

**THE IMPACT OF LEADER AUTONOMY
SUPPORT ON THE SAFETY BEHAVIOR OF
WORKERS IN CHINESE CONSTRUCTION
SMALL AND MEDIUM-SIZED ENTERPRISES**

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SMALL AND MEDIUM-SIZED ENTERPRISES**

by

WANG HAIJIN

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LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
CB-SEM	Covariance-based Structured Equation Modeling
CR	Composite Reliability
CWSB	Construction Worker Safety Behavior
GDP	Gross Domestic Product
HTMT	Heterotrait-monotrait
LAS	Leader Autonomy Support
LMX	Leader-member Exchange
LM	Linear Regression Model
MOHURD	Ministry of Housing and Urban–Rural Development
NBOS	National Bureau of Statistics
NFI	Normed Fit Index
PBC	Perceived Behavioral Control
PLS-SEM	Partial Least Squares Structural Equation Modeling
RAI	Relative Autonomy Index
SDT	Self-determination Theory
SMEs	Small and Medium Enterprises
SPSS	Statistical Package for Social Science
SRMR	Standardized Root Mean Square Residual
RMSE	Root Mean Squared Error
TPB	Theory of Planned Behavior
VIF	Variance Inflation Factor

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- Appendix A Research Questionnaire
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**IMPAK SOKONGAN AUTONOMI PEMIMPIN TERHADAP
TINGKAH LAKU KESELAMATAN PEKERJA DALAM SYARIKAT
PEMBINAAN KECIL DAN SEDERHANA DI CHINA**

ABSTRAK

Industri pembinaan China telah mencapai kemajuan yang belum pernah terjadi sebelumnya dalam sepuluh tahun terakhir. Di sebalik pencapaian ini, situasi keselamatan dalam industri pembinaan China masih buruk, dengan jumlah kemalangan yang sangat tinggi. Ketika ini, perusahaan kecil dan sederhana (PKS) menyumbang 97.54% daripada jumlah keseluruhan perusahaan dalam industri pembinaan China. Oleh itu, mengurangkan kemalangan dalam PKS pembinaan adalah sangat penting bagi industri pembinaan di China. Perilaku tidak selamat di kalangan pekerja pembinaan sering dianggap sebagai penyebab utama kemalangan tersebut. Mengenal pasti dan memahami punca-punca perilaku tidak selamat pekerja pembinaan adalah penting untuk melaksanakan langkah-langkah yang berkesan untuk memperbaiki dan mempromosikan perilaku yang lebih selamat di kalangan mereka. Kajian terdahulu menunjukkan bahawa kepimpinan telah diiktiraf sebagai penentu utama tingkah laku keselamatan dan sumber motivasi penting bagi pekerja untuk bekerja dengan selamat. Walau bagaimanapun, hanya sedikit kajian yang telah mengkaji secara empirikal pengaruh sokongan autonomi pemimpin (LAS) terhadap tingkah laku keselamatan pekerja pembinaan (CWSB), terutamanya dalam konteks PKS dalam pembinaan. Oleh itu, kajian ini bertujuan untuk membangunkan dan menguji model serta meneroka kesan LAS terhadap CWSB dan proses motivasi dan kognitif sosial yang mendasari hubungan LAS-CWSB berdasarkan integrasi teori perilaku terancang (TPB) dan teori penentuan diri (SDT). Data dikumpulkan

menggunakan soal selidik rentas sili daripada sampel kemudahan sebanyak 283 pekerja pembinaan yang bekerja oleh PKS dalam Wilayah Anhui, China. Teknik pemodelan persamaan struktur separuh terkecil (PLS-SEM) digunakan untuk menganalisis data. Hasil kajian ini menunjukkan bahawa LAS secara positif meramalkan motivasi keselamatan yang relatif ditentukan sendiri, pada akhirnya membawa kepada peningkatan sikap, norma subjektif, dan kawalan perilaku yang dirasai, dan seterusnya, niat yang lebih tinggi terhadap keselamatan dan CWSB. Penemuan ini menunjukkan bahawa pengaruh LAS terhadap penyertaan keselamatan adalah lebih besar daripada kepatuhan keselamatan. Kajian ini juga telah menunjukkan bahawa kesan langsung LAS terhadap kepercayaan kognitif sosial adalah positif dalam norma subjektif dan tidak signifikan dalam sikap dan kawalan perilaku yang dirasai, dan bahawa norma subjektif memainkan peranan penting dalam menerangkan hubungan berurutan serentak antara LAS dan CWSB. Kajian ini menyediakan pandangan baru ke dalam mekanisme psikososial yang mendasari CWSB. Ini dapat berfungsi sebagai asas empirikal untuk pembangunan intervensi untuk memperbaiki CWSB dan kecekapan kepimpinan dalam pengurusan keselamatan berkaitan dengan PKS dalam pembinaan.

**THE IMPACT OF LEADER AUTONOMY SUPPORT ON THE
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ABSTRACT

The Chinese construction industry has obtained unprecedented achievements over the past decade. Behind these achievements, the safety situation in the Chinese construction industry remains poor, with an excessively high number of accidents. Currently, small and medium enterprises (SMEs) account for 97.54% of the total number of enterprises in the Chinese construction industry. Therefore, reducing accidents in construction SMEs is of great significance for the Chinese construction industry. Unsafe behavior among construction workers is often cited as a primary cause of these accidents. Identifying and understanding the underlying causes of construction workers' unsafe behavior is crucial for implementing effective measures to improve and promote safer behaviors among them. Previous studies indicated that leadership has been recognized as a core determinant of safety behavior and an important source of motivation for employees to work safely. However, few studies have empirically examined the influence of leader autonomy support (LAS) on construction worker safety behavior (CWSB), particularly in the context of SMEs in construction. Therefore, this study aims to develop and test a model and explore the impact of LAS on CWSB and the motivational and social cognitive processes underlying the LAS-CWSB relationship based on the integration of the theory of planned behavior (TPB) and the self-determination theory (SDT). Data were gathered using a cross-sectional questionnaire from a convenience sample of 283 construction workers employed by SMEs in Anhui Province, China. The partial least squares

structural equation modeling (PLS-SEM) technique was used to analyze the data. The results of this study have indicated that LAS positively predicts relative self-determined safety motivation, which in turn leads to enhanced attitude, subjective norm, and perceived behavioral control, and subsequently, higher intention and CWSB. The findings have shown that the influence of LAS on safety participation is greater than that of safety compliance. This study has also demonstrated that the direct effect of LAS on social cognitive beliefs is positive in subjective norm and insignificant in attitude and perceived behavioral control, and that subjective norm plays a vital role in elucidating the serial multiple relationships between LAS and CWSB. The study provides new insights into the psychosocial mechanisms underlying CWSB. These can serve as an empirical basis for the development of interventions to improve CWSB and the efficiency of leadership in safety management with regards to SMEs in construction.

CHAPTER 1

INTRODUCTION

1.1 Introduction

The introduction serves as the foundational section of this research chapter. It offers a comprehensive overview of the research domain, encompassing general details about the entire study, including the rationale for undertaking the research, the research objectives, and the scope of the study. The subsections within this chapter comprise: introduction, background, problem statement, research questions, research aim and objectives, research scope, research significance, definitions of key terms, and the organization of the thesis.

1.2 Background

According to the International Labor Organization (ILO), more than 2.78 million people die annually from workplace injuries (Zhang et al., 2022). There are also over 374 million non-fatal work-related injuries worldwide each year, frequently resulting in prolonged work absences (Morgan et al., 2021). Additionally, with the exception of the non-production sector, the Ministry of Emergency Management of China reported over 34,600 industrial accidents across the country in 2021, resulting in over 26,300 fatalities (Wang et al., 2023).

The construction sector stands out as one of the riskiest globally, witnessing a multitude of injuries and accidents each year (X. Liu et al., 2023; Luo et al., 2022; Nwagbala & Park, 2023; Yuan et al., 2022). Fatal accidents within this sector annually result in loss of life, suffering, diminished work capability, substantial financial costs, and disruptions to construction schedules (Choi & Lee, 2018; P. Zhang et al., 2019). Despite only constituting 7% of the workforce, the construction industry contributes

disproportionately to occupational fatalities, accounting for 30%–40%, surpassing the average for all industry sectors (Hallowell Matthew, 2012; Sunindijo & Zou, 2012). While efforts have been made globally to enact construction safety management systems, as well as safety regulations and laws, the level of safety in the construction sector remains unsatisfactory (Luo et al., 2022; Meng & Chan, 2024). From a global perspective, the construction industry holds the top rank for the highest incidence of safety accidents among all sectors (Zahoor et al., 2017). In Europe, the construction industry contributes to over 20% of all fatal occupational accidents (Samuelsson et al., 2023). In the United States, the construction sector exhibits the highest overall fatality rate compared to other industries (Liang et al., 2022). In the United Kingdom, the casualty rate in the construction industry is four times higher than in all other industries (Khan et al., 2022). The injury rate in the Korean construction sector was found to be 1.9 times greater than the overall industry average (Choi & Lee, 2022). Particularly in China, data from the Ministry of Housing and Urban-Rural Development of China (MOHURD) reported 11,362 construction accidents and 13,566 worker deaths between 2004 and 2019, establishing the highest rank among all industrial accidents with regard to the total number of incidents (Xia et al., 2023; Yuan et al., 2022). Based on these statistics, the construction sector bears considerable risk, enduring the highest rate of injuries, accidents, and fatalities compared to other industries.

The construction industry exhibits a higher prevalence of safety issues compared to other manufacturing sectors, largely due to its continued reliance on manual labor for specialized tasks rather than extensive machinery for operations and production. Another contributing factor is the disproportionate emphasis on productivity (time, cost, and quality) at the expense of safety concerns (Van Heerden et al., 2018). Due to these reasons, human behavior emerges as a primary factor

influencing safety performance, as individuals, unlike machines, respond to external conditions and possess emotions. Numerous accident investigations attribute accidents primarily to construction workers' unsafe behaviors (Choi & Lee, 2018; B. G. Lee et al., 2021; Love et al., 2017; Sunindijo et al., 2017). Thus, the mitigation of fatalities and injuries hinges significantly on enhancing workers' safety behaviors (He et al., 2022; Newaz et al., 2024; Zhang et al., 2023; Zhao & Yan, 2023). Effectively promoting safety behavior requires an understanding of its determinants (Y. Liu et al., 2023; Mohajeri et al., 2023). Several studies have looked into the psychology, physiology, and external surroundings of workers, as well as other factors that may contribute to unsafe behavior (Curcuruto et al., 2020; Deng et al., 2024; Ghasemi et al., 2018; Ye et al., 2020; Jian Zhang et al., 2020).

Individual and organizational factors, recognized as influential variables in workers' safety behavior (Y. Liu et al., 2023; Xia et al., 2020a; Xiang et al., 2023), have been widely researched to improve construction worker safety behavior (CWSB) (Guo et al., 2016; He et al., 2022; Nwagbala & Park, 2023; Vinodkumar & Bhasi, 2010). When considering the safety behavior of employees, a comprehensive explanation often emerges by considering a combination of organizational factors and cognitive processes (Basahel, 2021; Ye et al., 2020). This emphasis on understanding the interplay of individual and organizational factors propels essential research in the realm of safety behavior (Christian et al., 2009). Moreover, behavior, defined as human action, is motivated by the desire to accomplish an objective (Cameron & Duff, 2007) and can be influenced by leaders inspiring motivation for positive change and prioritizing the well-being of their employees (Inness et al., 2010). Given the evidence that safety leadership motivates employees to work safely (Griffin & Hu, 2013), it is crucial to comprehend the underlying processes to gain deeper insights into how

leaders may successfully inspire staff to work safely (Sawhney & Cigularov, 2018). Consequently, it is critical to pinpoint the precise procedures that leaders use to encourage staff members to behave safely.

Due to the intricate and unpredictable characteristics of construction work, employees in the field usually depend significantly on their supervisors to allocate tasks (Newaz et al., 2020). Given the increased frequency of interaction between supervisors and workers, supervisors have a greater inclination to shape employees' attitudes and actions toward safety (Fang et al., 2015). According to Lingard et al. (2012), frontline supervisors have a greater impact on employees' safety performance than managers. Moreover, the construction sector is typified by a highly mobile workforce, widespread subcontracting structures, and a dynamic and complicated work environment, leading to a lack of communication between upper management and labor (Meliá et al., 2008; Xiong et al., 2018). Frontline supervisors, who serve as a crucial link between them, play a pivotal role in ensuring the safety of construction sites (Al-Bayati et al., 2024). While workers may shift between sites and be under different top managers, their workgroup supervisors typically remain relatively stable (Oswald et al., 2022). Lingard et al. (2010) pointed out that a supervisor's leadership has the most significant impact on group members' perceptions of safety, underscoring the importance of comprehending supervisors' leadership behaviors. Thus, gaining a thorough grasp of how supervisor leadership affects the safety performance of construction workers may offer important new perspectives on efficient construction safety management.

In addition, firm size is recognized as a significant factor influencing safety behavior and, consequently, occupational safety and health performance within construction companies (Bonafede et al., 2016; Manu et al., 2018). Particularly with

small and medium-sized enterprises (SMEs) operating in the construction industry, safety precautions are rarely implemented (Masi & Cagno, 2015). Unlike larger firms, SMEs often grapple with financial constraints, a smaller market share, and operate with narrower profit margins, leading to a reduced inclination or capacity to invest in enhancing safety measures (Guo et al., 2015a; Guo et al., 2015b). Compared to larger enterprises, there are almost eight times as many fatal incidents in construction SMEs (Guo et al., 2018). This issue is particularly significant considering the dominance of SMEs in the construction industry, highlighting the need for increased emphasis on enhancing the construction workers' safety practices in SMEs.

1.3 Problem Statement

In high-risk sectors, employees' unsafe behaviors are the main causes of accidents (Kaptan et al., 2021; Shi et al., 2021). Notably, Fang et al. (2016) found that the unsafe behaviors of construction workers were the root cause of the majority of construction accidents. Therefore, enhancing employee safety behavior holds significant potential for substantially reducing casualties and occupational safety accidents. Many studies have highlighted the crucial role that behavioral variables play in preventing workplace accidents and fatalities (Christian et al., 2009; Ford & Tetrick, 2008). Over the past few decades, numerous safety behavior models and approaches have been created and evaluated (H. Chen et al., 2021; Fang et al., 2020; Grote, 2020; Zhang et al., 2022). The two most frequently used theoretical models are the Theory of Planned Behavior (TPB) and Self-determination Theory (SDT).

Previous studies employing the TPB or SDT have examined the association between the constructs of each theory and CWSB (Liu et al., 2020; Suo & Zhang, 2017; Yuan et al., 2022; J. Zhang et al., 2020). Some studies indicate that safety motivation

directly affects the TPB constructs, and these TPB constructs mediate the influence of safety motivation on safety behavior (Mohajeri et al., 2020; Mohajeri et al., 2021). Nevertheless, the mediating processes that underpin the link between different types of safety motivation and construction workers' safety behavior have not received much attention in studies (J. Yang et al., 2021). Additionally, while the multidimensional nature of motivation was considered, it is essential to acknowledge that workers may simultaneously endorse multiple reasons for working safely. Therefore, the continuum of self-determination that underlies the various forms of motivation outlined in SDT, namely relative self-determined motivation, should not be overlooked (J. Howard et al., 2016). According to Hagger and Chatzisarantis (2009), a more comprehensive description of human behavior could be achieved by combining the social cognitive components from the TPB and the motivational structures from SDT within a unified framework. Through this integration, new insights have been gained into the processes associated with social cognitive and motivational predictors of behavior. Numerous studies have applied this integrated approach across various contexts and populations (Chan et al., 2023; Chan et al., 2020; Cheng et al., 2022; Jang et al., 2021; Lee et al., 2020; M'sallem, 2021; Phipps et al., 2020). However, to the best of the author's knowledge, no study has applied the approach to construction safety management.

Furthermore, apart from individual factors, organizational factors have been identified as influential in shaping safety behavior. Among these organizational factors, leadership stands out as a critical determinant of safety behavior (Hoffmeister et al., 2014). Additionally, safety motivation is substantially influenced by the leader's safety standards and leadership (Sawhney & Cigularov, 2018). Studies have indicated the significance of the leadership-safety motivation relationship in determining safety behavior (Kim et al., 2021; Smith et al., 2020). Leadership as a subject matter has been

investigated from numerous perspectives, such as transformational leadership and transactional leadership (Oswald et al., 2022), leader-member exchange (S.-Y. Chen et al., 2021), authentic leadership (B. J. Kim et al., 2022), empowering leadership (Alshemeili et al., 2022), ethical leadership (Cakir et al., 2023), and other types (Schopf et al., 2021; Wang et al., 2023; Zheng et al., 2022). SDT also introduces a leadership style that may influence motivation and subsequent behavior, known as leader autonomy support (LAS) (Deci et al., 2017). SDT states that people will be more autonomously motivated in an atmosphere that supports their autonomy, where they feel respected for their thoughts and feelings, have chances for choice and alternatives, and have a valid justification for suggestions. In the workplace, a fundamental tenet of SDT is LAS, wherein employees perceive support from authority figures for their interests, respect for their perspectives, and encouragement of choice (Ryan & Deci, 2017). In line with SDT, employees, when exposed to high degrees of perceived autonomy support, derive greater satisfaction from the basic psychological needs of autonomy, competence, and relatedness. More precisely, LAS is integral to fulfilling all three basic psychological needs, serving as a proxy for social events that bolster self-determined motivation (Deci et al., 2017; Reeve, 2015). As such, there is growing attention to the subject of LAS and its impact on a range of organizationally relevant outcomes (Slemp et al., 2018). Flatau-Harrison et al. (2020a) suggest that autonomy-supportive contexts may play a vital role in promoting the internalization of motivation to engage in safety behaviors. However, previous studies have not taken LAS into account in the prediction of employees' motivation and behavior related to safety.

In addition to the aforementioned, firm size is particularly important in predicting CWSB (Manu et al., 2018). Numerous studies posit that SMEs face

challenging work environments characterized by high risks, low safety control abilities, and increased exposure to safety hazards (Ahn, 2022; Gurmu, 2019; Maqsoom et al., 2019; Nadhim et al., 2016). As mentioned earlier, previous research and statistical data consistently suggest that SMEs are more prone to occupational accidents compared to large enterprises (Guo et al., 2018). Therefore, there is a heightened focus on understanding CWSB in SMEs (Khan et al., 2022; Mohajeri et al., 2020). In particular, within construction SMEs, workers' reliance on supervisors is heightened due to the smaller social groups, affording supervisors more significant control over their safety behavior (Guo et al., 2015b). Consequently, studies have emphasized the link between safety behavior and supervisor leadership within construction SMEs (Bentoy et al., 2022).

Scholars conducted empirical studies to explore the effects of workers' safety behavior in SMEs, demonstrating that, in the context of China, workers' safety behavior plays a crucial role in enhancing the efficacy of company security systems, supporting investments in safety management (Q. Wang et al., 2018), strengthening responsibility management, improving safety outcomes, and cultivating an environment conducive to elevating the company's safety standards (J. Zhang et al., 2019). However, within the Chinese construction industry, research tends to concentrate on investigating construction workers' safety practices in large construction enterprises or sites (Liang & Zhang, 2019; Su et al., 2019; D. Wang et al., 2018; Xia et al., 2017; Zhang & Fang, 2013). Few studies have been done to look into how construction workers in SMEs behave when it comes to safety. As far as the author is aware, there has only been one study that looked into how construction workers' behavioral intentions are impacted by fatigue on medium-sized construction sites (Gu & Guo, 2022). Given that SMEs comprise the majority of construction

enterprises in China, accounting for over 97% of the industry, prioritizing them is crucial for improving safety within the sector. Additionally, various types of leadership, including transformational, transactional, and leader-member exchange, have been examined to investigate their connections with CWSB (He et al., 2019; He et al., 2021; Shen et al., 2017; Su et al., 2019; Wu et al., 2022). However, no investigations have been done to identify the association between leadership and CWSB in Chinese construction SMEs.

Considering the abovementioned issues, this study attempts to adopt the TPB and SDT integrated model specifically to concentrate on the influence of LAS from supervisors on CWSB within the context of Chinese construction SMEs. It is hoped that this research offers a comprehensive overview of the underlying processes through which a supervisor motivates construction workers to behave safely and contributes to a better and broader understanding of the mechanism of CWSB.

1.4 Research Questions

Drawing from the aforementioned concerns, five research questions have been formulated as follows:

1. Does supervisors' LAS impact workers' relative self-determined safety motivation in Chinese construction SMEs?
2. Does supervisors' LAS impact workers' social cognitive beliefs (attitude, subjective norm, and perceived behavioral control) in Chinese construction SMEs?
3. Does workers' relative self-determined safety motivation impact their social cognitive beliefs in Chinese construction SMEs?

4. Do workers' relative self-determined safety motivation and TPB constructs (attitude, subjective norm, perceived behavioral control, and intention) mediate the relationship between LAS and CWSB in Chinese construction SMEs?

5. What are the different impacts of LAS on CWSB (safety participation and safety compliance) in Chinese construction SMEs?

1.5 Research Aims and Objectives

The aim of this study is to develop a model to explore the impact of leader autonomy support (LAS) on construction worker safety behavior (CWSB), as well as to delve into the motivational and social cognitive processes that underlie the LAS-CWSB relationship in Chinese small and medium-sized enterprises (SMEs) in construction.

The objectives of the study are as follows:

1. To investigate the impact of supervisors' LAS on workers' relative self-determined safety motivation in Chinese construction SMEs.

2. To evaluate the impact of supervisors' LAS on workers' social cognitive beliefs in Chinese construction SMEs.

3. To examine the impact of workers' relative self-determined safety motivation on their social cognitive beliefs in Chinese construction SMEs.

4. To analyze the mediating role of workers' relative self-determined safety motivation and TPB constructs in the relationship between LAS and CWSB in Chinese construction SMEs.

5. To evaluate the different impacts of LAS on CWSB (safety participation and safety compliance) in Chinese construction SMEs.

1.6 Scope of Research

It is apparent in the literature that CWSB is directly impacted by various well-established factors, encompassing both individual and organizational aspects. For this reason, the study is rooted in two overarching research theories, namely TPB and SDT. This study will attempt to generalize the psychosocial process through which a leader motivates construction workers to work safely using data gathered from construction sites in China. According to MOHURD, the safety accident rate in China is still very high (MOHURD, 2023). Compared with large construction firms, SMEs encounter distinct barriers and challenges in managing safety (Guo et al., 2018). In addition, SMEs dominate the Chinese construction industry. Thus, this study concentrates on Chinese SMEs in construction.

Moreover, the pivotal role of supervisors in shaping workers' safety behaviors within construction sites is well recognized (Newaz et al., 2020). By focusing specifically on the role of supervisors within construction, this study exclusively examines the interactions between workers and supervisors within construction SMEs.

To enhance safety practices, this study will propose targeted interventions to improve LAS and cultivate relative self-determined safety motivation along with TPB constructs among construction workers. This research will provide actionable insights for construction SMEs to enhance their safety management systems. By focusing on the supervisor-worker relationship, it identifies scalable strategies to improve safety outcomes. Furthermore, the findings are expected to inform policy recommendations for the construction industry in China, emphasizing the importance of leadership and psychosocial processes in enhancing safety behavior.

1.7 Research Significance

The significance of this study lies in its detailed exploration of the relationship between supervisor leadership and CWSB. It makes a notable contribution to the existing literature by incorporating LAS, a novel concept in safety-related research, thereby deepening the understanding of effective leadership styles in construction safety contexts. By emphasizing LAS, this study introduces a constructive leadership style that enhances knowledge about how specific leadership behaviors affect CWSB. This focus broadens the discourse on leadership styles in construction safety management, leading to a more comprehensive understanding of effective safety leadership practices tailored to the unique demands of the construction industry.

Moreover, this study significantly enriches the growing body of knowledge on the leadership-safety relationship in the construction sector by focusing specifically on Chinese construction SMEs, a segment often overlooked in safety research. By examining the dynamics between supervisors and employees within this context, the research sheds light on a previously underexplored area, providing essential insights into how leadership impacts workers' safety behaviors. This nuanced examination not only broadens the understanding of safety management in SMEs but also aids in developing more tailored and effective safety strategies for the Chinese construction industry.

This study proposes that relative self-determined safety motivation and TPB constructs act as mediators in the relationship between LAS and CWSB. The expected mediating role of these constructs aims to provide new insights into the internal mechanisms linking LAS to CWSB from both motivational and cognitive perspectives. By exploring these intermediary factors, the research seeks to uncover the deeper layers of how LAS impacts CWSB, offering a comprehensive understanding of the

underlying processes. The findings are anticipated to generate practical insights on the effective application of LAS to enhance CWSB. This study offers specific suggestions and guidance to supervisors in construction SMEs, emphasizing the importance of adopting proper leadership behaviors to foster safer working environments. Given the dominance of SMEs in the Chinese construction industry, these insights can form the empirical basis for developing targeted interventions to improve CWSB and the overall effectiveness of safety leadership in these enterprises. This, in turn, can significantly contribute to fostering an environment of safety and reducing accidents in SMEs in China.

1.8 Definitions of Key Terms

Table 1.1 outlines the definitions for each key term used in this study.

Table 1.1 Key Terms and Definitions

No	Terms	Definitions	Sources
1	Leader autonomy support	A cluster of supervisory behaviors that collectively promote a climate of support and understanding within leader-worker relationships.	Reeve (2015)
2	Safety leadership	The process of interaction between leaders and followers, in which leaders exert influence over their followers to achieve organizational safety goals.	Wu et al. (2008)
3	Safety motivation	An individual's willingness to exert effort to enact safety behaviors and the valence associated with those behaviors.	Neal and Griffin (2006)
4	Autonomous motivation	Engagement in behavior for internally-referenced reasons that emanate from the self.	Deci and Ryan (2000) and Deci and Ryan (2008)
5	Controlled motivation	Engagement in behavior for externally-referenced reasons that emanate from outside the individual.	

Table 1.1 (Continued)

No	Terms	Definitions	Sources
6	Relative self-determined motivation	The extent to which an individual's behavior is driven by autonomous motivation rather than controlled motivation.	Deci and Ryan (2000) and Deci and Ryan (2008)
7	Intrinsic safety motivation	An individual is motivated to work safely for its inherent pleasure in the activity.	
8	Identified safety motivation	An individual is motivated to work safely because he or she values safety and believes the importance of safety in the workplace.	Fleming and Scott (2012) and Lim et al. (2018)
9	Introjected safety motivation	An individual is motivated to work safely when feeling internal pressure to do so.	
10	External safety motivation	An individual is motivated to work safely when feeling external pressure to do so.	
11	Attitude	An individual's favorable or unfavorable evaluation of performing a certain behavior.	
12	Subjective norm	An individual's perception that significant others approve or disapprove of performing a certain behavior.	Ajzen (1991) and Fishbein and Ajzen (2010)
13	Perceived behavioral control	An individual's perception of the ease or difficulty of performing a certain behavior.	
14	Intention	An individual's estimate of the likelihood or perceived probability of performing a certain behavior.	
15	Safety compliance	The core activities that individuals need to carry out to maintain workplace safety.	
16	Safety participation	Behaviors that do not directly contribute to an individual's personal safety but that do help to develop an environment that supports safety.	Griffin and Neal (2000)

1.9 Organization of Thesis

This thesis consists of six chapters. Each chapter has a distinctive aim and purpose, summarized as follows:

Chapter One serves as an introduction to the study, outlining the study's background. It presents and deliberates on the study's problem, research questions, and objectives. Additionally, it delves into the significance of the research, its scope, and elucidates the definitions of key terms used within the research context.

Chapter Two starts with an overview of the Chinese construction industry, followed by the safety issues and SMEs within this sector. Additionally, the chapter explores occupational safety within construction SMEs and discusses the pivotal role of supervisors in the construction domain. This chapter also includes a comprehensive literature review on safety behavior, safety leadership, safety motivation, SDT, LAS, the TPB, and the integrated model of SDT and TPB. Additionally, there is a review of previous literature related to similar topics, followed by an identification of the research gap. Finally, the study hypotheses and the conceptual framework are presented in this chapter.

Chapter Three discusses the research methodology. It delineates the research paradigms and design, population, and sampling procedures, along with the methods utilized for data collection. Moreover, it addresses questionnaire design, the pilot study, and data analysis techniques.

Chapter Four discusses the results of the empirical data analysis based on the quantitative approach, as outlined in Chapter Three. The relationships between research variables are presented and discussed.

Chapter Five offers a comprehensive discussion of the research findings, covering responses to the proposed research questions and hypotheses. It presents

direct relationships and subsequently explores the mediation effect's indirect relationships.

Chapter Six summarizes the research findings, provides recommendations from the findings, and discusses the contributions of the study. This chapter also includes the limitations of the study and several recommendations for future research.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter offers a brief introduction to the study area. It begins by exploring the global safety issues in the construction industry, followed by a focused discussion on the specific safety issues within the Chinese context. Additionally, the chapter delves into occupational safety within construction SMEs and discusses the crucial role of supervisors in the construction industry. The chapter further reviews concepts, theories, and empirical literature relevant to the study. Subsections provide an extensive literature review on safety behavior, safety leadership, safety motivation, Self-Determination Theory (SDT), leader autonomy support (LAS), the Theory of Planned Behavior (TPB), and the integrated model of SDT and TPB. Furthermore, related works and research gaps are mentioned to ensure the formulation of hypotheses and the research framework. Lastly, the chapter concludes with a summary of its contents.

2.2 Global Safety Issues in the Construction Industry

The construction industry plays a pivotal role in global economic development, generating significant employment and contributing to infrastructure growth. However, it is also universally recognized as one of the most hazardous sectors, consistently plagued by a high incidence of injuries and fatalities worldwide (X. Liu et al., 2023; Luo et al., 2022; Nwagbala & Park, 2023; Yuan et al., 2022). Every year, this sector witnesses significant human and economic costs, including loss of life, diminished work capabilities, financial burdens, and project disruptions (Choi & Lee, 2018; P. Zhang et al., 2019). Despite accounting for only 7% of the global workforce, the

construction industry disproportionately contributes to 30%–40% of all occupational fatalities, far exceeding the average for other sectors (Hallowell Matthew, 2012; Sunindijo & Zou, 2012).

Efforts to enhance safety, including the introduction of safety management systems, regulations, and laws, have been implemented globally. Nevertheless, safety outcomes in construction remain suboptimal (Luo et al., 2022; Meng & Chan, 2024). From a global perspective, construction ranks as the industry with the highest rate of accidents (Zahoor et al., 2017), as seen in Europe, where over 20% of fatal occupational incidents occur within this sector (Samuelsson et al., 2023). Similar trends are observed in other regions, including the United States, where the construction industry reports the highest fatality rate compared to other industries (Liang et al., 2022), and the United Kingdom, where construction casualty rates are four times higher than the national average across all industries (Khan et al., 2022). In Korea, the injury rate within construction is nearly twice that of other sectors (Choi & Lee, 2022). These figures reflect a global pattern of persistent safety concerns, despite substantial investments in safety management systems and regulatory frameworks aimed at reducing risks.

China, as one of the largest construction markets globally, faces unique and severe safety challenges. Between 2004 and 2019, the Ministry of Housing and Urban-Rural Development of China (MOHURD) recorded 11,362 construction-related accidents resulting in 13,566 worker deaths, marking construction as the highest-ranking industry for industrial accidents by total incidents (Xia et al., 2023; Yuan et al., 2022). Therefore, the following section will narrow its focus to the Chinese construction sector, examining its unique safety challenges.

2.3 Overview of the Chinese Construction Industry

One of the major contributors to the economy of China is the construction industry. As shown in Figure 2.1, data from the National Bureau of Statistics of China (NBOS) indicates a significant expansion in the production and operational scale of Chinese construction enterprises. From 2013 to 2022, the gross output value of the construction industry showed a continuous upward trend. Starting at 16,036.6 billion yuan in 2013, this value steadily increased and eventually reached 30,793.5 billion yuan in 2022, nearly doubling over the past decade. This substantial increase reflects a significant expansion of the construction sector during this period.

Notably, the annual growth rate of the construction industry's gross output value displayed fluctuations while maintaining an overall upward trajectory. There were significant variations in growth rates between 2013 and 2015, with a peak of 16.87% in 2013 and a decline to 2.29% in 2015. However, from 2016 to 2022, the growth rate remained relatively stable, fluctuating within the range of 5% to 10.53%.

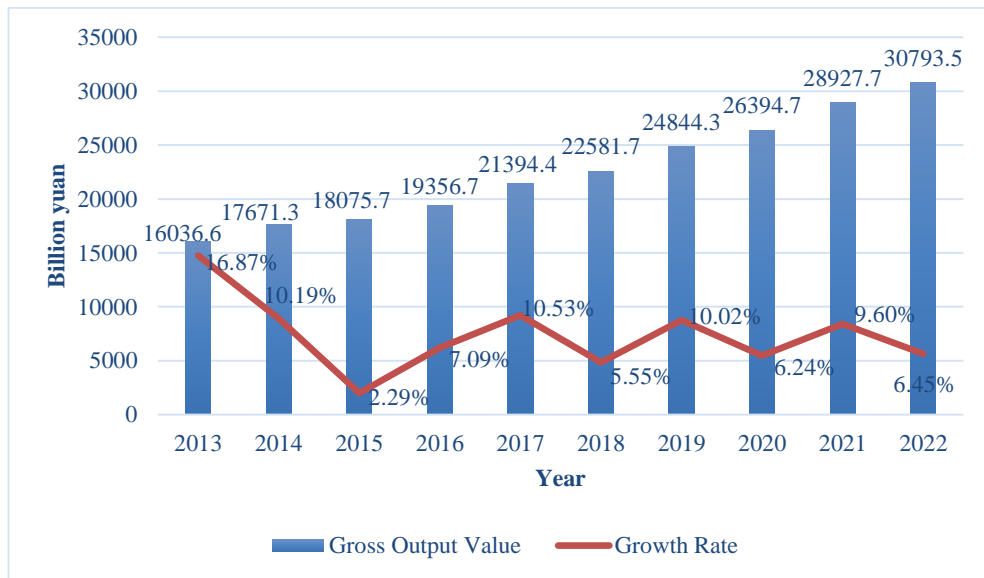


Figure 2.1 The Gross Output Value of the Chinese Construction Industry

Source: NBOS (2023)

A similar situation also occurred in the value-added part of the Chinese construction industry. As shown in Figure 2.2, the added value of the Chinese construction industry has seen a consistent increase over the past decade. Starting at 4,089.7 billion yuan in 2013, it climbed to 8,338.3 billion yuan in 2022. The annual growth rates varied throughout the years, displaying fluctuations while generally maintaining a positive trajectory. Peak growth rates were observed in 2017 (12.44%) and 2018 (13.10%), indicating significant expansion during these years. Conversely, there was a lower growth rate of 2.54% in 2020. Other years displayed moderate to relatively high growth rates, ranging between 5.20% and 8.69%.

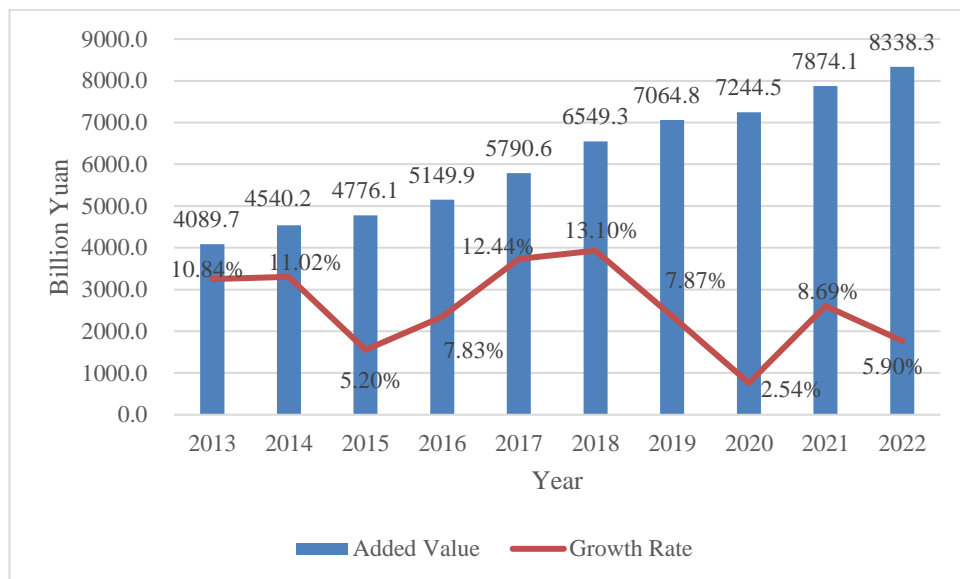


Figure 2.2 The Added Value of the Chinese Construction Industry

Source: NBOS (2023)

As shown in Figure 2.3, from 2013 to 2022, the proportion of the added value of the Chinese construction industry to the gross domestic product (GDP) remained relatively stable, fluctuating within the range of 6.85% to 7.16%. In 2022, the added value of the construction industry contributed 6.89% to the GDP, marking a 0.04 percentage point increase compared to the preceding year. A proportion of around 7% signifies the construction industry's significance within the broader economy,

highlighting its notable role in the GDP composition. The status of the construction industry as a pillar of the national economy remains stable.

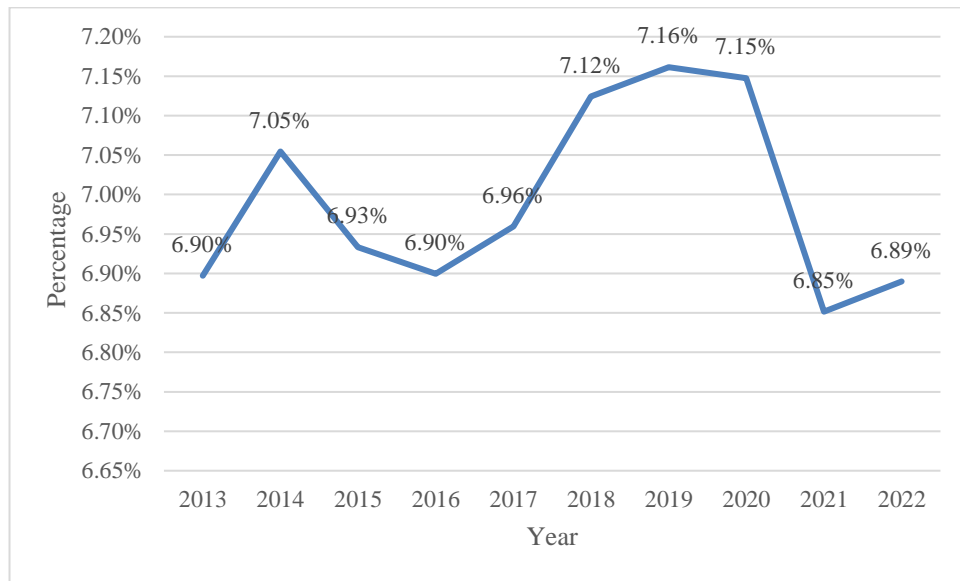


Figure 2.3 The Proportion of Added Value of the Chinese Construction Industry to GDP

Source: NBOS (2023)

2.4 Safety Issue in the Chinese Construction Industry

The Chinese construction sector has made remarkable strides since the implementation of China's 14th Five-Year Plan. However, despite these accomplishments, numerous incidents have led to financial and emotional losses for the country and the families of the workers. According to the Ministry of Housing and Urban-Rural Development of China (MOHURD), from 2013 to 2022, there were 6,282 fatal incidents in the Chinese construction sector that caused 7,388 deaths (except Hong Kong, Macao, and Taiwan).

As depicted in Figure 2.4, the highest number of construction accidents was recorded in 2019, totaling 773 accidents, followed by 734 accidents in 2018. In terms of fatalities, 2019 also saw the highest number, with 904 deaths, followed by 840

deaths in 2018. Conversely, the lowest numbers of construction accidents and deaths were observed in 2015, with 442 accidents and 554 fatalities, respectively. The number of incidents and fatalities in the Chinese construction sector has increased since reaching its lowest point in 2015. Between 2011 and 2015, China implemented its 12th Five-Year Plan, aiming to transition towards a consumption-driven economy. This strategic shift in economic structure and development model led to a deceleration in the growth of the construction industry from 2011 to 2015. Consequently, during this period, there was a decline in the total number of construction accidents. The gross output value of the construction industry in 2015 was merely 2.29%. Consequently, there were fewer accidents in 2015 as a result of reduced construction activity (Ma et al., 2022).

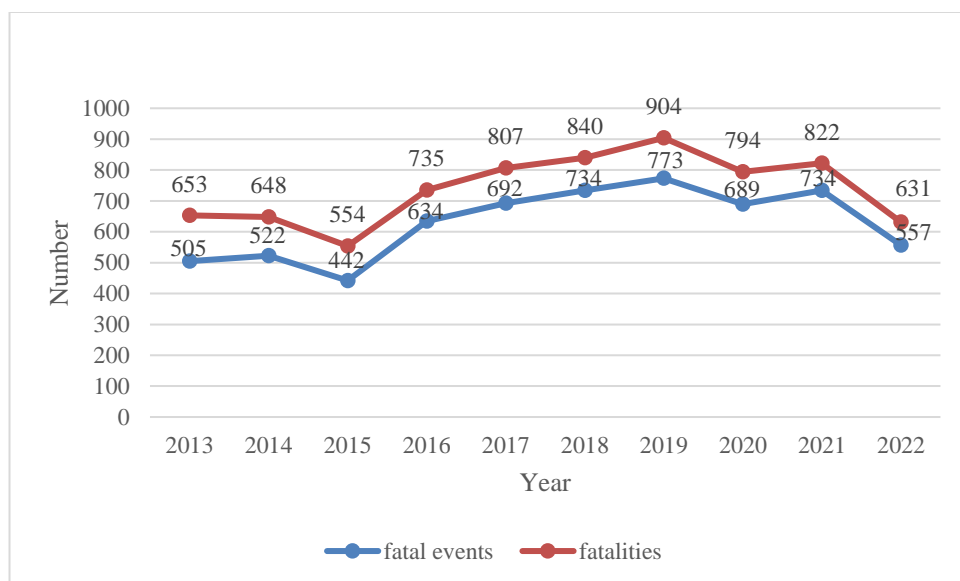


Figure 2.4 Fatal Events and Fatalities in the Chinese Construction Industry

Source: MOHURD (2023)

After reaching its peak in 2019, the number of fatal incidents and fatalities in the Chinese construction sector began to decline again from 2020 to 2022. This decline could be attributed to the impact of the COVID-19 pandemic on construction safety during this period (Duan et al., 2023). In order to prevent the spread and outbreak of

COVID-19, the Chinese government enforced a strict and mandatory isolation policy. Therefore, the pandemic restricted construction activities (Duan et al., 2023). From Figure 2.2, it is evident that the growth rate of added value in the construction industry has significantly slowed down from 2020 to 2022, with 2020 reaching a low point of only 2.54%. Consequently, there was a decrease in the occurrence of accidents (Baek et al., 2021). From an alternative perspective, this situation suggests that China's construction safety management might have been relatively inadequate before the pandemic, and the pandemic could potentially have prompted increased attention to Chinese construction safety management practices (Wang et al., 2022; Y. Yang et al., 2021).

According to the State Council of China, accidents are classified into different levels depending on the number of fatalities (Xu & Xu, 2021), as outlined in Table 2.1.

Table 2.1 Classification of the Accident Level

Accident Level	Ordinary	Major	Severe	Extraordinarily Severe
Deaths	[0,3)	[3,10)	[10,30)	≥30

Source: Xu and Xu (2021)

According to MOHURD, between 2013 and 2022, 221 severe and major accidents occurred in the construction sector, resulting in 880 deaths. These accidents accounted for 11.91% and 3.52% of the total number of fatalities and accidents, respectively. As depicted in Figure 2.5, the highest number of major and severe accidents was recorded in 2014, totaling 29 accidents, followed by 27 accidents in 2016. In terms of fatalities, 2019 saw the most deaths, with 107, followed by 105 deaths in 2014. Conversely, the lowest numbers of construction deaths and accidents were observed in 2022, with 49 fatalities and 11 accidents, respectively. The decline in major and severe accidents within the construction sector reflects the progress made

by the Chinese government in controlling such occurrences. Particular attention should be given to major and severe accidents since their effects on construction companies and society are even more detrimental than those of ordinary accidents.

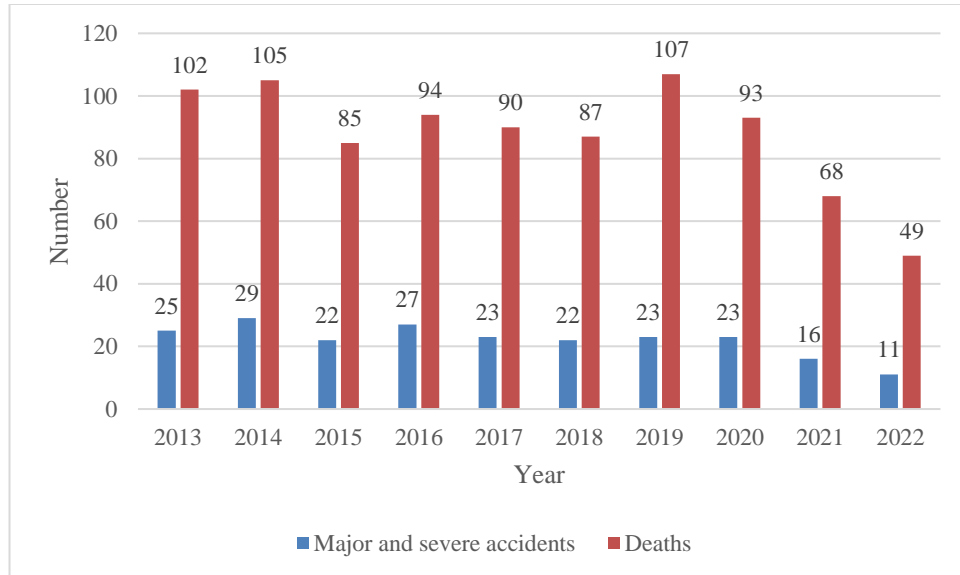


Figure 2.5 Major and Severe Accidents in the Chinese Construction Industry

Source: MOHURD (2023)

Based on the available data, China's construction industry still has a low level of safety, with an excessively high rate of accidents and fatalities. Hence, it remains imperative to mitigate accidents in the construction industry. Efforts to reduce the occurrence of such accidents are still necessary.

2.5 SMEs in the Chinese Construction Industry

As the construction industry continues to develop, the number of construction enterprises has also increased accordingly. As shown in Figure 2.6, over the past decade, the number of Chinese construction enterprises has experienced continuous growth, from 78,919 in 2013 to 143,446 in 2022. The annual growth rate of the number of construction enterprises has shown stable growth in most years, reaching over 7% annually from 2018 to 2022. Especially between 2020 and 2022, the growth rate