Uncertain Supply Chain Management 12 (2024) 1611–1624

Contents lists available at GrowingScience

Uncertain Supply Chain Management

homepage: www.GrowingScience.com/uscm

How managers' green transformational leadership affects green resilient supply chain: The moderating impact of green ambidexterity and green innovation

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A B S T R A C T

Upstream textile companies in Indonesia are the most significant contributors to environmentally hazardous production waste. Green Transformational Leadership (GTL) is critical to achieving a Green Resilient Supply Chain (GRS) to address vulnerability to supply chain disruptions while maintaining environmentally friendly practices. In addition, the mediation of Green Ambidexterity (GAM) and Green Innovation (GIN) is believed to strengthen the achievement of GRS. In line with the Indonesian government's policy to protect the environment, this study examines the direct effect of green transformational leadership variables on a green resilient supply chain. It evaluates Green Ambidexterity and Green Innovation's mediating effect on the relationship between GTL and GRS. This study analyzes the data of 50 production managers of upstream textile companies from 87 respondents collected from the survey. The analysis uses PLS-SEM based on variance to verify the relationship between variables. The research results indicate that green transformational leadership significantly influences green resilient supply chains. It was found that both Green Ambidexterity and Green Innovation significantly influence the Green Resilient Supply Chain, both directly and through mediating effects. Therefore, managers should consider implementing a Green Resilient Supply Chain, Green Ambidexterity, and Green Innovation practices to improve organizational goals while maintaining a green environment.

Article history:
Received January 9, 2024
Received in revised format February 18, 2024
Accepted March 23 2024
Available online March 23 2024

Keywords:
Green transformational leadership
Green resilient supply chain
Green ambidexterity
Green innovation
Textile industry

1. Introduction

The increasingly rapid growth of the world economy, especially driven by companies along the supply chain, requires increasingly large resources, causing environmental damage, which hurts human life (Sun & Sun, 2021). Thus, increasing awareness of protecting the environment is increasingly important, such as reducing greenhouse gas emissions and carbon footprint and implementing green supply chains (Ozturk et al., 2022; Dzikriansyah et al., 2023). Globally, upstream textile companies are the largest contributors to environmentally harmful waste discharges from production (Payet, 2021) due to the discharge of pollutants such as manganese, chromium, zinc, and dyes, all of which cannot be degraded by decomposing microorganisms (Naga Babu et al., 2019; Uddin & Sayem, 2020; Castillo-Suárez et al., 2023). In the Indonesian context, upstream textile companies contribute to environmental pollution and significantly to the Indonesian economy, employing 3.6 million people and contributing 6.38 percent of the gross domestic product (GDP) in 2022 (Sugeng et al., 2022). Thus, the upstream sector textile companies must be encouraged to improve the company's green supply chain performance by being driven by Transformational Leadership (Leite & Rua, 2022; Nasir et al., 2022; Azinga et al., 2023; Nabi et al., 2023). Likewise, supporting the upstream sector textile companies to have a Resilient Supply Chain that can recover in the face of various disruptions is a necessary strategy (Behrens et al., 2020; Piprani et al., 2020; Nguyen Thi et al., 2023). Furthermore, many researchers have expressed the importance of the upstream sector textile companies in carrying out innovations to reduce the

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ISSN 2291-6830 (Online) - ISSN 2291-6822 (Print)

doi: 10.5267/j.uscm.2024.3.019

discharge of toxic waste into the environment and improve green environmental performance (Ahmed et al., 2023; Martínez-Martínez et al., 2023; N. Wang et al., 2022; Zhou et al., 2022; Zhou et al., 2023; Tran et al., 2023). Ambidexterity in the upstream sector textile companies has also begun to be revealed by researchers in terms of managing the balance of exploration and exploitation factors to achieve operational excellence (Stelmaszczyk & Pierscieniak, 2020; Tseng et al., 2022; Seimon & Endagamage, 2022; Moradlou et al., 2023). To inspire, support, and continue to improve the upstream sector textile companies to excel in the Green Resilient Supply Chain, we use the perspective of the RBV theory or the resource-based view (Barney, 1991) and the AMO theory or the ability-motivation-opportunity to explain the practice of GTL which is a vital resource for companies and to achieve environmentally friendly goals (Kaur et al., 2019; Singh et al., 2020).

One important strategy in implementing the green supply chain is that companies must practice GTL (Jia et al., 2018), which has broad discretion to influence the company's green supply chain performance (Singh et al., 2019; Singh et al., 2020). Company supply chains often face unexpected upheavals, for example, pandemics, trade wars, armed conflicts, strikes, and disasters, which can cause delays in product distribution and company operations and the unavailability of raw materials and spare parts (Hsu et al., 2021). Consequently, a Green Resilient Supply Chain (GRS) is used to overcome vulnerabilities to various types of supply chain disruptions so that they can quickly recover to normal and work better than before while still paying attention to environmentally friendly concepts (Yavari & Zaker, 2020). Academics have suggested a significant interplay between transformational leadership and resilient supply chains (Taseer & Ahmed, 2022; Solis et al., 2023). However, research on the influence of GTL and the Green Resilient Supply Chain still needs to be carried out by academics, whereas analyzing the relationship between the two is important in the context of a green environment.

Recently, academics have also revealed the influence of Transformational Leadership on organizational Ambidexterity. This research is interesting because organizational ambidexterity can manage complex and different company components: aligning and adapting, productivity and profitability, exploration and exploitation, and radical change with sustainability (Birkinshaw & Gibson, 2004; Tariq et al., 2022). Thus, the transformational leadership function becomes critical in managing an ambidextrous organization. It enables the organization to leverage existing activities and explore new ones to help the organization adapt and anticipate rapid environmental changes (Ojha et al., 2018; Kozcu et al., 2021; Ali et al., 2022). Meanwhile, it currently needs to be clarified about the role of GTL on Green Ambidexterity and its mediating effect on the Green Resilient Supply Chain (Cao et al., 2010; Tang et al., 2022; Katou et al., 2023).

To balance economic growth and environmental protection, many company leaders consider Green Innovation to be an effective way to increase competitive advantage (Wang et al., 2020; Sun & Sun, 2021). Previous studies have concluded that Transformational Leadership is vital in implementing Green Innovation to plan green processes and products and reduce hazardous waste for the environment (Lisi et al., 2020; Singh et al., 2020; Maitlo et al., 2022; Begum et al., 2022; Pham et al., 2023; Van et al., 2023), to gain economic benefits, provide an image as a green company, and support saving the environment (Xie et al., 2019; Abu Seman et al., 2019). However, studies on GTL on green innovation and its mediating effect on green, resilient supply chains still need to be explored. Therefore, the influence between variables in a green context should be clarified.

Inspired by the identified gaps, it is essential to find further evidence, especially regarding the upstream textile industry in Indonesia, which has not been studied so far. Therefore, the objectives of this study are to (1) examine the direct relationship between GTL and Green Resilient Supply Chain and (2) evaluate the mediating effects of Green Ambidexterity and Green Innovation on the relationship between GTL and Green Resilient Supply Chain in the context of the upstream textile industry in Indonesia.

The justification for this research is based on the novelty of the approach to assess the role of GTL in transforming the upstream textile industry towards environmental sustainability. First, the emphasis on GTL as a critical actor in the paradigm shift of the upstream textile industry reflects the relevance and importance of the role of leaders in steering organizations toward more sustainable practices. This research contributes to our understanding of leadership in green transformation. It opens opportunities to explore leadership strategies and practices that can be applied in other industries under pressure to adapt to environmental sustainability. Second, considering the impact of GTL on the Green Resilient Supply Chain (GRS) is an essential focus of this research. In the context of the upstream textile industry, where green supply chains are becoming increasingly urgent, a better understanding of how leadership can shape and strengthen resilient supply chains is crucial. Finally, previous studies tend to pay less attention to the role of green ambidexterity and green innovation as moderating factors in the relationship between GTL and GRS. Thus, this research provides an opportunity to fill this knowledge gap and enrich the literature by expanding our understanding of how these additional factors can influence leadership and supply chain sustainability dynamics.

The next part of this paper will be presented in several different parts. Relevant literature to support the research hypothesis is discussed in the second part. The methodology to achieve this research's objectives is explained in the third part. The fourth section presents the results to answer the outlined hypothesis. The fifth section discusses interpreting the research findings in the context of existing theory or research. Finally, conclusions are presented, including implications and potential future research topics.

2. Literature Review

2.1 GTL and Green Resilient Supply Chain

Transformational Leadership influences the Company's future because it can provide strong confidence in employees to achieve the Company's vision (Sun et al., 2022; Bass, 2000). Meanwhile, GTL is a leader who has a vision, inspires, and supports employees to collectively achieve the Company's vision by adopting a green environment (Chen & Chang, 2013; Asad et al., 2021; Liu & Yu, 2023). The characteristics of GTL are reflected in, among others, clearly disseminating information to employees about the green vision, inspiring employees regarding the implementation of the green plan, organizing training for employees regarding green environmental advocacy, encouraging employees to participate in the green action program, engaging staff to achieve environmental objectives, encourages staff to develop and exchange their environmentally friendly solutions, and influences subordinates to voluntarily pro-green environment (Zhang et al., 2020; Singh et al., 2020; Khan & Khan, 2022; Liu & Yu, 2023; Cahyadi et al., 2023).

Initially, the concept of organizational resilience was known, namely the resilience of organizational members in facing stress obtained from the speed of learning in implementing positive adaptive behavior (Madani & Parast, 2023; Evenseth et al., 2022; Duchek, 2020; Chen et al., 2021). This concept has been adopted by Supply Chain Resilience, which describes the capacity of the supply chain network to recover from various unexpected disturbances so that operations can return to normal (Kaur & Singh, 2019; Lozano-Diez et al., 2020; Marinagi et al., 2023; Azam et al., 2023; Mohammed et al., 2023). Furthermore, Academics have introduced the concept of a Green Resilient Supply Chain. This concept explains the resilience of a company's supply chain in facing unexpected risk events and responding quickly while still paying attention to the environment. The aim is to recover to the original situation, increase customer satisfaction, and improve the company's competitive position. (Govindan et al., 2015; Malek et al., 2017; Ruiz-Benitez et al., 2017; Yavari & Zaker, 2020; Hasani et al., 2021; Sharma et al., 2021; Foroozesh et al., 2022; Ayyildiz, 2023).

Green Resilient Supply Chain (GRS) can be reflected by characteristics including contingency planning for upstream and downstream supply chain disturbances, intensifying visibility, communication and information sharing with suppliers, multi-sourcing and flexible supply base, optimizing buffer stock and maintaining excess capacity in production, improve integration, collaboration and coordination with suppliers, and have a recovery plan from disasters and supply chain disruption (Ruiz-Benitez et al., 2017; Yavari & Ajalli, 2021; Raut et al., 2021; Hasani et al., 2021). The study demonstrates a robust relationship between transformational leadership and a resilient supply chain. (Bag et al., 2021; Ritchie, 2021; Taseer & Ahmed, 2022). Therefore, we estimate that a Green, Resilient Supply Chain can be achieved with GTL so that:

H_1: *GTL has a positive and direct effect on Green Resilient Supply Chain.*

2.2 GTL and Green Ambidexterity

To develop organizational ambidexterity, a company must adapt to rapid external changes, such as technological, social, political, and cultural changes. This requires capacity modifications to ensure successful goal achievement (Tushman & O'Reilly, 1996). Organizational ambidexterity is the confident capability of an enterprise to simultaneously modify complex and conflicting components, namely exploration and exploitation (Sinha, 2019; Tariq et al., 2022). Exploration relates to creating new products, knowledge, opportunities, and resources with radical change and experimental learning. In this context, 'exploitation' refers to the process of enhancing the skills and knowledge of human resources and improving current company operations through continuous improvement (Mom et al., 2019; Lyu et al., 2022; Kassotaki, 2022).

Green Ambidexterity (GAM) can be reflected in the characteristics of Green Exploitation: focus on reducing waste in operational activities to be competitive, focus on developing environmentally friendly competencies, focus on improving work processes so that they are more efficient, and Green Exploiration: proactively looking for new solutions for green supply chains, creating new ways to optimize green supply chain goals, and consistently adopt innovative methods to address environmental issues in our supply chain effectively (Lewin & Volberda, 1999; Partanen et al., 2020; Khan et al., 2021; Úbeda-García et al., 2022; Chen et al., 2022). Transformational Leadership has not been extensively studied in relation to organizational ambidexterity (Pertusa-Ortega et al., 2020; Úbeda-García et al., 2022; Wang et al., 2023) despite its popularity in management research. GTL towards Green Ambidexterity (Cao et al., 2010; Tang et al., 2022; Katou et al., 2023), especially in the textile industry. Thus, we suspect:

H_2: *GTL has a positive and direct effect on Green Ambidexterity.*

2.3 GTL and Green Innovation

Green innovation is a continuous process that entails developing new operational processes, products, and technologies to safeguard the environment. This is accomplished by reducing emissions, recycling waste, conserving resources, and saving energy (Bai et al., 2019; Lian et al., 2022) so that it can improve environmental performance and company profits (Chen,

2008; Sun & Sun, 2021; Wang, 2023). The characteristics of Green Innovation Leadership (GIN) are reflected in, among others: has taken the initiative to restore the environment outside the obligations of government regulations, upgrading green technology to reduce environmental damage, adjusted operations to use renewable energy and recycle waste, eliminating hazardous waste and waste in operational processes, recycle chemicals and replace the use of non-renewable resources and using new energy sources with less pollution in company operations (Wang et al., 2020; Wang & Juo, 2021; Sun & Sun, 2021; Wang et al., 2022).

Green Innovation can be driven through GTL. Company leaders with a green environmental vision will increase pro-green environmental behavior in employees (Zhang et al., 2020) and encourage employees to actively participate in Green Innovation initiatives within manufacturing companies (Van et al., 2023). Recent studies have confirmed the positive relationship between GTL and Green Innovation. By reforming employee perceptions, GTL encourages creativity and greater participation in Green Innovation (Singh et al., 2020; Errmann et al., 2021; Maitlo et al., 2022; Begum et al., 2022). Meanwhile, leaders who pay less attention to the green environment will mean that employees will ignore being environmentally friendly and participate less in Green Innovation (Kalyar et al., 2021). Thus, we estimate:

H_3: *GTL has a positive and direct effect on Green Innovation.*

2.4 GTL, Green Resilient Supply Chain, and Green Ambidexterity

GTL builds an employee mindset to achieve an environmentally friendly company vision by providing sustainable support (Liu & Asad et al., 2021; Sun et al., 2022; Yu, 2023). The Green Resilient Supply Chain promptly responds to unforeseen risks in the Company's supply chain while prioritising environmental sustainability, ultimately enhancing the Company's performance (Yavari & Zaker, 2020; Sharma et al., 2021; Foroozesh et al., 2022; Ayyildiz, 2023).

In terms of achieving a Green Resilient Supply Chain, the Company needs the support of GTL so that the Company's performance can continue to be improved (Bag et al., 2021; Ritchie, 2021; Taseer & Ahmed, 2022). However, researchers have also identified the role of Green Ambidexterity in achieving a Green Resilient Supply Chain (Tang et al., 2022; Úbeda-García et al., 2022; Katou et al., 2023; Y. Wang et al., 2023). Meanwhile, limited research has been conducted on the role of Green Ambidexterity in mediating the relationship between GTL and the Green Resilient Supply Chain. (Katou et al., 2023, Wang et al., 2023). Therefore, we estimate:

H_4: *Green Ambidexterity has a positive and direct effect on Green Resilient Supply Chain.*

H_5: *GTL indirectly but positively influences Green Resilient Supply Chain through Green Ambidexterity.*

2.5 GTL, Green Resilient Supply Chain, and Green Innovation

Scholars have extensively researched the impact of Transformational Leadership on inspiring, characterizing, and motivating green innovation in company operations that promote environmentally friendly environments (Amabile & Pratt, 2016; Li et al., 2020). However, Transformational Leadership in Asia still needs to catch up to other regions in ensuring innovative production activities that prioritize environmentally friendly protection and demonstrate competence and expertise (Chen & Chang, 2013; Li et al., 2020; Maitlo et al., 2022). Meanwhile, the growth of the manufacturing sector in the Asian region is amazing (Hussain et al., 2019; Na & Kang, 2019; Timmer & Szirmai, 2000), so it requires a company supply chain that is resilient to face various conditions. Disruption and external risks (Marinagi et al., 2023; Azam et al., 2023; Mohammed et al., 2023; Nabil, 2021).

In connection with environmental issues, GTL is needed to encourage manufacturing companies to have a Green Resilient Supply Chain (Taseer & Ahmed, 2022; Bag et al., 2021; Ritchie, 2021). Another role of GTL is to encourage employees to actively participate in Green Innovation by reforming their thinking (Errmann et al., 2021; Maitlo et al., 2022; Begum et al., 2022) so that employees do not neglect to implement environmentally friendly company operations (Kalyar et al., 2021). However, it also requires the integration of Green Innovation in company operations that use advanced technology to become the main strategy for improving the Green Resilient Supply Chain (Maheshwari et al., 2021). Green Innovation supports the Green Resilient Supply Chain by adopting sophisticated and environmentally friendly technology. This technology enables faster and more accurate decision-making for supply chain recovery in the face of disruption (Hazen et al., 2018; Piprani et al., 2023).

Even though scholars have researched the relationship between GTL and Green Resilient Supply Chain (Taseer & Ahmed, 2022; Bag et al., 2021; Ritchie, 2022), the mediating role of Green Innovation in this relationship has not been widely discussed, especially in the upstream sector textile companies in Indonesia (Iqbal & Ciptaningtyas, 2018; Farradia et al., 2019). Thus, we estimate:

H_6: *Green Innovation has a positive and direct effect on Green Resilient Supply Chain.*

H_7: *GTL indirectly but positively influences Green Resilient Supply Chain through Green Innovation.*

We confidently present a conceptual research model (refer to Fig. 1), based on the literature review and hypotheses, which has been rigorously tested in this study.

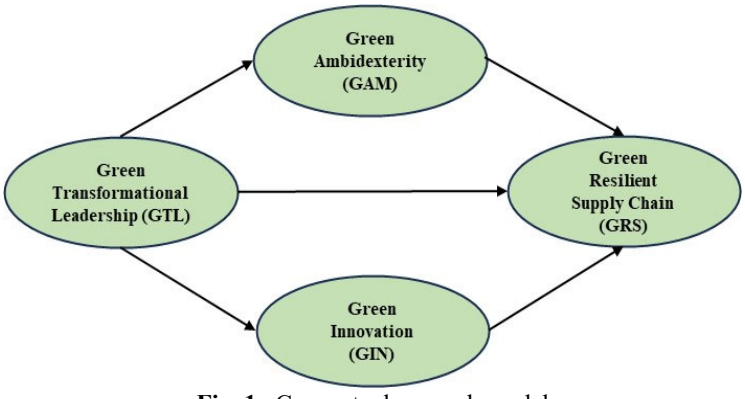

Fig. 1. Conceptual research model

3. Methodology

3.1 Research Design

To achieve the research objectives, the explanatory survey method, which aims to analyze cause-and-effect relationships between variables and to determine and predict changes or variations in a phenomenon concerning other variables, was chosen (Strydom, 2014). Meanwhile, when viewed from the time horizon, this research uses cross-sectional, that is, information from part of the population (sample respondents) is collected empirically at the scene to know the opinions of part of the population regarding the object being studied. The data is only collected once (Sekaran & Bougie, 2013).

3.2 Data Source and Sampling Techniques

Before conducting the survey, we meticulously crafted a set of 24 questions in a questionnaire. The questionnaire was designed using a five-point Likert scale and was based on the four variables outlined in the conceptual research model. To ensure that the respondents fully comprehended the questions, we took the extra step of translating the questionnaire into Indonesian. To ensure that the respondents fully comprehended the questions, we took the extra step of translating the questionnaire into Indonesian. A pilot test was conducted on 25 respondents to ensure proper understanding of the survey instrument before distribution to the research sample.

The Indonesian upstream sector textile companies are highly concentrated in West Java and Banten provinces, with a total of 87 companies. In October-November 2023, a comprehensive questionnaire was distributed to the entire population, both online and offline. The respondents were Production Managers, who possess an in-depth understanding of the production process in each company. Out of the total of 87 respondents, 50 responses met the requirements for further analysis, as only those were completed in full.

The proposal establishes a model for GTL and Green Resilient Supply Chain using Variance-based Partial Least Squares Structural Equation Modeling (PLS-SEM). The model investigates the relationships between variables, including moderator variables. The measurement model was evaluated using SmartPLS 4.0 to assess the validity and reliability of the construct variables, as recommended by Sarstedt et al. (2016). This study confirms the conceptual model through the use of PLS-SEM, despite the abnormal data distribution (Hair et al., 2022; Ringle et al., 2022).

4. Results

The research model is evaluated using PLS-SEM, which comprises two evaluations: the outer and inner models. The outer model evaluation is used to determine the validity and reliability of the model. Convergent validity is established by a factor loading value of ≥ 0.7 and an average variance extracted (AVE) value of ≥ 0.5. Meanwhile, discriminant validity is measured by ensuring that the square root of AVE (Fornell-Lacker criterion) is greater than the correlation between latent constructs. The model's reliability was assessed using Cronbach's Alpha (≥ 0.70) and Composite Reliability (≥ 0.70). Inner Model

Evaluation, which predicts the relationship between latent variables, was then conducted. The evaluation criteria for the Inner Model include the R-squares value (determinant coefficient), Statistical T Value, and P-value. If the R-Squares are 0.75, 0.5, and 0.25, it can be confidently concluded that the influence of exogenous variables on endogenous variables is strong, moderate, and weak. To determine the significance of the influence between variables with a significance level of 5%, use a t-value greater than 1.65 and a P-value less than 0.05, as recommended by Hair et al. (2022).

4.1 Outer Structural Model Results

The outer model evaluation is based on Table 1, which shows that all indicators have a Factor Loading of ≥ 0.7 and an AVE value of ≥ 0.5, meeting the Convergent Validity criteria. Additionally, discriminant validity was also met (Table 2) as measured by the value of the square root of AVE (Fornell-Lacker Criterion), which was greater than the correlation between latent constructs. Furthermore, the model meets the reliability requirements as measured by Cronbach's Alpha of ≥ 0.70 and Composite Reliability of ≥ 0.70.

Table 1
Validity and Reliability of the variables

Vrb	Idc	F_L	Cron_α	Com_R	A_VE
Green Transformational Leadership (GTL)			.922	.938	.687
L1	clearly disseminate information to employees about the green vision	.743			
L2	inspire employees regarding the implementation of the green plan	.735			
L3	organizing training for employees regarding green environmental advocacy	.902			
L4	encourage employees to participate in the green action program	.833			
L5	engaging staff to achieve environmental objectives	.918			
L6	encourages staff to develop and exchange their environmentally friendly solutions	.919			
L7	influence subordinates to voluntarily pro-green environment	.723			
Green Ambidexterity (GAM)			.856	.893	.581
A1	focus on reducing waste in operational activities to be competitive	.725			
A2	focus on developing environmentally friendly competencies	.729			
A3	focus on improving work processes so that they are more efficient	.787			
A4	proactively looking for new solutions for green supply chains	.808			
A5	creating new ways to optimize green supply chain goals	.772			
A6	consistently adopt innovative methods to address environmental issues in our supply chain effectively	.752			
Green Innovation (GIN)			.877	.908	.622
I1	has taken the initiative to restore the environment outside the obligations of government regulations	.814			
I2	upgrading green technology to reduce environmental damage	.762			
I3	adjusted operations to use renewable energy and recycle waste	.881			
I4	eliminating hazardous waste and waste in operational processes	.748			
I5	recycle chemicals and replace the use of non-renewable resources	.782			
I6	using new energy sources with less pollution in company operations	.736			
Green Resilient Supply Chain (GRS)			.867	.900	.602
R1	contingency planning for upstream and downstream supply chain disturbances	.726			
R2	intensify visibility, communication and information sharing with suppliers	.705			
R3	multi-sourcing and flexible supply base	.803			
R4	optimize buffer stock and maintain excess capacity in production	.845			
R5	improve integration, collaboration and coordination with suppliers	.776			
R6	have a recovery plan from disasters and supply chain disruption	.793			

Vrb = Variables, Idc = Indicators; F_L = Factor Loading; Cron_ α = Cronbach's alpha; Com_R = Composite Reliability; A_VE = AVE

Table 2
Fornell–Larcker criteria (discriminant validity)

	GAM	GIN	GRS	GTL
GAM	.763			
GIN	.909	.789		
GRS	.945	.917	.776	
GTL	.849	.872	.876	.829

4.2 Inner Structural Model Results

The evaluation criteria of the Inner Model use the R-squared value (determinant coefficient), Statistical T Value, and P-value. Table 3 shows that an average R-Squared value greater than 0.75 indicates a strong influence of GTL as an exogenous variable on endogenous variables, namely Green Ambidexterity (GAM), Green Innovation (GIN), and Green Resilient Supply Chain (GRS).

Table 3
R-Squares (determinant coefficient)

	R_S	R_SA
GAM	.721	.715
GIN	.761	.756
GRS	.920	.915

R_S = R Square; R_SA = R Square Adjusted

To determine the significance of the influence between variables at a significant level of 5%, a t-value greater than 1.65 and a P-value less than 0.05 must be used. Upon comparing Table 4 and Fig. 2, all hypotheses are accepted, indicating a direct or mediated positive relationship. The research model demonstrates that the total indirect effects from GTL to Green Resilient Supply Chain (GRS), either direct or through mediation, is 0.694.

Table 4
Hypothesis Testing Conclusion for all research hypotheses

Hypothesis	β	Original Sample (O)	SD	T_S	P_V	HTC
Hyp1: GTL → GRS	.182	.876	.038	23.275	.000	Accepted
Hyp2: GTL → GAM	.849	.849	.048	17.822	.000	Accepted
Hyp3: GTL → GIN	.872	.872	.047	18.728	.000	Accepted
Hyp4: GAM → GRS	.582	.582	.101	5.766	.000	Accepted
Hyp5: GTL → GAM → GRS	.494	.494	.099	4.980	.000	Accepted
Hyp6: GIN → GRS	.229	.229	.107	2.138	.016	Accepted
Hyp7: GTL → GIN → GRS	.200	.200	.091	2.185	.014	Accepted

Hyp = Hypothesis;, SD = Standard Deviation; T_S = T Statistics; P_V = P Value; HTC = Hypothesis Testing Conclusion

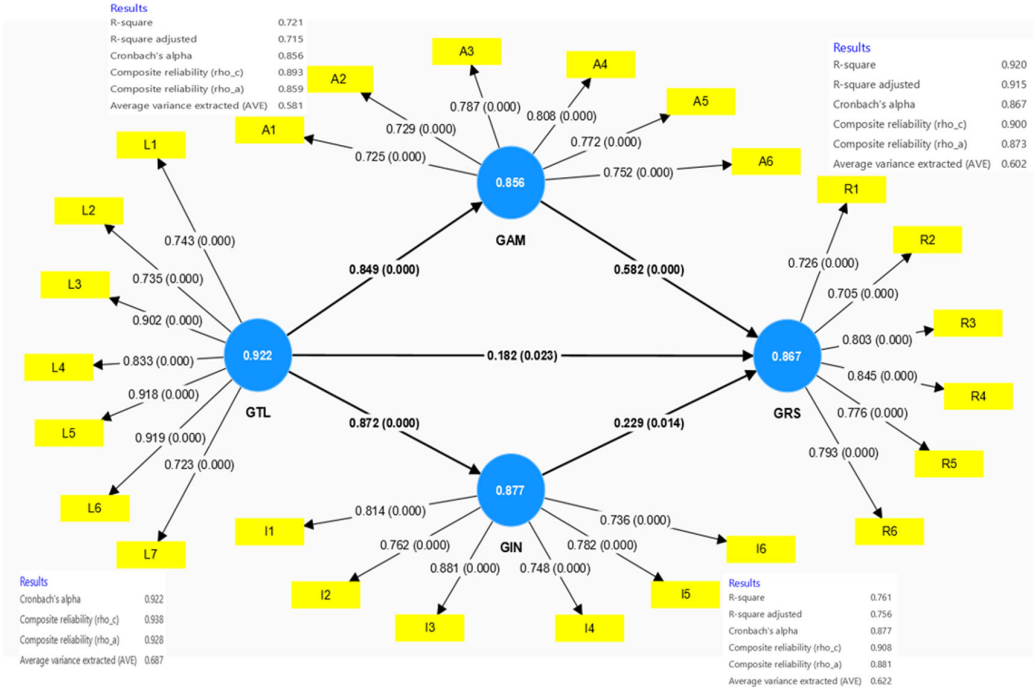

Fig. 2. The summary of the model from Bootstrapping results: Path coefficient, Factor Loading, Cronbach's α, and P Values

5. Discussion

This research aims to investigate the role of GTL in creating a green and resilient supply chain in Indonesia's textile industry. The choice of the textile industry is due to its significant contribution to environmental pollution, including manganese, chromium, zinc, and dyes, which cannot be decomposed by microorganisms. The hypothesis (H1) posits that GTL has a positive and direct impact on the green and resilient supply chain in the textile industry. This shows that upstream sector textile company leaders have played a role as Green Transformational leaders who have great power to influence employees to improve the company's Resilient Supply Chain performance. These findings strongly align with existing research (Bag et al., 2021; Ritchie, 2021; Taseer & Ahmed, 2022; Hasani et al., 2021; Sharma et al., 2021; Foroozesh et al., 2022; Ayyildiz, 2023). They highlight the crucial and decisive role of GTL in enabling companies to be highly resilient in the face of

unexpected risks and respond quickly while still prioritizing the environment. This allows them to recover and improve both customer service and company performance with great confidence.

The findings of H2 confirm that GTL has a positive and direct impact on Green Ambidexterity, consistent with prior research (Pertusa-Ortega et al., 2020; Úbeda-García et al., 2022; Wang et al., 2023). GTL will mobilize upstream sector textile companies' employees to explore new products, knowledge, and opportunities. It will also improve competency in human resources, knowledge, and current company operations through continuous improvement.

The results of H3 confirm that GTL has a positive and direct impact on Green Innovation, which is consistent with previous research (Singh et al., 2020; Zhang et al., 2020; Errmann et al., 2021; Kalyar et al., 2021; Maitlo et al., 2022; Begum et al., 2022; Van et al., 2023). Green transformational leaders in the upstream sector textile companies will carry out green innovation in their companies by developing new operating processes, products, and technologies to protect the environment. They will have a clear green environmental vision and will conduct objective evaluations of the impact of their actions.

The findings of H4 confirm that Green Ambidexterity has a positive and direct impact on Green Resilient Supply Chain, which is consistent with prior research (Tang et al., 2022; Úbeda-García et al., 2022; Katou et al., 2023; Y. Wang et al., 2023). Managing the complex and conflicting green capabilities of the textile industry, such as exploration and exploitation, will improve the company's green resilient supply chain. This will enable it to respond quickly and recover from unexpected risks. The study uncovers the moderating impact of Green Ambidexterity on the Green Resilient Supply Chain, as stated in H5. GTL has an indirect but positive influence on the Green Resilient Supply Chain through Green Ambidexterity. These findings confirm that GTL is effective in achieving a Green Resilient Supply Chain when leaders manage Green Ambidexterity well, as suggested by previous studies (Katou et al., 2023; Wang et al., 2023). The research findings confirm that the path coefficient for the indirect influence of GTL on the Green Resilient Supply Chain, which is mediated by Green Ambidexterity, is significantly greater (0.494) than the direct influence of GTL on the Green Resilient Supply Chain (0.182).

The findings of H6 confirm that Green Innovation has a positive and direct impact on Green Resilient Supply Chain, which is consistent with previous studies (Hazen et al., 2018; Maheshwari et al., 2021; Arsalan et al., 2023). Therefore, adopting the latest and environmentally friendly technology in the upstream sector textile companies can help companies restore their supply chain more quickly in the face of disruption, thereby increasing the Green Resilient Supply Chain in textile companies.

The results of H7 confirm that Green Innovation moderates the effect of GTL on the Green Resilient Supply Chain indirectly and positively. This finding is consistent with previous research (Iqbal & Ciptaningtyas, 2018; Farradia et al., 2019; Taseer & Ahmed, 2022; Bag et al., 2021; Ritchie, 2022), demonstrating the robustness of the relationship. GTL is essential for achieving a Green Resilient Supply Chain. Capable leaders who implement Green Innovation in textile companies can significantly enhance the effectiveness of this approach. The study found that the indirect influence of GTL on the Green Resilient Supply Chain, mediated by Green Innovation (0.200), is greater than its direct influence on the Green Resilient Supply Chain (0.182). This conclusion is supported by the path coefficient.

Our research has two main theoretical consequences. Firstly, it enhances the understanding of the Resource-Based View (RBV) theory proposed by Barney (1991) and the AMO theory proposed by Appelbaum et al. (2000). Our research proposes the use of GTL as a strategic resource in the formation and implementation of Green Ambidexterity, Green Innovation, and Green Resilient Supply Chain. The integration of RBV and AMO theories explains how GTL, Ambidexterity, and Green Innovation drive Green Resilient Supply Chains (Guest & Teplitzky, 2010; Barney, 1991; Appelbaum et al., 2000). Second, GTL, Green Ambidexterity, and Green Innovation are crucial for enhancing employee potential (Le & Lei, 2019). The research findings indicate that GTL fosters Green Ambidexterity and Green Innovation, which in turn improve the company's Green Resilient Supply Chain performance. We also recommend that companies should utilize GTL to implement Green Ambidexterity and Green Innovation policies and practices. This will help employees become more motivated to do environmentally friendly things and allow them to participate in activities related to environmental management in their workplace (Singh et al., 2020).

Our study recommends that business managers create a Green Resilient Supply Chain that can withstand risks, recover quickly, maintain a green environment, and improve customer service and performance. By implementing these recommendations, the company's supply chain will be better equipped to handle challenges and achieve success. First, we recommend investing in environmentally friendly management practices. This will help companies to improve their image with stakeholders, as there is an increasing expectation for companies to prioritize environmental concerns in all aspects of their operations. Companies should focus on and enhance their GTL behaviors to achieve excellence in Green Resilient Supply Chain management. Implementing GTL is crucial in motivating and assisting employees to work together towards achieving the Company's vision. Prioritizing a green environment as the company's primary strategy for excelling in a volatile market showcases our competence and expertise in sustainability. Second, companies should invest in Green Ambidexterity and Green Innovation practices as exploration and exploitation strategies. These practices create new products, knowledge, opportunities, and resources through radical changes and experiential learning, while also increasing the competency of human resources, knowledge, and current company operations through continuous improvement. To adapt to rapid environmental

and technological changes, managers must integrate Green Resilient Supply Chain practices with Green Ambidexterity practices and Green Innovation practices. This will enable companies to successfully achieve their goals while maintaining a Green Resilient Supply Chain. Thirdly, creating a green environment is a proactive measure aimed at reducing negative impacts on the environment and improving environmental performance. In addition, managers should consider Green Ambidexterity practices and Green Innovation practices as crucial strategies to achieve both company goals and green environmental management objectives. Thus, our research provides practical implications for managers and policymakers on how to enhance a supreme company's green resilient supply chain through GTL, green ambidexterity practices, and green innovation practices.

6. Conclusion and Implications

The objective of our research is to examine the influence of GTL, Green Ambidexterity, and Green Innovation on the creation of a Green Resilient Supply Chain in the upstream sector of textile companies in Indonesia, both directly and through mediation. This study demonstrates that GTL has a significant direct effect on Green Resilient Supply Chains. The Green Ambidexterity and Green Innovation factors also directly and significantly influence the Green Resilient Supply Chain. In addition, GTL significantly indirectly affects the Green Resilient Supply Chain, which Green Ambidexterity and Green Innovation moderate.

Our research has two main theoretical implications. First, it proposes the use of GTL as a strategic resource in the design and implementation of Green Ambidexterity, Green Innovation, and Green Resilient Supply Chains. Integrating Resource-Based View (RBV) and AMO theories explains how GTL, Ambidexterity, and Green Innovation drive Green Resilient Supply Chains. Second, GTL, Green Ambidexterity, and Green Innovation are essential for enhancing the potential of employees to participate in environmental management activities at their workplace. We then propose three practical implications. First, we recommend investing in green management practices, which help companies improve their image with stakeholders by prioritizing environmental management throughout their operations. Second, companies should invest in green ambidexterity and green innovation practices as exploration and exploitation strategies. These practices create new products, knowledge, opportunities, and resources through radical change and experimental learning while enhancing the company's current human resources, knowledge, and operational capabilities through continuous improvement. Third, creating a green environment is a proactive effort to reduce negative environmental impacts and improve environmental performance.

This study has limitations and provides future recommendations. First, the study is generalized only to the upstream industry sector that produces fibers and yarns. Future research should also include the intermediate industry sector producing fabrics and the downstream industry producing apparel. Second, our research framework only includes construction at the level of company managers to reveal relationships and interactions between research variables. Future research should involve employees to explore these relationships and interactions further. Third, this study only took a sample to measure business leaders' perceptions. Future research is recommended to examine the organization's perceptions of internal and external stakeholders. Finally, we recommend refining the research model by including the variable of competitive advantage. This would allow us to examine the relationship between a company's green and resilient supply chain advantages and its ability to enhance its competitive advantage.

Acknowledgments

We thank the Universitas Logistik Dan Bisnis Internasional for supporting this research financially. We want to thank the managers of upstream textile companies who agreed to be interviewed.

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