Scale Development for Supply Chain Management Self-Efficacy: The Role of Internship and Personal Experiences

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ABSTRACT

This study addresses a critical gap in the supply chain management (SCM) literature by developing and validating a self-efficacy measurement scale for students pursuing careers in SCM. The research had three key objectives: (1) to develop a SCM Self-Efficacy scale, (2) to examine how internships and personal experiences influence SCM self-efficacy, and (3) to identify strategies for higher education institutions (HEIs) to enhance students' self-efficacy in SCM activities. A case study design with a mixed-method approach was adopted. Quantitative data were collected from 59 students in a quasi-private Ghanaian university using an online structured survey. Participants were selected using purposive sampling. Exploratory and Confirmatory Factor Analyses revealed two dimensions of SCM self-efficacy: operational competencies and strategic leadership/relationship management. Internships and personal experiences significantly influenced SCM self-efficacy ($R^2 = 0.737$), with personal experiences having a larger effect. Thematic analysis of open-ended responses emphasized practical learning, mandatory internships, and industry collaboration as key enablers. The validated SCM self-efficacy scale introduced in this study provides a tool for educators and researchers. Also, the study introduces a new SCM Self-Efficacy scale for educational use and underscores the importance of internships and prior experiences in developing SCM self-efficacy. Future research should validate the scale across diverse contexts, investigate the optimal duration of internships, and explore the role of mentorship in building SCM capabilities among students.

Keywords: Supply Chain Management, Self-Efficacy, Internships, Learning, Higher Education

INTRODUCTION

Self-efficacy is the belief in one's ability to perform tasks and achieve goals in a specific field (Bandura, 1997; Chen & Allman-Farinelli 2018). This self-belief significantly influence one's choice of activities, efforts, resilience and persistence (Bandura, 1997; Pradhan et al., 2021). Recent studies show that new graduates with higher self-efficacy excel in job searches, leading to better employment outcomes (Petruzziello et al., 2021). Enhancing self-efficacy in higher education (HE) can improve job search success and employment rates, motivating increased research on students' beliefs in learning processes (Liu et al., 2021).

Literature explores self-efficacy in both generic and specific contexts. General self-efficacy stem from mastery, vicarious experiences, social persuasion, and physiological states (Singh et al., 2019). Educational programs and internship, particularly those based on social cognitive theory, can enhance self-efficacy in a professional context (van Dinther et al., 2011). However, separating internship experience during educational program from broader work-related personal experience is vital due to their distinct impacts on self-efficacy and professional development. Well-structured internships in SCM curricula boost self-efficacy by aligning

theoretical knowledge with practical experience and career goals (Hora, 2019). In contrast, broader work experiences prior to school enrolment, though valuable, may lack targeted skill development (Coco, 2000; Pentland et al., 2012).

SCM is essential for business efficiency and success, involving coordination of functions like procurement, inventory management, production, distribution, and quality assurance (Chopra & Meindl, 2013; Stevenson, 2018). Effective SCM reduces costs, improves quality, and enhances customer satisfaction globally. Research into SCM Self-Efficacy, defined in this study as students' belief in their ability to perform SCM tasks, is crucial for career readiness (Bandura, 1997).

Despite extensive research on self-efficacy in various domains, its measurement in the context of SCM remains underexplored (Kevill & Easterby-Smith, 2017; Zamani-Alavijeh et al., 2019; Ghosh et al., 2021). A critical research gap exists regarding the availability of validated scales specifically designed to measure SCM self-efficacy. This limitation leaves higher education institutions and researchers without robust tools to assess and enhance students' self-efficacy in SCM, potentially hindering their career readiness. Additionally, although the individual impacts of personal experiences and internships on job performance are well-established in educational literature (Botha & Bignotti, 2016; Anjum, 2020; Bondzie, 2022), the combined influence of internship experience and pre-university work experiences (e.g., family business involvement or part-time jobs) on SCM self-efficacy has received little scholarly attention. To address these gaps, this study is guided by the following research question:

"How do internships and personal experiences influence the development of Supply Chain Management Self-Efficacy among undergraduate students?"

This question supports the study's aims to: (1) Develop a SCM Self-Efficacy scale for students pursuing SCM as a profession, (2) Investigate the role of internships and personal experiences in the SCM Self-Efficacy of these students, and (3) Identify ways universities can improve students' self-efficacy, particularly in relation to operations and SCM activities.

LITERATURE REVIEW

Social Leaning Theory and Self-Efficacy Theory

This study is underpinned by Social Learning Theory and Self-efficacy Theory, focusing on the field of SCM. The theories are used to explore how internships and broader work experiences influence the SCM Self-Efficacy of students. Social Learning Theory posits that individuals learn behaviours, skills, and attitudes through observing others, which is critical in professional environments where students can watch and emulate experienced professionals (Kusimo, 2018; Ali & Hafeez, 2022; Visoso, 2024). This observational learning is essential in building self-efficacy, as individuals gain confidence through mastering tasks observed in real-world settings. Integrating these theories underpins why both internships and personal experience can be developed through social learning by observation in the job field, aligning with Bandura's theories of social learning and self-efficacy (Bandura, 1977; Bandura, 1997)

Supply Chain Management

The field of SCM emerged to effectively manage the flow of information, products, and services across a network of customers, enterprises, and supply chain partners (Russell & Taylor, 2018). SCM encompasses all activities involved in fulfilling customer requests and integrates business processes and inter-organizational relationships (Chopra & Meindl, 2013; Murphy & Knemeyer, 2018). Integration, information sharing, and strategic relationships, have been suggested as dimensions for measuring effective SCM competence (Jabbour et al., 2011). Others suggest that SCM requires skills in strategic planning, process optimization, inventory management, logistics optimization, risk mitigation, technology, and leadership (Lu & Swaminathan, 2013;

Murphy & Knemeyer, 2018). These skills or competencies integrate strategic, tactical, and operational decisions, influencing a company's success (Chopra & Meindl, 2013).

Hypotheses Development

Internship and Self-Efficacy

Comyn and Brewer (2018) describe work-based learning (WBL) as engaging in and reflecting upon productive work within authentic workplace settings, whether compensated or voluntary, which and may or may not lead to official certification. Although there is no single fixed definition, internships can be defined as a form of WBL that allows students to apply their learning theories and experiences from classroom to professional settings. The experiences help students build skills, networks, and enhance knowledge of their chosen fields (Hurst et al., 2023).

Internships, whether paid or unpaid, provide a platform for students to gain support necessary for future career launches. Tzanakou et al. (2021) categorize internships into three types: part of vocational/academic curricula, associated with active labor-market policies, and those based on students' free will. Our study focuses on a tertiary university with undergraduate studies (bachelor level), where internships during undergraduate studies, is without assessment as part of a curriculum by the institution.

Research studies frequently documents the impact of internship effects on employment and career indicators (Coco, 2000; Binder, Baguley, Crook & Miller, 2015; Atfield, Hunt, Luchinskaya., 2021), and academic achievement (Binder et al., 2015; Samoei, 2020), especially in developed countries. Studies have shown that internships enhance entrepreneurial intent and entrepreneurial self-efficacy (Botha & Bignotti, 2016), as well as professional and personal growth (Anjum, 2020). However, challenges such as insufficient opportunities and lack of job experience before college can impede skill development and employability (Hora, 2019). For, example, regulatory gaps in Ghanaian Technical Universities' internship placements hindered the effectiveness of these programs and self-efficacy development in a study by Arthur et al. (2022).

Shandra (2022) documented increased participation in internships among recent students and graduates in the United States, despite sustained inequalities for lower-income, public school, first-generation students, and those from less selective schools. Internship outcomes are influenced by gender, race, socioeconomic background, and firm size (Comyn & Brewer, 2018; Kusimo, 2018). Tzanakou et al. (2021) found that in Italy and the United Kingdom (UK), men from higher socio-economic backgrounds secure more beneficial internships, leading to better job prospects than women and individuals from lower socio-economic backgrounds. Curriculum internships positively affect employment post-graduation, boosting wages in the UK and employment in Italy when within firms.

Kusimo (2018) found that internships significantly boost engineering task self-efficacy (ETSE) for under-represented racial/ethnic minority (URM) women, matching ETSE scores of non-URM men without similar experiences. Internships in hospitality enhance social personality traits like openness and conscientiousness (Mundra et al., 2020). Internships positively influence Pakistan business students' professional and personal growth (Anjum, 2020). Lin et al. (2018) study also showed that self-efficacy mediates the relationship between internship experience and career decision-making, though their measure was generic and did not reflect confidence in professional capabilities like SCM. Recognizing the suggested relevance of internship on self-efficacy in literature, this study posits the first hypothesis that:

H1: There is a significant positive effect of Internship on SCM Self-Efficacy.

Personal Experience and Self-Efficacy

Personal experience, encompassing family business and other work experiences, is important in professional development. Research indicates that skills learned in family-run businesses, such as strategic planning,

resource management, and operational efficiency, are highly transferable to other sectors, including SCM (Tarling et al., 2016; Chou & Lu, 2022; Canale et al., 2024). For example, Tarling et al. (2016) findings showed that early exposure to family business environments fosters entrepreneurial skills and career interests in strategic management roles, including SCM. Family background positively affects academic self-efficacy and career success expectations (Kim, 2014). Broader work experiences enhances skills like teamwork and problem-solving, further boosting self-efficacy (Comyn & Brewer, 2018; Donald et al., 2024). Thus, it is hypothesized that:

H2: There is a positive effect of personal experience on SCM Self-Efficacy.

Conceptual Framework

The conceptual work consists of three constructs, namely, internship, personal experience and SCM Self-Efficacy (Figure 1). Based on the framework, internships and personal experience positively influence the students' self-efficacy. Thus, both internship and personal experience (ie family business plus other job experience prior to enrolment into higher education institution [HEI]) are independent variables, while self-efficacy is the dependent variable. This is depicted in the figure 1 below:

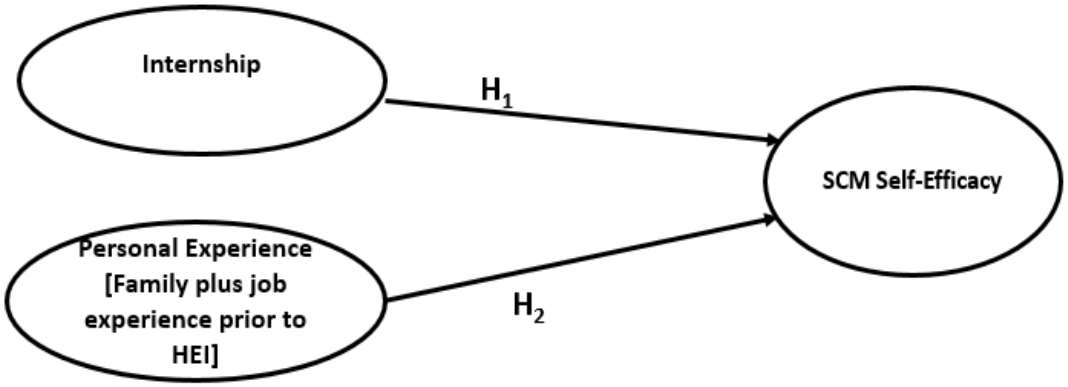

Figure 1: Conceptual framework (Source: Authors' Construct, June 2024)

METHOD

Study Design

This study utilized a case study research design with mixed methods within a quasi-private university. The case study approach aimed to provide an in-depth, context-specific exploration of the underdeveloped construct of SCM Self-Efficacy, facilitating the development of targeted and relevant measurement tools and hypotheses testing. This method is advantageous for both exploration and verification (Yin, 2017; Verleye, 2019). Conducting the study within a single institution allowed for a controlled environment that enhanced internal validity. The mixed-method approach combined quantitative and qualitative data collection and analysis techniques for a comprehensive understanding of the research problem (Timans et al., 2019).

Measurement of Variables and Scales

Self-efficacy items were adapted from existing literature in psychology (Schwarzer, 1993; Laver, George, Ratcliffe, & Crotty 2012), SCM (Chopra & Meindl, 2013; Blomquist et al., 2016), higher education and relevant fields (Jang, 2010; Kevill & Easterby-smith, 2017; Chen & Allman-farinelli, 2018). Thirty (30) items were generated to ensure a comprehensive assessment covering various supply chain skills, knowledge, and tasks. These items were modified to reflect operations and supply chain practices in a business setting. For example, items included statements like, "I am confident in my ability to analyze supply chain data" and "I can effectively manage inventory levels in a supply chain." The three (3) items measuring internship were

adapted from Lin et al. (2018) and four (4) items measuring personal experience were adapted from Stock and Kolb (2022) and Koren, DeChillo, & Friesen (1992). An open-ended question was asked for respondents to suggest ways students' SCM Self-Efficacy could be improved. (refer to Table 8). The draft questionnaire was pre-tested with Subject Matter Experts (SMEs) for content validity.

Data Collection

Data was collected via an online survey targeting business school students pursuing procurement, logistics, and SCM (PLS). The Google-based survey was distributed via email and WhatsApp platforms. Participation was voluntary, and anonymity was ensured by excluding email addresses. Data was collected and fifty-nine students completed the form, and the dataset was retrieved in Microsoft Excel format for analysis. Three missing data cells were addressed by filling in the blanks with the mean response of their respective columns, ensuring data completeness.

Statistical Tests/Methods

The dataset was analyzed using a partial least-squares structural equation modelling (PLS-SEM) approach. Structural equation modeling (SEM) is a robust multivariate statistical analysis technique that allows for the simultaneous examination of multiple relationships among observed and latent variables (Hair, Risher, Sarstedt & Ringle, 2019). PLS-SEM maximizes the explained variance of endogenous constructs through an iterative process (Fornell & Larcker, 1981; Ringle et al., 2014). The two statistical software used for the analysis, namely IBM-SPSS and SmartPLS4, were chosen for their ability to ensure accurate analyses even with fewer data points (Rahi, 2017). According to de Winter et al., (2009), Osborne (2016) and Risher (2018), smaller sample sizes of 59 is adequate to yield reliable factor structures.

Exploratory Factor Analysis for determining the number of factors to retain

Exploratory Factor Analysis (EFA) was conducted on the measurement scale to explore the interrelationship between variables, remove redundant or unnecessary items and simplify interrelated indicators (Habtemariyam, Kero & Nigatu, 2022). The factors with loadings above 0.70 was threshold in the current study (Hair, Celsi, Money, Samouel & Page, 2016).

Confirmatory Factor Analysis for Measurement Model Assessment

Confirmatory Factor Analysis (CFA) was conducted using SmartPLS4 to assess the measurement model's fit. CFA evaluates whether the observed variables adequately represent the underlying constructs they measure, assessing the model for dimensionality, reliability, and validity (Hair, Risher, Sarstedt, & Ringle, 2019). Outer loadings above 0.7 indicated a very good measurement model. Reliability was estimated using cronbach's alpha and composite reliability values, with internal consistency considered satisfactory at ≥ 0.70 (Rahi, 2017; Risher, 2018). Convergent and discriminant validity were employed to assess the validity of the measurement model. Convergent validity was evaluated using Average Variance Extracted (AVE), with a threshold of $AVE \geq 0.50$ (Fornell & Larcker, 1981; Ringle et al., 2014). Discriminant validity was assessed using the Heterotrait-Monotrait Ratio (HTMT), with a threshold of 0.85 (Kline, 2011) or 0.90 for conceptually similar constructs (Risher, 2018).

Structural Modelling

The research model was assessed using a two-step process: measurement model and structural model (Rahi, 2017). Upon satisfactory assessment of the measurement model, the structural model was evaluated. Structural model coefficients were derived from a series of regression equations. Collinearity was tested using the Variance Inflation Factor (VIF), with values greater than 5 indicating probable collinearity issues (Kock, 2015). Path coefficients were estimated using the PLS algorithm in SmartPLS4, with significance determined through bootstrapping with 10,000 resamples.

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Quantitative Data Analysis

Thematic analysis was employed to evaluate the qualitative data on improving students' self-efficacy, gathered from an optional open-ended question on the Google-Form questionnaire. Responses from participants who chose to answer were analyzed, identifying key themes and insights. This approach allowed for an in-depth understanding of students' perspectives and suggestions, providing valuable qualitative insights to complement the quantitative findings from the structured survey questions (Yin, 2017).

RESULTS

Sample Participants Selection

The target population consisted of both graduates who had just completed their undergraduate studies and students (level 400-200) who seek to major in SCM. Among 59 respondents who successfully completed the form, 28 *(47.5%)* were males and 31 *(52.5%)* were females. The summary of the descriptive statistics is presented in Table 1

Table: 1 Percentage and Frequency Demographic Characteristics

Item	Frequency	Percentage %
Gender		
Male	28	47.5
Female	31	52.5
Age		
Between 18-24	5	8.5
25-34	36	61.0
35-44	14	23.7
45-54	4	6.8
Level		
Completed	7	11.9
400	14	23.7
300 and /200	38	64.4

Source: Field data

Factor Analyses Results

Exploratory Factor Analysis

Before the EFA, Kaiser-Meyer-Olkin (KMO) was used to measure sampling adequacy and Bartlett's test for sphericity. The KMO test result was *0.923*, exceeding the commonly recommended value of 0.6, suggesting that the dataset is suitable for factor analysis. Additionally, Bartlett's test of sphericity was significant *(χ^2 (435) = 2762.776, $p < 05$)*, further supporting the appropriateness of factor analysis for the dataset.

The EFA results, with a threshold of 0.7, revealed two robust dimensions of SCM Self-Efficacy: (1) operational competencies and (2) strategic leadership/relationship management, each comprising nine items (refer to Table 2). Personal experience (four items) and internship (three items) indicated no dimensions. Therefore, the specified reflective measurement model was positive path coefficients between internships and SCM Self-Efficacy and between personal experience and SCM Self-Efficacy. In addition, SCM Self-Efficacy is a second-order construct with two indicators, namely operational competencies and Strategic Leadership/Relationship Management.

Table 2 : Rotated component matrix[a]

		Component 1	Component 2
SE	**SCM Self-Efficacy**	**Operational competencies**	**Strategic Leadership/ Relationship Management**
SE1	I am confident in my ability to analyze supply chain data.		
SE2	I can effectively manage inventory levels in a supply chain.		
SE3	I believe I can make informed decisions in operations/supply chain scenarios.		
SE4	I am confident in my ability to handle supply chain disruptions.	0.751	
SE5	I can effectively communicate with stakeholders in the supply chain.	0.757	
SE6	I have the skills needed to forecast demand accurately.	0.785	
SE7	I believe I can reduce lead times in the supply chain.	0.879	
SE8	I can identify and mitigate risks in the supply chain operations	0.838	
SE9	I am confident in my ability to design efficient supply chain networks.	0.783	
SE10	I can handle international logistics and trade challenges.		0.724
SE11	I believe I can improve the sustainability of supply chain operations.		
SE12	I can manage suppliers and relationships effectively.		0.739
SE13	I have the skills to evaluate and select supply chain technologies.		
SE14	I am confident in my ability to optimize transportation routes.		0.782
SE15	I can analyze and improve supply chain performance metrics.		0.779
SE16	I believe I can adapt to changing market conditions.		
SE17	I can develop and implement supply chain strategies.	0.797	
SE18	I have the skills to use supply chain software and tools.		
SE19	I am confident in my ability to manage cross-functional teams.		0.725
SE20	I can design and implement supply chain improvement projects.		
SE21	I believe I can enhance supply chain resilience.		0.708
SE22	I can address sustainability and ethical issues in supply chain management.		0.895
SE23	I have the skills needed to manage supply chain data and analytics.		0.719
SE24	I am confident in my ability to negotiate supply chain contracts.		
SE25	I can plan for supply chain capacity and growth.		
SE26	I believe I can lead supply chain innovation.		
SE27	I can adapt to changes in regulatory requirements.		

SE28	I have the skills to ensure supply chain security.		
SE29	I am confident in my ability to communicate supply chain strategies.	.771	
SE30	I can develop and implement supply chain risk management plans.	.712	
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.			
a. Rotation converged in 3 iterations			

Source: SPSS output

The Confirmatory Factor Analysis

The CFA was used to evaluate the structural model using three metrics: the dimensionality (factor loadings) and significance of the path coefficients, predictive accuracy (validity and reliability values) and Pearson's coefficient of determination (R^2). The CFA suggested a very good model with reflective indicator loading higher than the threshold of 0.70 for the measurement model (refer to Table 3).

Table 3: Outer Loadings from SmartPLS Output

Items/indicators	Self-efficacy	Internship	Personal Experience
Operational Competence	**0.972**		
SE4	0.933		
SE5	0.928		
SE6	0.873		
SE7	0.909		
SE8	0.928		
SE9	0.919		
SE17	0.881		
SE29	0.946		
SE30	0.903		
Strategic Leadership/ Relationship Management	**0.973**		
SE10	0.800		
SE12	8.837		
SE14	0.912		
SE15	0.933		
SE19	0.940		
SE20	0.893		
SE21	0.941		
SE22	0.896		
SE23	0.918		
INT1		0.780	

INT2		0.959	
INT3		0.948	
EX1			0.827
EX2			0.907
EX3			0.850
EX4			0.917

The reliability and validity measure are presented in reliability are presented in Table 4. Composite Reliability (rho_a) values were also strong, ranging from 0.913 to 0.966, suggesting the chosen reflective measurement model's validity. The results also demonstrated adequate convergent validity *(AVE > 0.50)* and discriminant validity (with HTMT less than the required threshold of 0.85 or 0.90), further confirming the scale's reliability. From analysis, the results (in Table 5) show an HTMT ratio less than the required threshold of 0.85 or 0.90, suggesting adequate discriminant validity. A test for collinearity prior to the regression analysis indicated that the VIFs are lower than *3.3 (i.e. VIF; 1.494 < 3.3)*, thus confirming that the model is free from collinearity (refer to Table 6). These results provide confidence in the reliability and validity of the measurement scale used in this work.

Table 4: Quality Criteria using smartpls4 (Reliability and Validity Measures)

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	AVE
Internship	0.885	0.966	0.926	0.809
Personal Experience	0.899	0.913	0.929	0.767
SCM Self-Efficacy	0.943	0.943	0.972	0.946

Table 5: Heterotrait-monotrait ratio- matrix

	Internship	Personal Experience	SCM Self-Efficacy
Internship			
Personal Experience	0.618		
SCM Self-Efficacy	0.708	0.879	
Note: Heterotrait-monotrait ratio (HTMT) discriminate at (HTMT < 0.9/ HTMT < 0.85)			

Source: Field data (using SmartPLS4)

Table 6: Variance Inflation Factor

	VIF
Internship →SCM Self-Efficacy	1.494
Personal Experience →SCM Self-Efficacy	1.494

Hypotheses Testing Using the Validated SCM Self-Efficacy Scale

Two hypotheses were tested and the results are presented in Table 7. Result showed positive and statistically significant effect of Internship on SCM Self-Efficacy ($p < 0.001$), supporting *H1*. The path coefficient from Personal Experience to SCM Self-Efficacy was found to be $\beta = 0.638$, indicating a positive and significant relationship between personal experience and SCM Self-Efficacy ($t = 7.057$, $p < 0.000$), supporting the *H2*. Moreover, the coefficient of determination R^2 is 0.737, which is substantial. The effect sizes ($f^2 = 0.259$) for internship and 1.024 for personal experience) depicted moderate and large influences, respectively (refer to Table 7)

Table 7: Results of structural model analysis (hypothesis testing)

Hypothesis	**Construct**	**Coefficient (β)**	**Standard deviation (STDEV)**	***t-statistics***	***P - values< 0.05***	**Confidence interval bias corrected**		***R-squared (R^2)***	**Effect Size (f^2)**
						2.5%	97.5%	0.737	
H_1	Internship → SCM Self-Efficacy	0.314	0.099	3.227	0.001	0.135	0.517		0.259
H_2	Personal Experience →SCM Self-Efficacy	0.638	0.090	7.057	0.000	0.443	0.795		1.024
Note of range for effect size: 0.02, small; 0.15, medium; 0.35, large									

Source: Field data (from SmartPLS4 output)

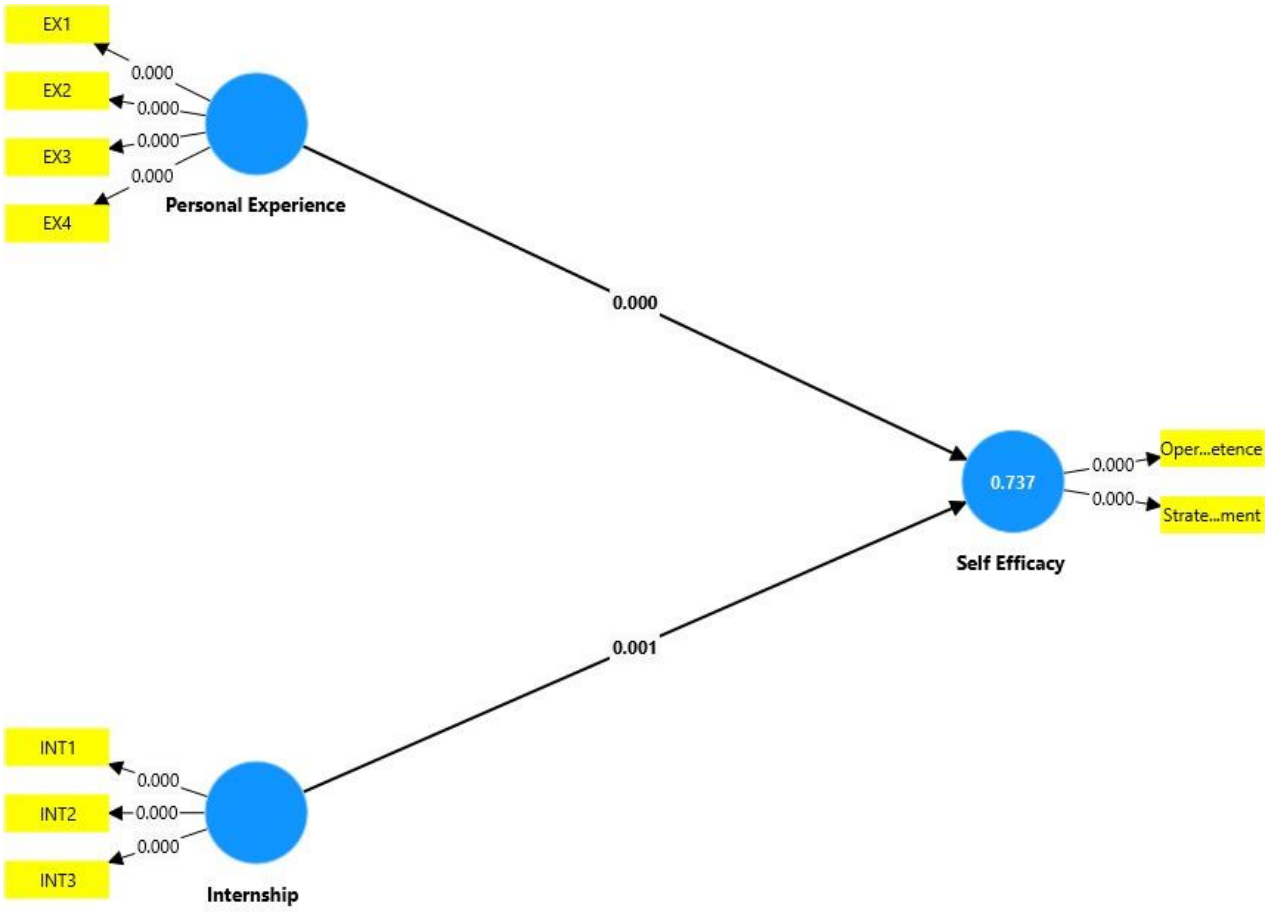

Figure 2 : Schematic representation of the model

Qualitative Analysis of how to Improve SCM Self-Efficacy

Respondents were asked to suggest ways universities can improve students' SCM Self-Efficacy. Table 8 presents the responses from the students, a major stakeholder in higher Education institutions (HEI). Generally, the strategies suggested by respondents provide strong support for more internships and transferable learning experiences. Thematically, the responses can be categorized into three (3) as follows: (1) Enhanced practical learning during HEI through simulation, interactive learning methods and case studies, (2) Mandatory internships, (3) Industry collaboration and mentorship programmes.

Table 8: Responses to open-ended question on how to improve SCM Self-Efficacy

Responses	*"Suggest ways universities can improve students' belief in their ability to perform tasks and succeed in activities related to operations and SCM"*
1.	Universities should invest in more practical experiences such as visiting warehouses, or well organized organizations.
2.	By strictly ensuring that students partake in internship every long vacation
3.	Practical and orientation
4.	Interactive learning methods and Industry collaboration
5.	Students should have more of practical courses
6.	Use of simulations for practical purposes
7.	by having more elaborate practical activities
8.	Engaging students in field work or on the job practices
9.	Universities can enhance students' belief in their capabilities in operations and supply chain management by incorporating real-world case studies, offering hands-on experiences through internships, providing mentorship programs, fostering a collaborative learning environment, and organizing industry-related events to connect students with professionals in the field.
10.	A lot of field work would do since the course is too practical
11.	The universities should be more practical rather than theory
12.	I believe there should be more hands-on practical's, the more theoretical the more confusing the course becomes for we the student to understand the concept
13.	By organizing more training related to supply chain and also provide basic tools for making supply chain management easier and understandable

Source: (Authors, 2025)

DISCUSSION

The primary goal of HEI is human capital development, equipping graduates with relevant skills, adaptability, task performance ability, and a strong work ethic (Chowdhury, 2016 Kromydas, 2017; Marginson, 2017). This study developed a reliable SCM Self-Efficacy measurement scale, identifying two main dimensions: operational competencies and strategic leadership/relationship management. Operational competencies involve technical skills for tactical and daily supply chain activities (Derwik & Hellström, 2017; Modgil et al., 2023), while strategic leadership focuses on higher-order decision-making capabilities such as leadership, negotiation, crucial for aligning supply chain strategies with organizational goals (Halley & Beaulieu, 2009; Naim & Gosling, 2023; Gammelgaard, 2023).

The empirical validation through EFA and CFA supported the robustness of these dimensions. Findings showed a strong factor loading, high reliability (Cronbach's alpha values between 0.885 and 0.943), and composite reliability (0.913 to 0.966). The model demonstrated adequate convergent and discriminant validity, aligning with Bandura's social cognitive theory. The study found that internships and personal experiences positively influence SCM Self-Efficacy, explaining 73% of its variability. Internships provide hands-on experience, enhancing self-efficacy by allowing students to apply theoretical knowledge practically. This

aligns with studies showing the positive impact of internships on professional and personal growth, self-efficacy development (Thompson et al., 2021; Anjum, 2020; Brown & Lent, 2019).

Personal experience, such as family business involvement and prior job experience, demonstrated a stronger impact on SCM Self-Efficacy *($p < 0.000$),* with a larger effect size *($f^2 = 1.024$)* compared to internships *($f^2 = 0.259$)*. This finding is supported by a study that also revealed that the family business environment has positive and significant effects on SCM Self-Efficacy (Valdez-Juárez & Pérez-de-Lema, 2023). The stronger effect of personal experiences on SCM Self-Efficacy compared to internship found in the current study can be attributed to several factors. For example, family business experience offers prolonged, hands-on exposure to real-world business operations, fostering a practical understanding of value chain or SCM principles from an early age. This continuous and immersive learning environment help in developing robust self-efficacy (Bandura, 1997; Carter et al., 2016). Conversely, internships, while beneficial, are typically shorter and may offer limited scope and responsibility, restricting the depth of learning compared to longer-term personal experiences (Abdullah et al., 2013; Galbraith & Mondal, 2014; Wang et al., 2018; Lee & Ahn, 2021). In addition, there are challenges that hinder internships in HEI and include lack of coordination and feedback between the firm of the intern and the institution, inadequate time allocation for internships and the complexity of the application process (Thompson et al., 2021, Bondzie, 2022). Effective programs require sufficient time and supervision to build SCM Self-Efficacy.

Thematic analysis of student's perspective on how to enhance SCM Self-Efficacy of students revealed three main strategies:

(1) Enhanced Practical learning: HEIs should incorporate simulations, interactive learning methods, and case studies to bridge theoretical knowledge with practical application. As indicated by a respondent:

'Universities can enhance students' belief in their capabilities in operations and supply chain management by incorporating real-world case studies, offering hands-on experiences through internships, providing mentorship programs, fostering a collaborative learning environment, and organizing industry-related events to connect students with professionals in the field'

Collaborative simulations foster teamwork and communication skills, preparing students for practical SCM scenarios (Schmuck, 2021; Badiee et al., 2024; Xanthopoulos & Kostavelis, 2024)

(2) Mandatory Internship: According to a respondent, students' participation in internship can be improved by "*strictly ensuring that students partake in internship every long vacation".* Ensuring compulsory internships during long vacations can significantly improve SCM Self-Efficacy. Mandatory internships provide students with essential practical experience, aligning with studies highlighting their impact on adaptability, team-playing capability, professionalism, and career potential (Khalil, 2015; Ojapinwa, 2022; Cao, 2022).

(3) Industry Collaboration and Mentorship Programs: Industry collaboration and mentorship programs are deemed essential for bridging the gap between academia and industry , supported by other studies (Tight, 2023; Abbas et al., 2024). Overall, students prefer practice-oriented approaches in SCM education, emphasizing the need for curricula aligned with industry demands.

CONCLUSION

This study advances SCM literature and self-efficacy theory by developing a reliable SCM Self-Efficacy measurement scale. It demonstrates the positive influence of internships and pre-enrollment work experience on students' SCM Self-Efficacy, highlighting the importance of practical experience in building professional confidence and competence. Based on the study's findings, the research recommendation include collaboration between educational institutions and industry partners to provide practical experience and career guidance

through joint research projects, guest lectures, industry-led workshops, and mentorship programmes. These initiatives can offer valuable industry insights and enhance students' readiness for professional challenges. Given the study's context-specific nature and limited dataset, future research should validate the SCM Self-Efficacy scale across diverse educational settings and larger samples to ensure robustness. Further investigation is needed to determine the optimal internship duration that maximizes SCM self-efficacy and explore innovative strategies to strengthen HEI-industry partnerships, evaluating their long-term impact on student outcomes.

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