adaptive logistics systems are therefore better equipped to sustain their performance when faced with disruptions such as global supply shortages or import delays.

These results are further reinforced by studies that emphasize resilience as a dynamic capability, linking environmental adaptability with performance outcomes. Asamoah et al. (2020) found that social network relationships enhance resilience, which subsequently improves customer-oriented performance, while Norman (2024) confirmed that adaptive capability, artificial intelligence, and collaboration significantly improve both resilience and performance. Similarly, Stentoft et al. (2023) and Ruel and Baz (2021) provided evidence that resilient firms achieve better financial outcomes during crises, particularly when disaster preparedness and absorptive capacity are integrated into their operations. Sadia et al. (2024) further expanded this perspective by demonstrating that resilience enhances performance through its sustainability dimensions, including social, environmental, and economic aspects, underscoring the holistic nature of resilient supply chains. Taken together, these findings validate the current study's results and highlight the importance of resilience as a strategic enabler of operational stability and long-term competitiveness. For pharmaceutical firms in Ghana, this highlights the need to institutionalize resilience through digital monitoring systems, collaborative supplier partnerships, and employee training that focuses on adaptive decision-making.

The significant positive relationship between Supply Chain Resilience and Supply Chain Performance reflects the essence of the DCT, which emphasizes the importance of adaptability and continuous renewal in maintaining competitiveness

(Teece, Pisano, & Shuen, 1997). In line with DCT, resilience represents an organization's ability to sense potential disruptions, seize emerging opportunities, and transform its operations to sustain effectiveness under changing conditions (Teece, 2018). This finding indicates that firms with well-developed adaptive capacities can maintain consistent performance even in uncertain environments. Thus, the results affirm that enduring supply chain performance stems from dynamic, learning-oriented capabilities that allow firms to evolve in response to environmental turbulence.

#### **4.14.3 Moderating Effect of Top Management Support**

The study revealed that top management support has a significant influence on the relationship between Supply Chain Resilience and Supply Chain Performance, indicating that the positive effect of resilience on performance becomes stronger with active managerial involvement. This finding suggests that leadership commitment enhances the effectiveness of resilience efforts by providing strategic direction, allocating resources, and fostering a culture of collaboration and flexibility. In the pharmaceutical industry, this suggests that companies with visible top management engagement, through investments in risk management systems, staff empowerment, and interdepartmental coordination, are better positioned to turn resilience capabilities into better performance results. The moderating effect highlights that leadership support is not just optional but a vital factor that enhances the benefits of resilience, ensuring steady supply chain operations and improved competitiveness in a volatile market environment.

The finding aligns with the core propositions of the UET, which argues that organizational outcomes mirror the cognitive orientations and strategic values of top executives (Hambrick & Mason, 1984). This result demonstrates that when leaders actively prioritize resilience initiatives, their strategic vision and commitment enhance

the effectiveness of resilience in driving performance. As emphasized by Pettit et al. (2019) and Wieland and Durach (2021), managerial involvement ensures that resilience-building efforts receive the necessary resources and are embedded into operational routines. In the pharmaceutical sector, this suggests that executives who recognize the strategic importance of resilience, through investment in risk management systems, flexible sourcing, and supplier partnerships, enable firms to maintain operational continuity during disruptions. The evidence supports UET's view that managerial cognition and values shape how organizational capabilities are activated, reinforcing that leadership engagement is a decisive factor in converting resilience into superior supply chain performance.

The finding is strongly reinforced by empirical evidence across diverse organizational contexts. Numerous studies have demonstrated that leadership commitment plays a pivotal role in enhancing the effectiveness of strategic initiatives by providing direction, resources, and a supportive climate for execution. For instance, Lee et al. (2017) found that top management support amplified the impact of human resource development efforts on organizational commitment through job satisfaction, illustrating that leadership endorsement magnifies the benefits of internal capability-building initiatives. Similarly, Chatterjee et al. (2023) reported that management backing strengthened the link between corporate social responsibility performance and firm sustainability, emphasizing the catalytic role of leadership in translating operational practices into strategic outcomes. In line with these findings, Fareed and Su (2022) showed that top management support moderated the relationship between project governance and performance in public sector projects, ensuring that governance mechanisms were effectively implemented. The studies emphasise that when executives actively engage in and champion resilience-related

strategies, they create an environment that enables the firm to enhance its adaptability and performance during disruptions.

In the context of supply chain and manufacturing systems, empirical research further confirms that managerial commitment enhances the translation of operational capabilities into performance outcomes. Shee et al. (2018) revealed that top management support strengthened the relationship between supply chain integration and performance, especially in supplier and internal integration processes, while Xue et al. (2024) found that leadership backing improved the adoption of new construction technologies by boosting organizational readiness and motivation. Similarly, Chatterjee et al. (2024) demonstrated that managerial involvement amplified the positive impact of deep learning technology capability on smart manufacturing systems, while Uddin and Jayaram (2025) established that leadership support increased firms' responsiveness to buyer and competition pressures in automation adoption. These findings align with the current study's results, confirming that leadership engagement improves the effectiveness of resilience initiatives by promoting strategic alignment, knowledge sharing, and resource reallocation. In the pharmaceutical industry, this suggests that firms with strong managerial commitment, through investment in agile systems, supplier development, and employee empowerment, are better positioned to turn resilience into superior supply chain performance, ensuring stability and competitiveness in a highly regulated and uncertain market environment.

#### **4.14.4 The Mediating Role of Supply Chain Resilience**

The results demonstrated that supply chain resilience plays a significant mediating role in the relationship between intellectual capital and supply chain performance, indicating that the knowledge resources embedded within firms mainly

lead to better performance through enhanced resilience capabilities. This finding emphasizes that intellectual capital forms the foundation for building adaptable and responsive supply chains. In the pharmaceutical sector, this relationship is particularly crucial, as firms must navigate frequent regulatory changes, import delays, and supply disruptions. Firms that successfully convert their human expertise, technological infrastructure, and collaborative networks into resilience skills are better equipped to anticipate risks, adjust supply strategies, and maintain medicine availability during crises. This mediating effect highlights that intellectual capital is not just a static asset but a dynamic driver of organizational agility, turning knowledge into practical strategies that support continuity, customer trust, and market stability. The findings show that resilience serves as the linchpin that transforms intellectual potential into operational excellence within the pharmaceutical supply chain ecosystem.

The significant mediating role of Supply Chain Resilience closely aligns with the principles of the DCT, which states that competitive advantage comes not just from having resources but from a firm's ability to constantly renew, reconfigure, and use those resources in dynamic settings (Teece, Pisano, & Shuen, 1997). The findings indicate that intellectual capital, encompassing human, structural, and relational aspects, enhances performance by fostering resilience capabilities that enable firms to identify potential disruptions, capitalize on new opportunities, and adapt operational processes to remain stable (Teece, 2018). This suggests that firms utilizing employee expertise, robust information systems, and strong partner networks are better equipped to anticipate risks, adjust supply operations, and maintain performance during uncertain times. This demonstrates DCT's view that resilience acts as a dynamic ability that turns intangible knowledge assets into adaptive responses and successful

outcomes. Therefore, intellectual capital is the base of potential value, while resilience is the mechanism that turns that potential into real operational success.

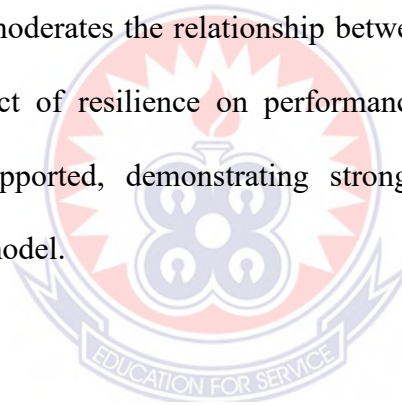
The finding is supported by empirical evidence demonstrating that resilience acts as a critical mechanism through which organisational resources translate into superior performance outcomes. For instance, Qader et al. (2022) found that the adoption of Industry 4.0 technologies improved supply chain performance primarily through resilience, as technological integration enhanced firms' capacity to sense disruptions, respond quickly, and maintain continuity. Similarly, Bahrami et al. (2022) showed that big data analytics capabilities contribute to performance indirectly by fostering resilience and innovation, highlighting that adaptive and learning-based supply chains are better equipped to withstand volatility. Likewise, Haq and Aslam (2023) confirmed that entrepreneurial leadership drives performance through resilience-building, reinforcing the idea that dynamic capabilities serve as the bridge between strategic resources and performance. These studies collectively affirm that resilience transforms latent capabilities into tangible operational advantages, mirroring the mediating pattern observed between intellectual capital and supply chain performance in the current study.

Within the context of Ghana's pharmaceutical industry, this finding aligns with research by Asamoah et al. (2020), who demonstrated that social networks enhance resilience and customer-oriented performance among SMEs, indicating that relational resources can strengthen adaptability during disruptions. Similarly, Seif and Jafari (2025) found that analytics capabilities improved firm performance through resilience, emphasizing the necessity of analytical insight and flexibility in managing uncertainty. Salam and Bajaba (2023) also demonstrated that alignment between marketing and supply chain management indirectly enhances firm performance via

resilience, illustrating that cross-functional coordination strengthens responsiveness and recovery capacity. Together, these findings converge on a consistent conclusion: resilience serves as the conduit through which knowledge, technology, and relational resources yield sustained improvements in performance.

#### **4.15 Chapter Summary**

This chapter confirms that intellectual capital, supply chain resilience, and top management support have a significant influence on supply chain performance. The results indicated that intellectual capital has a positive effect on both resilience and performance, while resilience enhances performance and mediates the relationship between intellectual capital and performance. The analysis also established that top management support moderates the relationship between resilience and performance, strengthening the effect of resilience on performance outcomes. All hypothesised relationships were supported, demonstrating strong interconnections among the constructs within the model.



## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATION

#### 5.0 Introduction

This chapter presents a summary of the study's key findings, draws conclusions aligned with the research objectives, and offers practical recommendations based on empirical evidence. It provides an overview of the main results, highlights key insights, and explains how these findings contribute to addressing the research problem. Additionally, the chapter outlines directions for future research and suggests policy and practice interventions to improve the effectiveness of the context under study.

#### 5.1 Summary of Findings

The study examines the effect of intellectual capital on supply chain performance, the roles of resilience and top management support in the pharmaceutical industry in Ghana. The study was guided by four specific objectives:

- i. To examine the effect of intellectual capital on supply chain performance in the pharmaceutical industry in Ghana.
- ii. To assess the effect of resilience on supply chain performance in the pharmaceutical industry in Ghana.
- iii. To examine how top management support moderates the relationship between resilience and supply chain performance
- iv. To examine the mediating role of resilience in the relationship between intellectual capital and supply chain performance in the pharmaceutical industry in Ghana.

The study is grounded in three interrelated theoretical perspectives: the knowledge-based view, the dynamic capabilities theory, and the upper echelons theory, which collectively provide a comprehensive understanding of how intellectual

capital, supply chain resilience, and top management support impact supply chain performance. The Knowledge-Based View positions knowledge as the most critical organisational resource, explaining how human, structural, and relational capital enhance value creation through effective knowledge sharing and application. The Dynamic Capability Theory builds on this by emphasising the importance of adaptability and renewal, proposing that firms achieve superior performance by sensing changes, seizing opportunities, and transforming internal processes to maintain competitiveness. The Upper Echelons Theory complements these perspectives by highlighting the role of managerial cognition and strategic orientation in shaping organisational decisions, particularly how leadership support determines the prioritisation and effectiveness of resilience-building initiatives. The theories form an integrated framework that explains how knowledge resources, adaptive capabilities, and executive commitment interact to drive sustainable supply chain performance.

This study employed a quantitative, explanatory research design grounded in the post-positivist philosophical paradigm to investigate the relationships among intellectual capital, supply chain resilience, top management support, and supply chain performance within Ghana's pharmaceutical industry. The post-positivist stance acknowledges that, while objective reality can be studied through measurement and observation, findings remain subject to refinement. This aligns with the study's aim to test theoretical relationships using statistical techniques empirically. The quantitative approach was selected for its suitability in examining cause-and-effect relationships through measurable constructs and hypothesis testing. Data were collected using a structured questionnaire adapted from validated instruments in prior literature, ensuring content validity and reliability. The instrument covered sections on

intellectual capital, resilience, top management support, and performance, with responses recorded on a five-point Likert scale. The target population consisted of all 275 pharmaceutical firms registered with the Food and Drugs Authority in Ghana. A census sampling method was adopted to ensure comprehensive coverage of manufacturers, importers, and distributors.

Data were collected through direct distribution of questionnaires to the firms. Completed questionnaires were coded and cleaned using SPSS version 26, then exported to SmartPLS-SEM 4 for advanced analysis. Descriptive statistics were used to summarize demographic data. At the same time, structural equation modeling was used to test the hypothesized relationships, including the mediating role of supply chain resilience and the moderating effect of top management support. Reliability was assessed through Cronbach's alpha and composite reliability, while validity was verified using factor loadings, average variance extracted, and discriminant validity tests. Ethical standards were strictly observed by obtaining institutional consent, ensuring respondent confidentiality, and maintaining voluntary participation. Out of 275 questionnaires distributed to pharmaceutical firms, 227 were returned, yielding an initial response rate of 82.5%. After excluding 12 incomplete responses, 215 valid questionnaires were retained for analysis, resulting in an effective response rate of 78.2%. This high rate demonstrates strong participation and ensures the reliability and representativeness of the study's data.

The study found that intellectual capital significantly enhances supply chain performance both directly and indirectly through supply chain resilience. Similarly, supply chain resilience was shown to have a strong positive effect on supply chain performance, confirming its role as a critical dynamic capability that enables firms to anticipate, respond to, and recover from disruptions. Moreover, top management

support was found to positively moderate the relationship between supply chain resilience and supply chain performance, indicating that managerial commitment and resource backing strengthen the performance benefits derived from resilience initiatives. Lastly, the findings proved that supply chain resilience partially mediates the relationship between intellectual capital and supply chain performance in the pharmaceutical industry.

## **5.2 Conclusion**

The study examines the effect of intellectual capital on supply chain performance, as well as the roles of resilience and top management support in the pharmaceutical industry in Ghana. The findings confirm that all hypothesized relationships in the study were supported, demonstrating a coherent and interdependent framework that links intellectual capital, supply chain resilience, top management support, and supply chain performance. Specifically, intellectual capital was found to have a significant positive effect on both supply chain resilience and performance, indicating that firms with stronger knowledge-based assets achieve superior operational outcomes. Supply chain resilience also positively influenced performance, reinforcing its role as a vital capability that enables firms to withstand and adapt to disruptions. Furthermore, the mediating effect of resilience in the relationship between intellectual capital and performance highlights that the benefits of knowledge resources are realised through enhanced adaptive capacity. The moderating effect of top management support further showed that leadership commitment amplifies the positive impact of resilience on performance.

## **5.3 Managerial Implication**

The findings of this study offer several critical managerial implications for pharmaceutical firms operating in Ghana's dynamic and competitive environment.

First, the significant impact of intellectual capital on both supply chain resilience and performance underscores the need for managers to prioritise the systematic development and utilisation of knowledge-based assets. Firms should invest in strengthening human capital through continuous professional training, technical skill enhancement, and knowledge-sharing initiatives that encourage innovation and problem-solving across departments. Equally, structural capital, such as digital systems, data management infrastructure, and standard operating procedures, should be reinforced to ensure efficient coordination and decision-making. Building strong relational capital with suppliers, regulatory agencies, and distribution partners will further enhance information exchange, trust, and collaboration, leading to improved supply chain visibility and responsiveness. By embedding intellectual capital into strategic and operational processes, pharmaceutical firms can better anticipate disruptions, optimise resource allocation, and sustain long-term competitive advantage.

Moreover, the findings highlight the importance of resilience and top management support as critical enablers of superior supply chain performance. Managers should institutionalize resilience-building practices, such as scenario planning, supplier diversification, inventory flexibility, and the adoption of digital monitoring systems that enable early detection of risks and swift recovery from disruptions. Senior executives must take an active role in endorsing and allocating resources for these resilience initiatives, ensuring that they are not treated as reactive responses but as strategic capabilities integrated into corporate planning. Leadership commitment should also promote a culture of agility and continuous learning, where employees are encouraged to experiment, share insights, and adapt to evolving market conditions. Ultimately, by aligning intellectual capital development with proactive

resilience strategies and visible top management support, pharmaceutical firms in Ghana can strengthen their supply chain robustness, improve operational efficiency, and enhance their ability to consistently deliver essential healthcare products, even in times of uncertainty.

#### **5.4 Theoretical Implication**

The findings of this study provide strong theoretical validation and integration of the KBV, DCT, and UET in explaining supply chain performance within the pharmaceutical sector. The significant effect of intellectual capital on supply chain performance and resilience supports the central tenets of the knowledge-based view, which posits that knowledge and intangible resources form the foundation of sustainable competitive advantage. The study demonstrates that intellectual capital (human, structural, and relational capital) serves as a strategic assets that enhance supply chain performance. By demonstrating that intellectual capital enhances both resilience and performance, the results confirm that knowledge embedded in employees, systems, and networks enables firms to identify opportunities, respond effectively to disruptions, and maintain high performance levels. This reinforces the argument that in complex, knowledge-intensive industries such as pharmaceuticals, the ability to leverage intellectual resources determines not only innovation capacity but also operational continuity under volatile market conditions.

The findings also substantiate dynamic capability theory by demonstrating that supply chain resilience acts as a critical mechanism through which intellectual capital translates into performance outcomes. Resilience embodies the dynamic capability of an organisation to sense environmental changes, seize opportunities, and transform internal structures to maintain competitiveness. The mediation effect observed in this study indicates that intellectual resources alone are insufficient unless channelled

through adaptive processes that enable firms to anticipate, absorb, and recover from disruptions. Furthermore, the moderating influence of top management support aligns with the upper echelons theory, confirming that executives' commitment, vision, and strategic orientation significantly shape how dynamic capabilities are developed and deployed. This highlights the theoretical proposition that managerial cognition and leadership behaviour determine the effectiveness of resource utilisation in achieving strategic goals. The integration of these theories highlights a multidimensional understanding of performance, where knowledge assets provide the foundation, dynamic capabilities drive adaptability, and managerial leadership ensures strategic alignment, thus advancing theory by demonstrating their interdependence in explaining organisational resilience and performance in turbulent environments.

### **5.5 Contribution to Knowledge**

This study makes a significant contribution to knowledge by advancing an integrated theoretical understanding of how intellectual capital, supply chain resilience, and top management support jointly influence supply chain performance within the pharmaceutical industry. By empirically linking the knowledge-based view, dynamic capability theory, and upper echelons theory, the research moves beyond isolated theoretical explanations to present a holistic model that captures the interaction between knowledge resources, adaptive capabilities, and leadership behaviour. The findings reveal that intellectual capital enhances performance not only directly but also indirectly through resilience, demonstrating the pivotal role of adaptive processes in converting knowledge assets into tangible outcomes. Moreover, the moderating effect of top management support extends the upper echelons perspective by showing how executive commitment amplifies the value of resilience-building efforts in achieving operational excellence. This synthesis contributes to the

theoretical discourse by establishing that organisational performance in dynamic environments is best explained through the interplay of knowledge, capability development, and leadership-driven strategic alignment, thereby enriching both supply chain management and strategic management literature.

## **5.6 Limitations and Recommendations for Future Research**

This study recognizes several limitations that offer valuable directions for future research. The use of a cross-sectional design restricts the ability to determine causal relationships among intellectual capital, supply chain resilience, top management support, and supply chain performance. Future research could adopt a longitudinal approach to observe how these relationships change over time and across different environmental conditions. Additionally, focusing solely on Ghana's pharmaceutical sector may limit the applicability of the findings to other industries or regions with different institutional and cultural contexts. Broadening the scope to include multiple sectors or cross-country comparisons would improve the external validity of the results. Relying on self-reported data might also introduce common method bias; therefore, future studies could incorporate objective performance metrics or use mixed-methods designs to enhance data robustness. Finally, adding more moderating or mediating variables could provide a deeper understanding of the mechanisms affecting supply chain performance.

## REFERENCE

- Ahmed, M., Ullah, I., Mugahed Al-Rahmi, W., Alzahrani, A. I., & Ameen, N. (2022). Intellectual capital and organizational agility in SMEs: The role of dynamic capabilities and environmental turbulence. *Journal of Business Research*, 144, 451–463. <https://doi.org/10.1016/j.jbusres.2022.01.059>
- Alavi, M., & Leidner, D. E. (2001). Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS Quarterly*, 25(1), 107–136. <https://doi.org/10.2307/3250961>
- Al-Fawaz, K., Drew, S., & Al-Fawaz, F. (2008). Critical success factors in ERP implementation: A review. *European and Mediterranean Conference on Information Systems*, 1–12.
- Al-Hakim, L., Hassan, S., & Al-Nasrawi, S. (2023). Intellectual capital and sustainable competitive advantage: Evidence from emerging economies. *Management Decision*, 61(1), 211–229. <https://doi.org/10.1108/MD-06-2022-0721>
- Ali, Z., Gongbing, B., Mehreen, A., & Rehman, I. (2021). The impact of green intellectual capital on green innovation adoption: Evidence from Pakistan's manufacturing SMEs. *Sustainability*, 13(4), 2212. <https://doi.org/10.3390/su13042212>
- Almanasreh, E., Moles, R., & Chen, T. F. (2019). Evaluation of methods used for estimating content validity. *Research in Social and Administrative Pharmacy*, 15(2), 214–221. <https://doi.org/10.1016/j.sapharm.2018.03.066>
- Alrowwad, A., Abualoush, S., Masa'deh, R., & Taamneh, A. (2020). Intellectual capital and organizational performance: The mediating role of knowledge sharing. *VINE Journal of Information and Knowledge Management Systems*, 50(3), 322–342. <https://doi.org/10.1108/VJIKMS-08-2019-0120>
- Alsyouf, A., Ishak, A. K., & Abualqumboz, M. (2022). The role of top management support in driving digital transformation: A dynamic capabilities perspective. *Journal of Enterprise Information Management*, 35(2), 480–499. <https://doi.org/10.1108/JEIM-05-2020-0207>
- Altay, N., Gunasekaran, A., Dubey, R., & Childe, S. J. (2018). Agility and resilience in humanitarian supply chains: Empirical evidence from India. *International Journal of Production Research*, 56(21), 6609–6629. <https://doi.org/10.1080/00207543.2017.1394599>
- Ambulkar, S., Blackhurst, J., & Grawe, S. (2015). Firm's resilience to supply chain disruptions: Scale development and empirical examination. *Journal of Operations Management*, 33–34, 111–122. <https://doi.org/10.1016/j.jom.2014.11.002>
- Ambulkar, S., Blackhurst, J., & Grawe, S. (2015). Firm's resilience to supply chain disruptions: Scale development and empirical examination. *Journal of*

*Operations Management*, 33–34, 111–122.  
<https://doi.org/10.1016/j.jom.2014.11.002>

- Arshad, D., Khan, M. A., & Ameen, N. (2023). Intellectual capital and sustainable competitive advantage: Mediating role of knowledge management capabilities. *Journal of Intellectual Capital*, 24(2), 329–347. <https://doi.org/10.1108/JIC-07-2022-0164>
- Asamoah, D., Annan, J., & Nyarko, S. (2020). Social network relationships, supply chain resilience and customer-oriented performance of small and medium enterprises in Ghana. *International Journal of Emerging Markets*, 15(3), 571–595. <https://doi.org/10.1108/IJOEM-04-2017-0138>
- Babbie, E. R. (2021). *The practice of social research* (15th ed.). Cengage Learning.
- Bahrani, M., Shokouhyar, S., & Gholamian, M. R. (2022). Big data analytics capabilities and supply chain performance: The mediating role of supply chain resilience and innovation. *Kybernetes*, 51(4), 1425–1449. <https://doi.org/10.1108/K-04-2020-0236>
- Bambale, A. J. (2014). *Research methodology and dissertation writing for business students*. Kano: Department of Business Administration, Bayero University.
- Bantel, K. A., & Jackson, S. E. (1989). Top management and innovations in banking: Does the composition of the top team make a difference? *Strategic Management Journal*, 10(S1), 107–124. <https://doi.org/10.1002/smj.4250100709>
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99–120. <https://doi.org/10.1177/014920639101700108>
- Bayraktaroglu, A. E., Calisir, F., & Baskak, M. (2019). Intellectual capital and firm performance: an extended VAIC model. *Journal of intellectual capital*, 20(3), 406–425.
- Beamon, B. M. (1999). Measuring supply chain performance. *International Journal of Operations & Production Management*, 19(3), 275–292. <https://doi.org/10.1108/01443579910249714>
- Bhattacharjee, A. (2012). *Social science research: Principles, methods, and practices* (2nd ed.). University of South Florida.
- Birken, S. A., Lee, S.-Y. D., & Weiner, B. J. (2015). Uncovering middle managers' role in healthcare innovation implementation. *Implementation Science*, 7, 28. <https://doi.org/10.1186/1748-5908-7-28>
- Bode, C., Wagner, S. M., Petersen, K. J., & Ellram, L. M. (2011). Understanding responses to supply chain disruptions: Insights from information processing and resource dependence perspectives. *Academy of Management Journal*, 54(4), 833–856. <https://doi.org/10.5465/amj.2011.64870145>

- Bontis, N. (1998). Intellectual capital: An exploratory study that develops measures and models. *Management Decision*, 36(2), 63–76. <https://doi.org/10.1108/00251749810204142>
- Bontis, N. (1999). Managing organizational knowledge by diagnosing intellectual capital: Framing and advancing the state of the field. *International Journal of Technology Management*, 18(5–8), 433–462. <https://doi.org/10.1504/IJTM.1999.002780>
- Bontis, N., Ciambotti, M., Palazzi, F., & Sgro, F. (2018). Intellectual capital and financial performance in social cooperative enterprises. *Journal of Intellectual Capital*, 19(4), 712–731.
- Bontis, N., Janošević, S., & Dženopoljac, V. (2015). Intellectual capital in Serbia's hotel industry. *International Journal of Contemporary Hospitality Management*, 27(6), 1365–1384.
- Boonstra, A. (2013). How do top managers support strategic information system projects and why do they sometimes withhold this support? *International Journal of Project Management*, 31(4), 498–512. <https://doi.org/10.1016/j.ijproman.2012.09.013>
- Booth, A., Sutton, A., & Papaioannou, D. (2016). *Systematic approaches to a successful literature review* (2nd ed.). Sage.
- Brandon-Jones, E., Squire, B., Autry, C. W., & Petersen, K. J. (2014). A contingent resource-based perspective of supply chain resilience and robustness. *Journal of Supply Chain Management*, 50(3), 55–73. <https://doi.org/10.1111/jscm.12050>
- Bryman, A. (2016). *Social research methods* (5th ed.). Oxford University Press.
- Bryman, A., & Bell, E. (2022). *Business research methods* (6th ed.). Oxford University Press.
- Butarbutar, M., Setiawan, H., & Surjasa, D. (2023). Top management support and ERP system success in developing countries: Evidence from SMEs. *Cogent Business & Management*, 10(1), 2183655. <https://doi.org/10.1080/23311975.2023.2183655>
- Cabello-Medina, C., López-Cabrales, Á., & Valle-Cabrera, R. (2011). Leveraging the innovative performance of human capital through HRM and social capital in Spanish firms. *The International Journal of Human Resource Management*, 22(4), 807–828. <https://doi.org/10.1080/09585192.2011.555125>
- Cabrita, M. R., & Bontis, N. (2008). Intellectual capital and business performance in the Portuguese banking industry. *International Journal of Technology Management*, 43(1–3), 212–237. <https://doi.org/10.1504/IJTM.2008.019416>
- Çankaya, S. Y., & Sezen, B. (2018). Effects of green supply chain management practices on sustainability performance. *Journal of Manufacturing Technology Management*, 30(1), 98–121. <https://doi.org/10.1108/JMTM-03-2018-0099>

- Carmeli, A., & Schaubroeck, J. (2008). Organisational crisis-preparedness: The importance of learning from failures. *Long Range Planning*, 41(2), 177–196. <https://doi.org/10.1016/j.lrp.2008.01.001>
- Carpenter, M. A., Geletkanycz, M. A., & Sanders, W. G. (2004). Upper echelons research revisited: Antecedents, elements, and consequences of top management team composition. *Journal of Management*, 30(6), 749–778. <https://doi.org/10.1016/j.jm.2004.06.001>
- Chahal, H., & Bakshi, P. (2016). Measurement of intellectual capital in the Indian banking sector. *Vikalpa*, 41(1), 61-73.
- Chatterjee, S., Chaudhuri, R., & Vrontis, D. (2023). The impact of green human resource management on organizational sustainability: The moderating role of top management team support. *Journal of Cleaner Production*, 395, 136330. <https://doi.org/10.1016/j.jclepro.2023.136330>
- Chatterjee, S., Chaudhuri, R., & Vrontis, D. (2024). Deep learning technology capability and smart manufacturing systems: Moderating roles of technological turbulence and top management support. *Technological Forecasting and Social Change*, 198, 122929. <https://doi.org/10.1016/j.techfore.2023.122929>
- Chatterjee, S., Vrontis, D., Thrassou, A., & Shams, S. M. R. (2023). Corporate social responsibility activities and firm sustainability: The mediating role of CSR performance and moderating role of top management support. *Corporate Social Responsibility and Environmental Management*, 30(2), 509–522. <https://doi.org/10.1002/csr.2410>
- Chen, J., & Chen, Y. (2021). Effects of intellectual capital and big data analytical capability on operational performance: The mediating role of supply chain integration. *Journal of Business Research*, 131, 242–250. <https://doi.org/10.1016/j.jbusres.2021.03.061>
- Chinnasamy, R., Loganathan, G. B., & Govindasamy, S. (2023). Intellectual capital and financial performance: Evidence from the banking sector. *Journal of Intellectual Capital*, 24(1), 88–105. <https://doi.org/10.1108/JIC-11-2021-0320>
- Choi, B., & Lee, H. (2003). An empirical investigation of KM styles and their effect on corporate performance. *Information & Management*, 40(5), 403–417. [https://doi.org/10.1016/S0378-7206\(02\)00060-5](https://doi.org/10.1016/S0378-7206(02)00060-5)
- Christopher, M., & Peck, H. (2004). Building the resilient supply chain. *The International Journal of Logistics Management*, 15(2), 1–13. <https://doi.org/10.1108/09574090410700275>
- Coase, R. H. (1937). The nature of the firm. *Economica*, 4(16), 386–405. <https://doi.org/10.1111/j.1468-0335.1937.tb00002.x>
- Cohen, L., Manion, L., & Morrison, K. (2018). Research methods in education (8th ed.). Routledge. <https://doi.org/10.4324/9781315456539>

- Conner, K. R., & Prahalad, C. K. (1996). A resource-based theory of the firm: Knowledge versus opportunism. *Organization Science*, 7(5), 477–501. <https://doi.org/10.1287/orsc.7.5.477>
- Cook, T. D., & Reichardt, C. S. (1979). *Qualitative and quantitative methods in evaluation research*. Sage.
- Craighead, C. W., Ketchen Jr, D. J., & Darby, J. L. (2020). Pandemics and supply chain management research: Toward a theoretical toolbox. *Decision Sciences*, 51(4), 838–866. <https://doi.org/10.1111/dec.12468>
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage.
- Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage.
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Sage.
- Crossland, C., & Hambrick, D. C. (2011). Differences in managerial discretion across countries: How nation-level institutions affect the degree to which CEOs matter. *Strategic Management Journal*, 32(8), 797–819. <https://doi.org/10.1002/smj.913>
- Cyert, R. M., & March, J. G. (1963). *A behavioral theory of the firm*. Englewood Cliffs, NJ: Prentice Hall.
- Darroch, J. (2005). Knowledge management, innovation and firm performance. *Journal of Knowledge Management*, 9(3), 101–115. <https://doi.org/10.1108/13673270510602809>
- Del Giudice, M., Scuotto, V., Garcia-Perez, A., & Petruzzelli, A. M. (2021). Shifting wealth and innovation dynamics: Emerging trends in intellectual capital research. *Journal of Business Research*, 124, 355–367. <https://doi.org/10.1016/j.jbusres.2020.11.055>
- Denzin, N. K., & Lincoln, Y. S. (2018). *The SAGE handbook of qualitative research* (5th ed.). Sage.
- Dost, M., Badir, Y. F., Ali, Z., & Tariq, A. (2016). The impact of intellectual capital on innovation generation and adoption. *Journal of Intellectual Capital*, 17(4), 675–695.
- Dost, M., Badir, Y., Ali, Z., & Tariq, A. (2016). The impact of intellectual capital on innovation generation and adoption. *Journal of Intellectual Capital*, 17(4), 675–695. <https://doi.org/10.1108/JIC-04-2016-0049>
- Dubey, R., Gunasekaran, A., Childe, S. J., Fosso Wamba, S., Roubaud, D., & Foropon, C. (2023). Empirical investigation of data analytics capability and organizational flexibility as complements to supply chain resilience.

*International Journal of Production Research*, 61(1), 1–20. <https://doi.org/10.1080/00207543.2021.1956675>

Dumay, J., & Garanina, T. (2013). Intellectual capital research: A critical examination of the third stage. *Journal of Intellectual Capital*, 14(1), 10–25. <https://doi.org/10.1108/14691931311288995>

Edvinsson, L., & Malone, M. S. (1997). Intellectual capital: Realising your company's true value by finding its hidden brainpower. Harper Business.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal*, 21(10–11), 1105–1121.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal*, 21(10–11), 1105–1121. [https://doi.org/10.1002/1097-0266\(200010/11\)21:10/11<1105::AID-SMJ133>3.0.CO;2-E](https://doi.org/10.1002/1097-0266(200010/11)21:10/11<1105::AID-SMJ133>3.0.CO;2-E)

Elbanna, A., Sarker, S., & Rajapakse, J. (2022). Beyond support: A nuanced view of top management involvement in digital transformation. *Information and Management*, 59(3), 103590. <https://doi.org/10.1016/j.im.2021.103590>

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, 5(1), 1–4. <https://doi.org/10.11648/j.ajtas.20160501.11>

Fareed, M., & Su, Q. (2022). Project governance, top management support, and project performance: A moderated mediation analysis. *International Journal of Project Management*, 40(5), 468–482. <https://doi.org/10.1016/j.ijproman.2022.05.005>

Finkelstein, S., Hambrick, D. C., & Cannella, A. A. (2009). *Strategic leadership: Theory and research on executives, top management teams, and boards*. Oxford University Press.

Fitch Solutions *Analysis Of Domestic Pharmaceutical Supply Chains In Ghana*. <https://www.fitchsolutions.com/pharma-healthcare/ghana-continues-work-towards-increasing-local-pharmaceutical>

Fok, L. Y., Zee, S. M., & Morgan, R. M. (2022). Supply chain sustainability performance measurement: A comprehensive review and future research agenda. *Sustainable Production and Consumption*, 30, 115–133. <https://doi.org/10.1016/j.spc.2021.12.023>

Food and Drugs Authority. (2024). List of licensed pharmaceutical manufacturing companies in Ghana. <https://fdaghana.gov.gh>

García-Meca, E., & Martínez, I. (2005). Assessing the quality of intellectual capital reporting in Spain. *European Accounting Review*, 14(4), 633–658.

- Ghana Ministry of Health. (2021). National Pharmaceutical Policy. Accra: Ministry of Health.
- Goebel, V. (2015). Managing intellectual capital in organizations: Learning from a longitudinal case study. *Knowledge Management Research & Practice*, 13(1), 16–25. <https://doi.org/10.1057/kmrp.2013.46>
- Goffnett, S. P., & Goswami, M. (2016). Supply chain leadership: Conceptualization and scale development. *Journal of Supply Chain Management*, 52(1), 75–94. <https://doi.org/10.1111/jscm.12093>
- Gogan, L. M., Artene, A., Sarca, I., & Draghici, A. (2016). The impact of intellectual capital on organizational performance. *Procedia - Social and Behavioural Sciences*, 221, 194–202.
- Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of Management Information Systems*, 18(1), 185–214. <https://doi.org/10.1080/07421222.2001.11045669>
- GPMA. (2023). Press Release on Industry Challenges. Accra: Ghana Pharmaceutical Manufacturers Association.
- Grant, C., & Osanloo, A. (2014). Understanding, selecting, and integrating a theoretical framework in dissertation research: Creating the blueprint for your “house.” *Administrative Issues Journal*, 4(2), 12–26. <https://doi.org/10.5929/2014.4.2.9>
- Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal*, 17(S2), 109–122. <https://doi.org/10.1002/smj.4250171110>
- Gunasekaran, A., Patel, C., & McGaughey, R. E. (2004). A framework for supply chain performance measurement. *International Journal of Production Economics*, 87(3), 333–347. <https://doi.org/10.1016/j.ijpe.2003.08.003>
- Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2017). A primer on partial least squares structural equation modeling (PLS-SEM) (2nd ed.). Sage.
- Hair, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, 26(2), 106–121. <https://doi.org/10.1108/EBR-10-2013-0128>
- Hair, J. F., Sarstedt, M., Ringle, C., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. *Journal of the Academy of Marketing Science*, 40(3), 414–433. <https://doi.org/10.1007/s11747-011-0261-6>
- Hallikas, J., Puumalainen, K., Vesterinen, T., & Virolainen, V. M. (2020). Risk management processes in supplier networks. *International Journal of Production Economics*, 227, 107–122. <https://doi.org/10.1016/j.ijpe.2020.107662>

- Hambrick, D. C. (2007). Upper echelons theory: An update. *Academy of Management Review*, 32(2), 334–343. <https://doi.org/10.5465/amr.2007.24345254>
- Hambrick, D. C., & Finkelstein, S. (1987). Managerial discretion: A bridge between polar views of organizational outcomes. *Research in Organizational Behavior*, 9, 369–406.
- Hambrick, D. C., & Finkelstein, S. (2023). Upper echelons theory at forty: A review and a look ahead. *Academy of Management Perspectives*, 37(1), 57–76. <https://doi.org/10.5465/amp.2020.0157>
- Hambrick, D. C., & Mason, P. A. (1984). Upper echelons: The organization as a reflection of its top managers. *Academy of Management Review*, 9(2), 193–206. <https://doi.org/10.5465/amr.1984.4277628>
- Hamidu, M., Tweneboah-Koduah, I. Y., & Owusu, G. M. Y. (2023). Supply chain resilience and performance: Moderating role of supply chain disruptions among manufacturing firms in Ghana. *Journal of Manufacturing Technology Management*, 34(9), 138–162. <https://doi.org/10.1108/JMTM-08-2021-0316>
- Haq, I. U., & Aslam, M. K. (2023). Entrepreneurial leadership, supply chain resilience, and supply chain performance: The moderating role of supply chain orientation. *Journal of Business & Industrial Marketing*, 38(5), 1177–1193. <https://doi.org/10.1108/JBIM-08-2021-0420>
- Hashim, M. J., Osman, I., & Alhabshi, S. M. (2015). Effect of intellectual capital on organizational performance. *Procedia - Social and Behavioral Sciences*, 211, 207–214. <https://doi.org/10.1016/j.sbspro.2015.11.085>
- Helfat, C. E., & Raubitschek, R. S. (2018). Dynamic and integrative capabilities for profiting from innovation in digital platform-based ecosystems. *Research Policy*, 47(8), 1391–1399. <https://doi.org/10.1016/j.respol.2018.01.019>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- Herrmann, P., & Datta, D. K. (2005). Relationships between top management team characteristics and international diversification: An empirical investigation. *British Journal of Management*, 16(1), 69–78. <https://doi.org/10.1111/j.1467-8551.2005.00429.x>
- Hohenstein, N.-O., Feisel, E., Hartmann, E., & Giunipero, L. (2015). Research on the phenomenon of supply chain resilience: A systematic review and paths for further investigation. *International Journal of Physical Distribution & Logistics Management*, 45(1/2), 90–117. <https://doi.org/10.1108/IJPDLM-05-2013-0128>
- Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics*, 4(1), 1–23. <https://doi.org/10.1146/annurev.es.04.110173.000245>

- Hosseini, S., Ivanov, D., & Dolgui, A. (2019). Review of quantitative methods for supply chain resilience analysis. *Transportation Research Part E: Logistics and Transportation Review*, *125*, 285–307. <https://doi.org/10.1016/j.tre.2019.03.001>
- Huang, X., & Watson, L. (2015). Corporate social responsibility research in accounting. *Journal of Accounting Literature*, *34*, 1–16. <https://doi.org/10.1016/j.acclit.2015.03.001>
- Hult, G. T. M., Ketchen, D. J., & Arrfelt, M. (2007). Strategic supply chain management: Improving performance through a culture of competitiveness and knowledge development. *Strategic Management Journal*, *28*(10), 1035–1052. <https://doi.org/10.1002/smj.627>
- Huo, B., Gu, M., & Li, J. (2024). Supply chain resilience and firm performance: Evidence from Chinese manufacturers. *International Journal of Operations & Production Management*, *44*(2), 211–238. <https://doi.org/10.1108/IJOPM-06-2022-0401>
- Hussinki, H., Ritala, P., Vanhala, M., & Kianto, A. (2017). Intellectual capital, knowledge management practices and firm performance. *Journal of intellectual capital*, *18*(4), 904–922.
- Inkinen, H. (2015). Review of empirical research on intellectual capital and firm performance. *Journal of Intellectual Capital*, *16*(3), 518–565. <https://doi.org/10.1108/JIC-01-2015-0002>
- Inkinen, H., Kianto, A., & Vanhala, M. (2017). Knowledge management practices and innovation performance: Are they linked? *Journal of Knowledge Management*, *21*(3), 537–556. <https://doi.org/10.1108/JKM-04-2016-0160>
- Ivanov, D. (2020). Predicting the impacts of epidemic outbreaks on global supply chains: A simulation-based analysis on the coronavirus outbreak (COVID-19/SARS-CoV-2) case. *Transportation Research Part E: Logistics and Transportation Review*, *136*, 101922. <https://doi.org/10.1016/j.tre.2020.101922>
- Jabareen, Y. (2009). Building a conceptual framework: Philosophy, definitions, and procedure. *International Journal of Qualitative Methods*, *8*(4), 49–62. <https://doi.org/10.1177/160940690900800406>
- Jitpaiboon, T. (2005). Key issues of management support for successful is implementation: Lessons from ERP. *AMCIS 2005 Proceedings*, 155.
- Kamalahmadi, M., & Parast, M. M. (2016). A review of the literature on the principles of supply chain resilience: Major findings and directions for future research. *International Journal of Production Economics*, *171*(1), 116–133. <https://doi.org/10.1016/j.ijpe.2015.10.023>
- Khalique, M., Bontis, N., Shaari, J. A. N. B., Yaacob, M. R., & Ngah, R. (2015). Intellectual capital and organizational performance: An empirical study in

- SMEs in Pakistan. *Journal of Intellectual Capital*, 16(1), 224–238. <https://doi.org/10.1108/JIC-01-2014-0014>
- Kianto, A., Ritala, P., Spender, J. C., & Vanhala, M. (2020). The interaction of intellectual capital assets and knowledge management practices in organisational value creation. *Journal of Intellectual Capital*, 21(5), 649–667. <https://doi.org/10.1108/JIC-11-2019-0262>
- Kianto, A., Sáenz, J., & Aramburu, N. (2017). Knowledge-based human resource management practices, intellectual capital and innovation. *Journal of Business Research*, 81, 11–20. <https://doi.org/10.1016/j.jbusres.2017.07.018>
- Klarner, P., & Raisch, S. (2013). Move to the beat: Rhythms of change and firm performance. *Academy of Management Journal*, 56(1), 160–184. <https://doi.org/10.5465/amj.2010.0767>
- Kogut, B., & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science*, 3(3), 383–397. <https://doi.org/10.1287/orsc.3.3.383>
- Kraus, S., Jones, P., Kailer, N., Weinmann, A., Chaparro-Banegas, J. A., & Roig-Tierno, N. (2022). Digital transformation: An overview of the current state of the art of research. *SAGE Open*, 12(1), 21582440221085240. <https://doi.org/10.1177/21582440221085240>
- Le, T. (2022). Green supply chain management practices and sustainability performance: Evidence from emerging economies. *Journal of Cleaner Production*, 362, 132–214. <https://doi.org/10.1016/j.jclepro.2022.132214>
- Lee, J., Kim, S., & Kim, Y. (2017). Human resource development efforts, top management support, and employees' attitudes: Evidence from Korea. *Human Resource Development International*, 20(3), 195–213. <https://doi.org/10.1080/13678868.2016.1248720>
- Li, S., Ragu-Nathan, B., Ragu-Nathan, T. S., & Rao, S. S. (2006). The impact of supply chain management practices on competitive advantage and organizational performance. *Omega*, 34(2), 107–124. <https://doi.org/10.1016/j.omega.2004.08.002>
- Li, X., Chung, C., Goldsby, T. J., & Holsapple, C. W. (2017). A unified model of supply chain agility and supply chain resilience: Supply chain preparedness, alertness and agility. *International Journal of Logistics Management*, 28(3), 945–971. <https://doi.org/10.1108/IJLM-07-2016-0177>
- Liao, Y., Hong, P., & Rao, S. S. (2011). Knowledge sharing, absorptive capacity, and innovation capability: An empirical study of Taiwan's knowledge-intensive industries. *Journal of International Technology and Information Management*, 20(3), 109–125.
- Lin, H. F. (2010). An empirical study of knowledge management enablers and knowledge sharing processes. *Journal of Knowledge Management*, 11(3), 51–63. <https://doi.org/10.1108/13673270710752146>

- Liu, Y., Lee, J. M., & Lee, C. (2018). The impact of supply chain resilience on firm performance: Evidence from Korean firms. *Sustainability*, 10(11), 3856. <https://doi.org/10.3390/su10113856>
- Malhotra, N. K., & Birks, D. F. (2007). *Marketing research: An applied approach* (3rd ed.). Pearson Education.
- Manes Rossi, F., Nicolò, G., & Tartaglia Polcini, P. (2018). New trends in intellectual capital reporting: Exploring online intellectual capital disclosure in Italian universities. *Journal of Intellectual Capital*, 19(4), 814-835.
- Marco-Lajara, B., Claver-Cortés, E., Úbeda-García, M., & Zaragoza-Sáez, P. (2022). Intellectual capital and sustainability in the wine industry. *Journal of Intellectual Capital*, 23(4), 813–835. <https://doi.org/10.1108/JIC-08-2021-0208>
- Martín-de-Castro, G., Delgado-Verde, M., Navas-López, J. E., & Cruz-González, J. (2011). The role of corporate culture for intellectual capital development: An empirical study in Spanish firms. *International Journal of Information Management*, 31(3), 239–248. <https://doi.org/10.1016/j.ijinfomgt.2010.08.002>
- Maxwell, J. A. (2012). *A realist approach to qualitative research*. Sage.
- Meredith, J. (1993). Theory building through conceptual methods. *International Journal of Operations & Production Management*, 13(5), 3–11. <https://doi.org/10.1108/01443579310028120>
- Ministry of Health, Ghana. (2021). *National Pharmaceutical Policy*. Accra: Ministry of Health.
- Mokhtar, A., Genovese, A., & Brint, A. (2019). Supply chain leadership and performance: An empirical study. *International Journal of Production Economics*, 210, 95–108. <https://doi.org/10.1016/j.ijpe.2019.01.014>
- Morgan, D. L. (2014). Pragmatism as a paradigm for social research. *Qualitative Inquiry*, 20(8), 1045–1053. <https://doi.org/10.1177/1077800413513733>
- Mubarik, M. S., Bontis, N., Mubarik, M., & Mahmood, T. (2022). Intellectual capital and supply chain resilience. *Journal of intellectual capital*, 23(3), 713-738.
- Mubarik, M. S., Chandran, V. G. R., Devadason, E. S., & Ahmed, Z. (2021). Intellectual capital and supply chain resilience: The role of supply chain learning. *Journal of Intellectual Capital*, 22(6), 1083–1107. <https://doi.org/10.1108/JIC-07-2020-0258>
- Mubarik, M. S., Naghavi, N., & Ahmed, M. (2021). Intellectual capital, supply chain resilience and sustainable competitive advantage. *Journal of Intellectual Capital*, 22(3), 497–521. <https://doi.org/10.1108/JIC-05-2020-0154>
- Mustafa Othman Alsaigh and Dr. Nor Hidayati Zakaria (2017) Top Management Support and Project Team for System/IT Project Success *IOSR Journal of*

*Business and Management (IOSR-JBM)* e-ISSN: 2278-487X, p-ISSN: 2319-7668. Volume 19, Issue 4.

- Nadkarni, S., & Barr, P. S. (2008). Environmental context, managerial cognition, and strategic action: An integrated view. *Strategic Management Journal*, 29(13), 1395–1427. <https://doi.org/10.1002/smj.717>
- Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, 23(2), 242–266. <https://doi.org/10.5465/amr.1998.533225>
- Neely, B. H., Lovelace, J. B., Cowen, A. P., & Hiller, N. J. (2020). Metacritiques of upper echelons theory: Verbal, statistical, and methodological. *Academy of Management Annals*, 14(1), 287–321. <https://doi.org/10.5465/annals.2018.0089>
- Nelson, R. R., & Winter, S. G. (1982). *An evolutionary theory of economic change*. Harvard University Press.
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford University Press.
- Norman, D. A. (2024). Supply chain artificial intelligence, adaptive capability, collaboration, and performance: The mediating role of supply chain resilience. *Sustainability*, 16(2), 567. <https://doi.org/10.3390/su16020567>
- Nortey Mark Anum & Obed Nortey Annan 2025 Transforming Ghana's Pharmaceutical Sector: Opportunities And Strategies In A 24-Hour Economy Policy Framework
- Opoku, R., Addae, B., & Boateng, E. (2023). The role of green supply chain practices in enhancing sustainability performance. *Sustainable Production and Consumption*, 36, 102–115. <https://doi.org/10.1016/j.spc.2023.01.005>
- Østergaard, C. R., Timmermans, B., & Kristinsson, K. (2011). Does a different view create something new? The effect of employee diversity on innovation. *Research Policy*, 40(3), 500–509. <https://doi.org/10.1016/j.respol.2010.11.004>
- Ozkan, N., Cakan, S., & Kayacan, M. (2017). Intellectual capital and financial performance: A study of the Turkish Banking Sector. *Borsa Istanbul Review*, 17(3), 190–198. <https://doi.org/10.1016/j.bir.2016.03.001>
- Pandey, P., & Pandey, M. M. (2021). *Research methodology: Tools and techniques* (4th ed.). Bridge Center.
- Pedro, E., Leitão, J., & Alves, H. (2023). Intellectual capital and sustainability: A systematic literature review. *Sustainability*, 15(2), 1153. <https://doi.org/10.3390/su15021153>
- Penrose, E. T. (1959). *The theory of the growth of the firm*. Basil Blackwell.

- Pettit, T. J., Fiksel, J., & Croxton, K. L. (2010). Ensuring supply chain resilience: Development and implementation of an assessment tool. *Journal of Business Logistics*, 31(1), 1–21. <https://doi.org/10.1002/j.2158-1592.2010.tb00125.x>
- Pharmaceutical Development Fund Report. (2022). Annual Report on the State of the Pharmaceutical Industry in Ghana. Accra: Pharmaceutical Development Fund.
- Phillips, D. C., & Burbules, N. C. (2000). Postpositivism and educational research. Rowman & Littlefield.
- Poh, L. T., Kilicman, A., & Ibrahim, S. N. I. (2018). On Intellectual Capital and Financial Performances of Banks in Malaysia. *Cogent Economics & Finance*, 6(1), 1453574.
- Polanyi, M. (1966). *The tacit dimension*. Routledge & Kegan Paul.
- Ponomarov, S. Y., & Holcomb, M. C. (2009). Understanding the concept of supply chain resilience. *International Journal of Logistics Management*, 20(1), 124–143. <https://doi.org/10.1108/09574090910954873>
- Powell, T. C., Lovallo, D., & Fox, C. R. (2011). Behavioral strategy. *Strategic Management Journal*, 32(13), 1369–1386. <https://doi.org/10.1002/smj.968>
- Qader, I. K., Hameed, A., & Ali, S. (2022). Industry 4.0 technologies and supply chain performance: The mediating role of supply chain resilience and moderating role of supply chain visibility. *Technological Forecasting and Social Change*, 178, 121586. <https://doi.org/10.1016/j.techfore.2022.121586>
- Qiao, S., Xie, Y., & Wu, J. (2024). Critical success factors of ERP implementation: A systematic review. *Enterprise Information Systems*, 18(1), 23–48. <https://doi.org/10.1080/17517575.2022.2112675>
- Rehman, M., Bhatti, A., & Chaudhry, N. (2021). Intellectual capital and innovation capability in manufacturing firms. *Journal of Intellectual Capital*, 22(2), 295–320. <https://doi.org/10.1108/JIC-07-2020-0243>
- Rehman, S. U., Iqbal, M., & Saeed, R. (2021). Intellectual capital, management control systems, business strategies and innovative performance: Evidence from SMEs. *Journal of Intellectual Capital*, 22(3), 467–489. <https://doi.org/10.1108/JIC-03-2020-0092>
- Ritchie, J., Lewis, J., Nicholls, C. M., & Ormston, R. (2013). Qualitative research practice: A guide for social science students and researchers (2nd ed.). Sage.
- Robson, C., & McCartan, K. (2016). Real world research (4th ed.). Wiley.
- Ruel, S., & Baz, J. (2021). Supply chain disaster preparedness, resilience, and robustness: Impact on firm performance during COVID-19. *International Journal of Operations & Production Management*, 41(9), 1360–1384. <https://doi.org/10.1108/IJOPM-08-2020-0595>

- Sadia, S., Kabir, G., & Ahmed, R. (2024). Information technology, supply chain resilience, and performance: The mediating role of sustainability dimensions in Bangladesh. *Journal of Cleaner Production*, 429, 139514. <https://doi.org/10.1016/j.jclepro.2023.139514>
- Salam, M. A., & Bajaba, S. (2023). Marketing–supply chain alignment, resilience, absorptive capacity, and firm performance: Evidence from Saudi Arabia. *Supply Chain Management: An International Journal*, 28(6), 841–856. <https://doi.org/10.1108/SCM-11-2022-0420>
- Sanders, N. R. (2008). Pattern of information technology use: The impact on buyer–supplier coordination and performance. *Journal of Operations Management*, 26(3), 349–367. <https://doi.org/10.1016/j.jom.2007.07.002>
- Sardo, F., Serrasqueiro, Z., & Alves, H. (2018). On the relationship between intellectual capital and financial performance: A panel data analysis on SME hotels. *International Journal of Hospitality Management*, 75, 67–74. <https://doi.org/10.1016/j.ijhm.2018.03.001>
- Saunders, M., Lewis, P., & Thornhill, A. (2007). *Research methods for business students* (4th ed.). Pearson Education.
- Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson Education.
- Schilke, O., Hu, S., & Helfat, C. E. (2018). Quo vadis, dynamic capabilities? A content-analytic review of the current state of knowledge and recommendations for future research. *Academy of Management Annals*, 12(1), 390–439. <https://doi.org/10.5465/annals.2016.0014>
- Scholten, K., & Schilder, S. (2015). The role of supply chain leadership in managing a sustainable supply chain. *International Journal of Operations & Production Management*, 35(6), 953–973. <https://doi.org/10.1108/IJOPM-07-2014-0359>
- Scuotto, V., Ferraris, A., Bresciani, S., & Del Giudice, M. (2022). Intellectual capital and digital transformation: Evidence from European firms. *Journal of Business Research*, 139, 137–148. <https://doi.org/10.1016/j.jbusres.2021.09.051>
- Secundo, G., Dumay, J., Schiuma, G., & Passiante, G. (2020). Managing intellectual capital through a collective intelligence approach: An integrated framework for universities. *Journal of Intellectual Capital*, 21(2), 298–320. <https://doi.org/10.1108/JIC-02-2019-0045>
- Seif, H., & Jafari, H. (2025). Analytics capability, supply chain resilience, and performance: Moderating role of supply chain integration. *International Journal of Production Economics*, 268, 109050. <https://doi.org/10.1016/j.ijpe.2024.109050>
- Shee, H., Miah, S. J., Fairfield, L., & Pujawan, I. N. (2018). The impact of cloud-enabled supply chain integration on performance and sustainability: The moderating role of top management support. *Supply Chain Management: An*

- International Journal*, 23(6), 500–517. <https://doi.org/10.1108/SCM-09-2017-0306>
- Sheffi, Y., & Rice, J. B. (2005). A supply chain view of the resilient enterprise. *MIT Sloan Management Review*, 47(1), 41–48.
- Simon, H. A. (1947). *Administrative behavior: A study of decision-making processes in administrative organizations*. Free Press.
- Singer, E., & Couper, M. P. (2017). Some methodological uses of responses to open questions and other verbatim comments in quantitative surveys. *Methods, Data, Analyses*, 11(2), 115–134. <https://doi.org/10.12758/mda.2017.01>
- Singh, S. P., Modgil, S., Gupta, S., & Sahi, G. K. (2021). Supply chain resilience: Analysing the enablers through interpretive structural modelling. *Benchmarking: An International Journal*, 28(1), 250–275. <https://doi.org/10.1108/BIJ-04-2020-0183>
- Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, 104, 333–339. <https://doi.org/10.1016/j.jbusres.2019.07.039>
- Soetanto, R., & Liem, A. (2019). Intellectual capital and firm performance: The role of innovation and competitive advantage. *Entrepreneurship and Sustainability Issues*, 6(3), 1071–1087. [https://doi.org/10.9770/jesi.2019.6.3\(8\)](https://doi.org/10.9770/jesi.2019.6.3(8))
- Soewarno, N., & Tjahjadi, B. (2020). Measures that matter: an empirical investigation of intellectual capital and financial performance of banking firms in Indonesia. *Journal of Intellectual Capital*, 21(6), 1085–1106.
- Spender, J. C. (1996). Making knowledge the basis of a dynamic theory of the firm. *Strategic Management Journal*, 17(S2), 45–62. <https://doi.org/10.1002/smj.4250171106>
- Stentoft, J., Rajkumar, C., & Mikkelsen, O. S. (2023). Absorptive capacity, supply chain resilience and firm performance during COVID-19: Evidence from Danish manufacturing firms. *International Journal of Operations & Production Management*, 43(3), 337–361. <https://doi.org/10.1108/IJOPM-07-2021-0452>
- Stewart, T. A. (1997). *Intellectual capital: The new wealth of organizations*. Doubleday.
- Stone, M., Aravopoulou, E., & Aravopoulou, D. (2021). How top management support influences digital transformation and innovation. *Journal of Business Strategy*, 42(6), 420–430. <https://doi.org/10.1108/JBS-12-2020-0261>
- Subramaniam, M., & Youndt, M. A. (2005). The influence of intellectual capital on the types of innovative capabilities. *Academy of Management Journal*, 48(3), 450–463. <https://doi.org/10.5465/amj.2005.17407911>

- Talke, K., Salomo, S., & Rost, K. (2011). How top management team diversity affects innovativeness and performance via the strategic choice to focus on innovation fields. *Research Policy*, 40(6), 907–918. <https://doi.org/10.1016/j.respol.2011.02.013>
- Tang, Z., Hull, C. E., & Rothenberg, S. (2018). How corporate social responsibility engagement strategy moderates the CSR–financial performance relationship. *Journal of Management Studies*, 49(7), 1274–1303. <https://doi.org/10.1111/j.1467-6486.2012.01068.x>
- Teece, D. J. (2000). Strategies for managing knowledge assets: The role of firm structure and industrial context. *Long Range Planning*, 33(1), 35–54. [https://doi.org/10.1016/S0024-6301\(99\)00117-X](https://doi.org/10.1016/S0024-6301(99)00117-X)
- Teece, D. J. (2018). Business models and dynamic capabilities. *Long Range Planning*, 51(1), 40–49. <https://doi.org/10.1016/j.lrp.2017.06.007>
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509–533. [https://doi.org/10.1002/\(SICI\)1097-0266\(199708\)18:7<509::AID-SMJ882>3.0.CO;2-Z](https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z)
- Torraco, R. J. (2005). Writing integrative literature reviews: Guidelines and examples. *Human Resource Development Review*, 4(3), 356–367. <https://doi.org/10.1177/1534484305278283>
- Tukamuhabwa, B. R., Stevenson, M., Busby, J., & Zorzini, M. (2015). Supply chain resilience: Definition, review and theoretical foundations for further study. *International Journal of Production Research*, 53(18), 5592–5623. <https://doi.org/10.1080/00207543.2015.1037934>
- Tyrer, S., & Heyman, B. (2016). Sampling in epidemiological research: Issues, hazards and pitfalls. *BJPsych Bulletin*, 40(2), 57–60. <https://doi.org/10.1192/pb.bp.114.050203>
- Uddin, M., & Jayaram, J. (2025). External pressures, supplier automation, workforce upskilling, and the moderating role of top management support: Evidence from Bangladesh’s garment sector. *Journal of Manufacturing Technology Management*, 36(2), 456–478. <https://doi.org/10.1108/JMTM-07-2023-0289>
- UNIDO. (2020). Pharmaceutical Sector Profile: Ghana. Vienna: United Nations Industrial Development Organization. <https://open.unido.org/api/documents/15548932/download/PHARMACEUTICAL%20SECTOR%20PROFILE%20GHANA.pdf>
- United Nations Industrial Development Organization (UNIDO). (2020). Pharmaceutical sector profile: Ghana. Vienna: UNIDO. <https://open.unido.org/api/documents/15548932/download/PHARMACEUTICAL%20SECTOR%20PR%20PROFILE%20GHANA.pdf>
- United Nations. (2015). Transforming our world: The 2030 Agenda for Sustainable Development. New York: United Nations. <https://sdgs.un.org/2030agenda>

- Vale, V. A., Marín-García, J. A., & Rodríguez-Rodríguez, R. (2022). Intellectual capital and sustainability: A systematic review and future research agenda. *Journal of Intellectual Capital*, 23(6), 1249–1277. <https://doi.org/10.1108/JIC-12-2021-0332>
- Voorhees, C. M., Brady, M. K., Calantone, R., & Ramirez, E. (2016). Discriminant validity testing in marketing: An analysis, causes for concern, and proposed remedies. *Journal of the Academy of Marketing Science*, 44(1), 119–134. <https://doi.org/10.1007/s11747-015-0455-4>
- Wang, Y., Hong, P., & Kafouros, M. (2016). Exploring the role of top management in firm innovation capability development. *International Journal of Operations & Production Management*, 36(12), 1642–1666. <https://doi.org/10.1108/IJOPM-03-2015-0175>
- Wang, Z., Wang, N., Cao, J., & Ye, X. (2021). Intellectual capital and firm performance: The mediating role of innovation speed and quality. *Journal of Knowledge Management*, 25(7), 1687–1708. <https://doi.org/10.1108/JKM-11-2020-0850>
- Warner, K. S., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, 52(3), 326–349. <https://doi.org/10.1016/j.lrp.2018.12.001>
- WHO. (2022). Global Medicine Shortages Report. Geneva: World Health Organization.
- Wieland, A., & Durach, C. F. (2021). Two perspectives on supply chain resilience. *Journal of Business Logistics*, 42(3), 315–324. <https://doi.org/10.1111/jbl.12270>
- Wiersema, M. F., & Bantel, K. A. (1992). Top management team demography and corporate strategic change. *Academy of Management Journal*, 35(1), 91–121. <https://doi.org/10.5465/256474>
- Williams, T. A., Gruber, D. A., Sutcliffe, K. M., Shepherd, D. A., & Zhao, E. Y. (2017). Organizational response to adversity: Fusing crisis management and resilience research streams. *Academy of Management Annals*, 11(2), 733–769. <https://doi.org/10.5465/annals.2015.0134>
- Winter, S. G. (2003). Understanding dynamic capabilities. *Strategic Management Journal*, 24(10), 991–995. <https://doi.org/10.1002/smj.318>
- World Bank. (2023). Ghana Economic Update. Washington, DC: World Bank.
- Wrede, M., Velamuri, V. K., & Dauth, T. (2020). Top management characteristics and digital transformation: An empirical analysis. *Business Research*, 13(3), 981–1032. <https://doi.org/10.1007/s40685-020-00127-4>
- Wu, F., Yenyiyurt, S., Kim, D., & Cavusgil, S. T. (2006). The impact of information technology on supply chain capabilities and firm performance: A resource-

- based view. *Industrial Marketing Management*, 35(4), 493–504. <https://doi.org/10.1016/j.indmarman.2005.05.003>
- Xie, Y., Qiao, S., & Wang, J. (2022). The role of top management support in system assimilation: Evidence from ERP implementations. *Information Systems Frontiers*, 24(5), 1399–1418. <https://doi.org/10.1007/s10796-021-10153-6>
- Xu, J., & Li, J. (2020). The impact of intellectual capital on SMEs' performance in China: Empirical evidence from the dynamic panel data analysis. *Journal of Intellectual Capital*, 21(4), 601–620. <https://doi.org/10.1108/JIC-09-2019-0227>
- Xue, X., Zhang, R., Sun, J., & Wang, Y. (2024). Organizational factors influencing the adoption of emerging construction technologies: Moderating role of top management support. *Automation in Construction*, 152, 104931. <https://doi.org/10.1016/j.autcon.2023.104931>
- Yang, J. (2012). The impact of knowledge sharing on organizational learning and effectiveness. *Journal of Knowledge Management*, 11(2), 83–90. <https://doi.org/10.1108/13673270710738933s>
- Yang, S., Lee, H., & Kim, Y. (2023). Intellectual capital and firm performance: The mediating role of dynamic capabilities. *Journal of Intellectual Capital*, 24(3), 567–589. <https://doi.org/10.1108/JIC-09-2022-0304>
- Yaseen, S. G., Dajani, D., & Hasan, Y. (2022). Intellectual capital and organisational performance in knowledge-intensive industries: Evidence from emerging markets. *Journal of Knowledge Management*, 26(2), 291–311. <https://doi.org/10.1108/JKM-04-2021-0272>
- Yilmaz, K. (2013). Comparison of quantitative and qualitative research traditions: Epistemological, theoretical, and methodological differences. *European Journal of Education*, 48(2), 311–325. <https://doi.org/10.1111/ejed.12014>
- Yu, W., Chavez, R., & Jacobs, M. A. (2023). Leveraging intellectual capital for supply chain resilience and competitive performance. *International Journal of Production Economics*, 255, 108678. <https://doi.org/10.1016/j.ijpe.2022.108678>
- Yusliza, M.-Y., Yong, J. Y., Tanveer, M. I., Ramayah, T., Fawehinmi, O., & Muhammad, Z. (2020). A structural model of the impact of green intellectual capital on sustainable performance. *Journal of Cleaner Production*, 249, 119334. <https://doi.org/10.1016/j.jclepro.2019.119334>
- Zack, M., McKeen, J., & Singh, S. (2009). Knowledge management and organizational performance: An exploratory survey. *Journal of Knowledge Management*, 13(6), 392–409. <https://doi.org/10.1108/13673270910997088>
- Zhang, Y., & Rajagopalan, N. (2010). Once an outsider, always an outsider? CEO origin, strategic change, and firm performance. *Strategic Management Journal*, 31(3), 334–346. <https://doi.org/10.1002/smj.812>

- Zhang, Y., Song, J., & Hamori, M. (2017). Intellectual capital and innovation performance: The mediating role of learning capability. *Technological Forecasting and Social Change*, 123, 154–163. <https://doi.org/10.1016/j.techfore.2017.01.001>
- Zhang, Y., Zhao, L., Voss, H., & Zhu, J. (2017). Intellectual capital and product innovation performance: The mediating role of supply chain adaptability and supplier knowledge integration. *Technological Forecasting and Social Change*, 118, 161–170. <https://doi.org/10.1016/j.techfore.2017.01.001>
- Zikmund, W. G., Babin, B. J., Carr, J. C., & Griffin, M. (2013). *Business research methods* (9th ed.). Cengage Learning.





### Section B: Intellectual Capital

Please indicate by ticking [] the appropriate column using the scale: 1= Strongly Disagree – 7= Strongly Agree

Statement	1	2	3	4	5	6	7
Our firm has strong relationships with key customers and suppliers.							
We maintain long-term partnerships that support supply chain learning and innovation.							
Our supply chain partners share valuable knowledge and expertise with us.							
Our supply chain employees possess high levels of competence and expertise.							
Our organisation invests significantly in training and knowledge development.							
Employees are empowered to make decisions and innovate within supply chain functions.							
Our firm has well-documented supply chain processes and best practices.							
Our databases and IT systems effectively support supply chain decision-making.							
Organisational routines help retain critical supply chain knowledge.							

### Section C: Supply Chain Resilience

Please indicate by ticking [] the appropriate column using the scale: 1= Strongly Disagree – 7= Strongly Agree

Statement	1	2	3	4	5	6	7
Our supply chain can quickly recover from disruptions (e.g., delays, shortages).							
We have contingency plans in place to respond effectively to unexpected supply chain disruptions.							
We collaborate with suppliers to manage and mitigate risks.							
We have multiple (redundant) sources for our critical supplies.							
We can quickly adapt our sourcing, manufacturing, and distribution strategies in response to disruptions.							
We continuously learn from past disruptions to improve future resilience.							
Our supply chain adapts well to changes in the							

environment.							
--------------	--	--	--	--	--	--	--

### Section D: Top Management Support

Please indicate by ticking [] the appropriate column using the scale: 1= Strongly Disagree – 7= Strongly Agree

Statement	1	2	3	4	5	6	7
Top management provides strong support for supply chain initiatives.							
Leaders allocate adequate resources to enhance supply chain performance.							
Senior managers actively participate in supply chain decision-making.							
Our leadership prioritises supply chain agility and responsiveness.							
Top management encourages collaboration across departments and partners.							
There is a clear strategic vision from top leadership regarding supply chain goals.							

### Section E: Supply Chain Performance

Please indicate by ticking [] the appropriate column using the scale: 1= Strongly Disagree – 7= Strongly Agree

Statement	1	2	3	4	5	6	7
Our supply chain operations are cost-effective.							
We are able to reduce inventory holding and transportation costs.							
Our supply chain can quickly respond to customer demand changes.							
We fulfil urgent orders promptly and efficiently.							
We have the flexibility to adapt to market and customer dynamics.							
Our products/services consistently meet customer expectations.							
There are a few quality-related complaints from customers.							
Our supply chain ensures high consistency in product/service delivery.							

*Thank you for your time and participation.*