

# Twitch the Corporate Green Tale - An Empirical Study on the Learning Styles to Enhance Green Supply Chain Practices

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## Abstract

With an increasing awareness of environmental impacts, corporates are migrating from traditional supply chain operations to green supply chain operations. In this endeavor of corporate greening, employees' roles and functions are transformed to become extensions of learning roles to enhance green practices. The employees, through their job roles, are receptive to learning about green supply chain practices in different ways through different learning styles. Understanding which learning style enhances green supply chain practices in the organization will be beneficial to structure appropriate learning interventions. For this study, 12 manufacturing companies were selected based on convenience sampling. In total, 270 respondents were chosen based on disproportionate stratified random sampling from 12 manufacturing companies through questionnaire. Bayesian Linear Regression was performed on the data collected. This empirical study establishes that employees' learning styles can play a pertinent role in enhancing green practices in organizations. The learning styles drive, support and exploit the full-fledged potential of Green Procurement and Green Manufacturing practices but no significant impact on Green Distribution and Reverse Logistics. The understanding derived from the analysis is depicted as 'Learn and Act' Cycle of green supply chain practices.

**Keywords:** Bayesian Linear Regression, Corporate Greening, Green Supply Chain, Learning Style, Learn and Act Cycle

## 1. Introduction

### 1.1 Background and Motivation

Poor environmental health and ecosystem vitality in India leaves unprecedented environmental concerns in limelight. It is now an important twitch for many organizations in developing countries like India to make essential positive contributions to the environment and to the society. Organizations are facing increased pressure to visualize and operationalize green initiatives in their daily operations. The current situation heralds

the modern organizations to an 80-20 challenge, i.e.; reduction of 80% of the global carbon emissions to be achieved in two decades. While a handful of the organizations know that this can be achieved not through minor adjustments in business-as-usual, many conglomerates are still obscured about the vision (Luthra et al., 2012; Diabat et al., 2014). In India, most organizations strive towards 80-20 challenge to strike a balance between business growth and environmental sustainability through Green Supply Chain Practices (GSCPs). The extant implementation and effective

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functioning of GSCPs mitigate the environmental consequences of a firm's practices and processes (Mitra, 2015).

In organizations, to work towards GSCPs in isolation is a robust task. Hence, GSCPs initiatives become a new and challenging form of cooperation, between different knowledge producers and ubiquitous types of experts. Implementation of GSCPs is faced by organizations as an emergent practice, through recursive processes of learning by organizational members (Siebenhüner and Arnold, 2007). This leads to public knowledge production which is essential for ecological restoration (Feng et al., 2013). The key factor in this type of knowledge production is the engagement of organizational members as knowledgeable agents who are capable of dealing with environmental practices (Skyggebjerg, 2019). Every organization is a learning institution, and one of its principal purposes is the expansion of knowledge (Engestrom, 2004). In such institutions, employees' roles and functions are transformed so that they become extensions of learning roles (Engestrom and Kerosuo, 2007). The employees,

through their job roles, are receptive to learning about GSCPs in different ways through different learning styles (Billett, 2001; Geertshuis and Fazey, 2006; Ropes, 2013). The learning style of employees is differentiated between participative and anticipative learning, the approach of which is altered between action and reflection, and between doing and thinking (Jagasia et al., 2015). The approach is a combination of cognitive, affective, and behavioral activity (Delahaj and Dam, 2016; Azzi et al., 2020)

## 1.2 Conceptual Framework

Richard (2009) attempted to answer the question "What analysis can help find a way to the most realistic understanding of green initiatives in organizations?" In his attempt, he classified studies on organizations into two major and thirteen minor categories. For the major categories, he distinguished between 'pre-predicament' approaches tinged with natural scientific optimism and emerging 'post-predicament' approaches which have taken a more critical stance. The typological approach of organizations to green initiatives is summarized in Table 1.

**Table 1.** Typological approach of organizations to green initiatives

Major Category	Minor Category	Explanation
Pre-Predicament Approaches	Structural-Functional Analysis	The main concern is with the process and structural efficiency of organizations
	Systems Analysis	Organizations are concerned with building models and is based on General Systems Theory and Cybernetics
	Socio-technical Analysis	Interested in laws of equilibrium, control and self-regulation in organizations
	Action Research	Organization uses ideas borrowed from psychology such as psychodynamics and psychoanalysis
	Social Analysis	Based on psychology and especially concerned with unconscious reality
	Institutional Analysis	Focuses on the dynamic processes which establish social structures and norms
Post-Predicament Approaches	Organizational Learning	Emphasizes co-operation, theories-in-use, mental images, organizational norms; single and double feedback loops
	Interpretive Interactionism	Pursues an understanding of the interaction phenomena rather than casual explanation; basically, a sociological approach
	Longitudinal Analysis and Life Histories	This is essentially a historical and evolutionary approach, concerned with the processes of organizational growth and critical events
	Corporate Culture and Organizational Symbolism	Organizations can be seen as an interplay between symbols and actions; or as a network of shared meaning in which symbolic forms are used as a part of the collective construction of reality. This approach is closely allied with anthropology
	Cognitive Mapping	Concerned with how organizational members represent reality at cognitive level with recurrent mental models and scripts, the storage of knowledge; concerned with how shared mental maps can be either harmonious or fragmented and dissonant
	Semiotic Approach	Focuses on language; an organization is built upon discourse, and the objective of organization studies is to highlight the narrative structure and read visible signs, and reveal the hidden messages that convey the values of the organization
	Dramaturgical Approach	Organization is seen as a theatrical performance, to be interpreted according to the five elements – act, scene, agent, motive and agency

Source: Compiled from Richard (2009)

Of the seven post-predicament approaches suggested by Richard (2009), organizational learning is the primary approach undertaken in this research study to understand the GSCPs in organizational terms. The approach considered for the study is based on four major typological assumptions. The assumptions are -

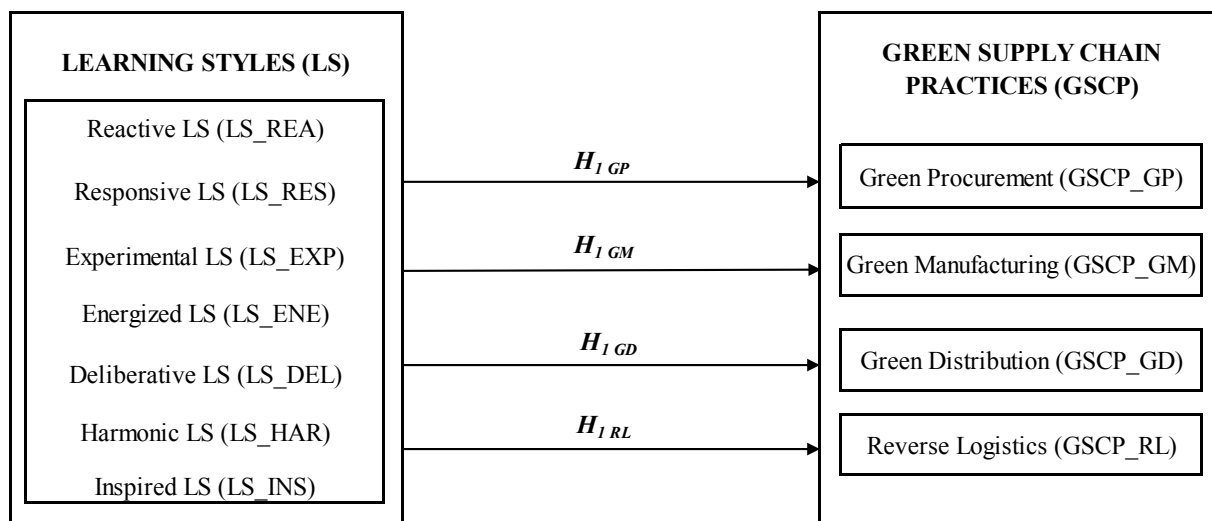
- Seeing organizations as social structures.
- Seeing organizations as adaptive learning systems.
- Seeing employees in organizations as system of coherent goal-oriented action performers.
- Seeing employees’ learning interventions as system of meaning.

In this view, organizations work to match their environments, not necessarily through rational action but instead through learning, diffusion of experience and results in differential, adaptive work practices. This is considered as an expounded effort of the employees in organizations to approach the post environmental crisis and take necessary actions to turn successful, in both ecological protection and economic growth. Learning in organization happens because of pattern recognition, intuition, interpretation and acumen of meaning in both formal and informal work situations (Tynjala, 2008). Employee’s learning ability and variability are based on the individual’s learning

style (Berings et al., 2005). Hence, the conceptual framework developed for this research work is based on the premise of Lessem (1994) that in organizations, every employee as a learner, orients his learning through the complete learning cycle which incorporates the LS from reactive to inspiring, through responsive, experimental, energizing, deliberative and harmonic styles of learning. So, the measures of LSs used in this research work are Reactive LS (LS\_REA), Responsive LS (LS\_RES), Experimental LS (LS\_EXP), Energized LS (LS\_ENE), Deliberative LS (LS\_DEL), Harmonic LS (LS\_HAR), and Inspired LS (LS\_INS). Employees exhibit any one of the seven LSs and then reach out successively or simultaneously onto the other six. This research paper aims to understand empirically the potential LS of employees in organizations which are likely to enhance GSCPs. The different measures used for GSCPs are Green Procurement (GSCP\_GP), Green Manufacturing (GSCP\_GM), Green Distribution (GSCP\_GD), and Reverse Logistics (GSCP\_RL). The conceptual framework developed for this study is depicted in Figure 1.

### 1.3 Objectives and Hypotheses

This research paper aims to understand empirically the potential LSs of employees in organizations which are likely to enhance GSCPs. The objectives formulated for this research study are –



Source: Self-developed.

**Figure 1.** Conceptual framework.

- To understand if learning styles of employees are likely to enhance the green supply chain practices.
- To draw a 'Learn and Act' Cycle, a framework to understand how learning of employees can pave way to collective action towards green supply chain practices in the organizations.

To achieve the research objectives, following four hypotheses are built. In the following hypotheses, the notation  $H_0$  represents null hypothesis and  $H_1$  represents alternate hypothesis. The suffixed abbreviations GP, GM, GD, and RL represent the supply chain practices of Green Procurement, Green Manufacturing, Green Distribution, and Reverse Logistics respectively.

The subsequent sections of this paper are structured as follows. First, through literature review, previous studies on GSCPs and LSs are presented and the research gap is identified. Second, the data collected from 270 respondents of the 12 manufacturing organizations are analyzed using Bayesian Linear Regression and the results are presented. Third, the understanding gained from the analysis is discussed to draw insights and a framework is developed to understand how learning styles of employees pave way to collective action towards GSCPs in organizations. The last section of the paper presents the concluding remarks and scope for further research.

- $H_{0GP}$  The parameters of LS (LS\_REA, LS\_RES, LS\_EXP, LS\_ENE, LS\_DEL, LS\_DEL, and LS\_INS) are not likely to enhance Green Procurement practices.
- $H_{1GP}$  The parameters of LS (LS\_REA, LS\_RES, LS\_EXP, LS\_ENE, LS\_DEL, LS\_DEL, and LS\_INS) are likely to enhance Green Procurement practices.
- $H_{0GM}$  The parameters of LS (LS\_REA, LS\_RES, LS\_EXP, LS\_ENE, LS\_DEL, LS\_DEL, and LS\_INS) are not likely to enhance Green Manufacturing practices.
- $H_{1GM}$  The parameters of LS (LS\_REA, LS\_RES, LS\_EXP, LS\_ENE, LS\_DEL, LS\_DEL, and LS\_INS) are likely to enhance Green Manufacturing practices.
- $H_{0GD}$  The parameters of LS (LS\_REA, LS\_RES, LS\_EXP, LS\_ENE, LS\_DEL, LS\_DEL, and LS\_INS) are not likely to enhance Green Distribution practices.
- $H_{1GD}$  The parameters of LS (LS\_REA, LS\_RES, LS\_EXP, LS\_ENE, LS\_DEL, LS\_DEL, and LS\_INS) are likely to enhance Green Distribution practices.
- $H_{0RL}$  The parameters of LS (LS\_REA, LS\_RES, LS\_EXP, LS\_ENE, LS\_DEL, LS\_DEL, and LS\_INS) are not likely to enhance Reverse Logistics practices.
- $H_{1RL}$  The parameters of LS (LS\_REA, LS\_RES, LS\_EXP, LS\_ENE, LS\_DEL, LS\_DEL, and LS\_INS) are likely to enhance Reverse Logistics practices.

## 2. Literature Review

This section presents the previous research studies on the constructs 'Green Supply Chain Practices' and 'Learning Style' to identify potential research gap.

### 2.1 Green Supply Chain Practices

In an organization, GSCPs define environmentally conscious operations that enables strategic shift from the traditional practices to green practices (Srivastava, 2007a). GSCPs encompass "Green Procurement", "Green Manufacturing", "Green Distribution" and "Reverse Logistics". GSCPs integrate the functional arena among the supplier, manufacturer, distributor, customer and facilitates a closed loop (Zhu et al., 2008). The GSCPs promote efficiency and help achieve enhanced environmental performance (Zhu et al., 2010).

In India, following the quality revolution of 1980's, supply chain revolution called for integration of operational excellence with environmental management (Sachan and Datta, 2005). Because of the growing importance of GSCPs, organizational units have started taking responsibility to ensure environmental excellence in their supply chain operations and enhance environmental health (Srivastava, 2007a).

Empirical research on GSCPs have shown that Indian organizations invest on green practices because it results in saving of resources, elimination of waste and improves productivity (Charan et al., 2008). Three approaches to GSCPs are observed amongst environmental specialists, namely – reactive, proactive and value-seeking initiatives (Luthra et al., 2010; Mitra, 2015). The reactive environmental specialists learn from the consequences of their activities and then implement beneficial environmental initiatives (Verma et al., 2018). The proactive environmental specialists pre-empt the need and implement the best solutions (Ayub and Zaman, 2015). The value seekers look for tangible rewards from the greening initiatives (Mitra, 2015).

Early adopters of GSCPs affirm and acknowledge correlation between GSCPs and performance (Rao and Holt, 2005; Sharma and Gandhi, 2016; Vijayvargy and Agarwal, 2014). GSCPs drive authentic margin on economic performance in the Indian organizations (Charan et al., 2008; Park and Kim, 2014; Dhull and Narwal, 2016). The interaction of GSCPs and performance is clarified by three reasonable causal directions: “Practices affect performance, performance affects practices and bi-directional impact between practices and performance” (Sharma and Gandhi, 2016). While discussions on GSCPs and performance exist amongst Indian firms, largely scholars agree that they are linked as key elements of organization’s sustainability (Liu et al., 2012; Morana and Morana,

**Table 2.** Variables of green supply chain practices

GSCP	Indicators of GSCPs	SOURCES																								
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
GSCP <sub>GP</sub>	Eco-Design Specification of Suppliers	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓
	ISO 14001 Certification of Suppliers	✓			✓	✓		✓	✓	✓		✓	✓	✓		✓	✓		✓				✓		✓	
GSCP <sub>GM</sub>	Product Design and Development	Eco-design	✓	✓			✓	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓		✓		✓		✓	
		Life Cycle Assessment						✓	✓	✓		✓	✓		✓					✓		✓	✓		✓	
	Internal Environmental Management	Top Management Commitment	✓	✓		✓		✓	✓	✓	✓							✓		✓	✓					
		Cross Functional Cooperation	✓		✓	✓			✓										✓							
		Environmental Management System	✓				✓	✓		✓				✓								✓	✓			
Eco-Labeling	✓																	✓			✓	✓	✓			
GSCP <sub>GD</sub>	Green Packaging		✓				✓			✓	✓				✓	✓			✓				✓	✓	✓	
	Green Logistics		✓	✓			✓				✓				✓	✓			✓						✓	✓
GSCP <sub>RL</sub>	Used Product Recovery		✓			✓	✓	✓		✓					✓	✓	✓	✓				✓	✓	✓	✓	✓
	Disassembly / Recycle Plant Facilities		✓			✓					✓				✓							✓				✓

Key: 1. Pruss (2005); 2. Sahay et al. (2006); 3. Srivastava (2007b); 4. Darnall et al. (2008); 5. Zhu et al. (2008); 6. Bajdor and Grabara (2011); 7. Kumar and Chandrakar (2012); 8. Luthra et al. (2012); 9. Liu et al. (2012) 10. Sarkis (2012); 11. Xu et al. (2013); 12. Martí and Seifert (2013); 13. Hsu et al. (2013); 14. Aich and Tripathy(2014); 15. Diabat et al. (2014); 16. Tachizawa et al. (2015); 17. Lintukangas et al. (2015); 18. Jaggernath and Khan (2015); 19. Lo and Shiah (2016); 20. Sambrani and Pol (2016); 21. Sharma and Gandhi (2016); 22. Perez Valls et al. (2016); 22. Verma et al. (2018); 23. Patnaik (2018); 24. Hillis and Duvall (2018); 25. Lisi et al. (2020).

Source: Self-developed.

2013; Bhajndari and Garg, 2015; Lintukangas et al., 2015). In India, GSCPs are used as a conservational tool to improve the ecological image and gain competitive advantage in the business scenario (Ghosh and Gangopadhyay, 2016; Sambrani and Pol, 2016; Chauhan, 2017).

Methodical review of 25 relevant research papers within the purview of the current study was undertaken to understand the associated indicators of GSCPs. The variables of GSCPs are summarized in Table 2.

## 2.2 Learning and Green Supply Chain Practices in Organizations

‘Ecological literacy’ invites organizations to conceive change for better environmental performance in a more holistic context (Espinosa and Porter, 2011; Himmelberger and Brown, 1995). This vision prioritizes the development of ecological practices by recognizing the precise role of learning in constructing change (Fiksel, 1997). There are two main approaches to environmental learning (Banerjee, 1998). They are:

- “Single-loop learning process” with a short-term focus, limited to regulatory compliance and environmental training for employees.
- “Double-loop learning process” leads to integration of environmental concerns with the work processes bearing a long-term strategic view.

Adoption of green practices is influenced by environmental awareness and knowledge of the firms (Boiral, 2002). The learning flows and knowledge stocks positively affect environmental orientation and environmental orientation strongly influences the implementation of GSCPs in the organizations (Espinosa and Porter, 2011; Siebenhuner and Arnold, 2007; Whiteley et al., 2009). In organizations, learning is antecedent to greening and OL promotes implementation of proactive green practices (Dicle and Kose, 2014; Feng et al., 2013).

The transition towards corporate greening requires a cultural change in the form of “new shared values, norms and processes, procedures and attitudes and a strategic renewal in which the organization integrates

the three dimensions of people, planet and profit in its strategy making” (Azadegan et al., 2019; Salama, 2017; Skyggebjerg, 2019). Learning in organizations is necessary to understand the transition process towards greening (Lisi et al., 2020; Venkatesa Narayanan et al., 2020).

## 2.3 Learning Style

Individual’s knowledge and competence plays a crucial role in the organization’s knowledge assimilation (Robotham, 2004). At individual level, learning happens because of pattern recognition, intuition, interpretation and acumen of meaning in both formal and informal work situations (Tynjala, 2008). Individual’s learning ability and variability are based on the individual’s LS (Berings et al., 2005).

Various established LS models and the allied learning theories are briefed in Table 3.

LS of employees is the usual way of acquiring, processing, assimilating and managing information in workplace learning situations (Boyle, 2005; Geertshuis and Fazey, 2006). Different LSs lead to different ways of adopting knowledge pertaining to employee’s roles in the workplace (Towler and Dipboye, 2003; Boyle, 2005). In organizations, assessing the LSs play a pertinent role to understand employee’s LS and help them suit their learning as per the learning need (Gruenfeld et al., 2000; Oostvogel et al., 2010). LSs exhibit cognitive, affective and psychological aspects of workplace learning behavior (Smith, 2000; Noe et al., 2014).

LSs are majorly based on cognition theory, personality theory and activity-centered theory (Lessem and Baruch, 1999; Bennet and Bennet, 2008; Sternberg and Zhang, 2011). Cognition theory underlines LSs as an interface between the cognitive ability and cognitive psychology (Gregorc, 1982; Gardner, 1983). Personality theory emphasizes LSs as an outcome of the learner’s psychological types (Sirmans, 2002) and the way learner’s organize learning space and time (Jackson, 2002). Activity-centered theory orients LSs toward activities that learners take up in the learning space (Katz, 1986; Lessem and Baruch, 2000; Lessem, 2001).

**Table 3.** Established learning style models and associated theories

Established LS Model	Suggested LS Preferences	Learning Theory	Inclusive Dimensions	Source
Gregorc Model, 1982	“Concrete Sequential, Abstract Random, Abstract Sequential, Concrete Random”	Cognitive Theory	Perceptual Learning Qualities	Gregorc (1982)
Howard Gardner Model, 1983	“Linguistic Intelligence, Logical-Mathematical Intelligence, Visual-Spatial Intelligence, Bodily-Kinesthetic Intelligence, Musical Intelligence, Interpersonal Intelligence, Intrapersonal Intelligence, Naturalist Intelligence”	Intelligence Theory	Inherent Intelligence Interests	Gardner (1983)
Kolb Model, 1984	“Divergers, Assimilators, Convergors, Accommodators”	Experimental Theory	Personality Type	Katz (1986) and Mainemelis et al. (2002)
Honey and Mufford Model, 1985	“Reflectors, Theorists, Pragmatists, Activists”	Behavioural Theory	Educational; Career Choice/ Specialization	Cockerton et al. (2002)
Carl and Myers Brigg Indicator Model, 1988	“Judging and Perceiving, Thinking and Feeling, Sensing and Intuition, Extroversion and Introversion”	Personality Theory	IQ Factors; Biological Factors	Sirmans (2002)
Felder-Silverman Model, 1988	“Active–Reflective–Active, Sensing–Intuitive, Visual–Verbal, Sequential–Global”	Psychological Theory	Job Role; Adaptive Competencies; Environmental Factors	Deborah et al. (2014)
Flemming VAK Model, 1992	“Visual, Auditory and Kinesthetic”	Meta-Learning Theory	Adaptive Competencies	Feldman et al. (2015)
Ronnie Lessem, 1994	“Reactors, Responders, Deliberators, Energizers, Experimenters, Harmonizers, Inspirers”	Total Quality Learning Approach - Spectral Theory	Personality Spectrum; Modes of Learning; Managerial Learning Style Orientation	Lessem (1994) and Lessem and Baruch (2000)
Chris Jackson Model, 2002	“Sensation Seeker, Goal Oriented Achiever, Conscientious Achiever, Emotionally Intelligent Achiever, Deep Learning Achiever”	Neuro-psychological Theory	Personality Type	Jackson (2002)

Source: Self-compiled.

While researches on LSs were taken up by adopting appropriate tools to suit their enquiry, for the current study, the Learning Style Inventory (LSI) suggested by (Lessem, 1994) is adopted. Lessem’s LSI analyses 7 LSs in the organizational context. The structure of LSI by Lessem aims at total quality learning, thereby, covering the spectrum of surface to deep learning processes with emphasis on cognitive, psychological and activity centered learning approaches.

At a workplace with learners of different LSs, the dint of learner’s capacity, talent and ability results in seven learning fields (Lessem, 1994; Lessem and Baruch, 2000). They are:

- “*Activity field*” represents messy chaos, of which survival skills are born and “*reactive learning*” takes place.
- “*Communal field*” represents shared collaboration, of which rich tapestry to “*responsive learning*” is developed.

- “*Adaptivefield*” encourages necessary organisational adaptation, out of which professional, technical, and management knowledge is born and through which “*experiential learning*” takes place.
- “*Proactive field*” asserts the learners of the acquired skills, instilling “*energized learning*” amongst employees.
- “*Functional field*” concerns major business domains where business knowledge is created and managed, leading to “*deliberative learning*” for knowledge sustenance.
- “*Molecular field*” harmonises individual, group and organisational centric learning, through which the “*harmonic learners*” consciously develop his/her learning experience.
- “*Holographic field*” radiates flashes of inspiration, fuels organisational transformation where “*inspired learners*” advance from vision to action.

In a learning organization, every employee as a learner, works himself through the complete learning cycle which incorporates the LSs from reactive to inspiring, through responsive, experimental, energizing, deliberative and harmonic styles of learning (Lessem, 2001). The employee exhibits any one of the seven LSs and then reaches out successively or simultaneously into the other six (Lessem, 2001).

Table 4 gives a brief overview of the LSs and their characteristics as propounded by Lessem.

The employees, through their job roles are receptive to learning in different ways through different LSs (Badger et al., 2001; Towler and Dipboye, 2003; Ropes, 2013; Deborah et al., 2014). The LS of employees is differentiated between participative and anticipative learning, the approach of which is altered between action and reflection and between doing and thinking; the approach is a combination of cognitive, affective and behavioral activity (Berings et al., 2005; Hardaker et al., 2007; Feldman et al., 2015).

## 2.4 Gap Identification

Appreciating the importance of LS in organizational context, various researchers have studied LSs to improve adaptive flexibility (Mainemelis et al.,

**Table 4.** Learning styles and their characteristics

Learning Style	Learning Focus	Learning Capacities
Reactive	Action Centric	Go-getters, Cope with Crises
Responsive	People Centric	Practical, Realistic, Social learners
Deliberative	Logic Centric	Logical, Rational, Objective
Energizing	Emotional Centric	Motivational, Take Initiative
Experimental	Investigational Centric	Opportunity Seeking, Innovative, Flexible
Harmonic	Congruent Centric	Synergistic, Intellectually Stimulating
Inspiring	Creative Centric	Inspirational, Potential Creators

Source: Adopted from Lessem (1994).

2002), to understand personality dimensions (Towler and Dipboye, 2003), to enhance on-the job learning (Berings et al., 2005), to improve work performance (Boyle, 2005), to implement e-learning (Deborah et al., 2014) and to improve training efficiency (Pani, 2015).

Past studies have not examined if LSs of employees are likely to enhance the green supply chain practices in Indian organizations. Hence, this study tries to understand the role of employees’ LSs to enhance green practices in organizations.

## 3. Research Method

Quantitative research method is used in this research study to collect relevant data with respect to LSs and GSCPs. For the study, 12 select companies are chosen based on convenience sampling from the manufacturing sector in India. The respondents of the survey are chosen using Disproportionate Stratified Random Sampling technique.

The survey instrument for the study was created with the variables identified through the review of literature. In this research paper, to measure LSs, Lessem’s learning style inventory is used as it analyses 7 LSs in the organizational context and aims at total quality learning, covering the spectrum of surface to deep learning processes with emphasis on cognitive, psychological and activity centered learning approaches for an organizational learning environment; while other existing learning style inventories do not measure all the three aspects together bearing in mind the learning



environment of organizations. Literature survey on most popular learning style inventories covered only one aspect of the learning approach theoretically, for e.g. Gregorc Model's focus is on Cognitive theory (Gregorc, 1982), Honey and Mufford Model's focus is on Behavioural theory (Cockerton et al., 2002), Kolb Model's focus is on experiential theory (Katz, 1986; Mainemelis et al., 2002). However, the current research study required a holistic learning style inventory that suits corporate employees' way of learning with respect to green supply chain practices. Considering the limitations associated with other learning style inventories, in focus of this research study, the validated learning style inventory suggested by (Lessem, 1994) is adopted. The items related to GSCPs were developed based on the variables identified from literature review. The developed questionnaire was approved by industry experts of the sample companies.

Initially pilot study was conducted in all sample companies to validate the constructs of the questionnaire. For the final analysis, 270 responses were collected in total from the sample companies. The content validity of the questionnaire was established through recursive review of literature and expert opinions (from the sample companies). TLI = 0.968, CFI = 0.977 and RMSEA = 0.033 revealed a satisfactory fit of the constructs. The factor loadings were significant for all the constructs with  $p < 0.05$ . Reliability for the complete questionnaire was tested by computing Cronbach alpha coefficient and the value of 0.837 showed acceptable level of internal consistency of the constructs. A summary of the sample is presented in Table 5. From the 270 responses collected through the questionnaire, Bayesian Linear Regression was performed to understand if LSs of employees are likely to enhance the green supply chain practices.

#### 4. Analysis

Bayesian Linear Regression (BLR) is used to evaluate the posterior distribution of the model parameters with the prior probability distribution of the data on the variables of the study (Nie and Ji, 2014). In BLR, the prior information about the parameters is combined with the likelihood function to generate posterior

**Table 5.** Description of sample

Sample Characteristics	Sample (N = 270)	Percentage
<b>Experience</b>		
Less than One year	29	10.7
2-5 Years	45	16.7
6-10 Years	59	21.9
11-15 Years	55	20.4
16-20 Years	34	12.6
Over 20 Years	48	17.8
<b>Age</b>		
18-25	37	13.7
26-33	41	15.2
34-41	58	21.5
42-49	52	19.3
50-55	53	19.6
55+	29	10.7
<b>Industry Type</b>		
Automotive Component Manufacturers	67	24.8
Bearings and Castings Manufacturers	64	23.7
Abrasives and Suspension Bush Manufacturers	74	27.4
Pneumatics and Compressors Manufacturers	65	24.1

Source: Primary Data – Field Survey.

estimates for the parameters of the study (Hashimoto and Sugawara, 2020). With the basic understanding on the foundations of BLR, this study analyses the quantitative data by using BLR to understand if learning styles of employees are likely to enhance the green supply chain practices. Thus, this analysis predicts the future response of the response variable (GSCP), with the given information of the predictor or explanatory variables (LS).

For the BLR analysis between LS and GSCP\_GP, the hypothesis is defined as below:

$H_0$  – The parameters of LS ( $LS\_REA$ ,  $LS\_RES$ ,  $LS\_EXP$ ,  $LS\_ENE$ ,  $LS\_DEL$ ,  $LS\_DEL$ , and  $LS\_INS$ ) are not likely to enhance the Green Procurement practices

$H_1$  – The parameters of LS ( $LS\_REA$ ,  $LS\_RES$ ,  $LS\_EXP$ ,  $LS\_ENE$ ,  $LS\_DEL$ ,  $LS\_DEL$ , and  $LS\_INS$ ) are likely to enhance the Green Procurement practices

**Table 6.** BLR of green procurement and learning style

Predictor Parameters	Regression Estimates		Bayes Factor Model Summary					Evidence Category for Hypothesis Testing
	F Value	P Value	Bayes Factor	R	R Sq.	Adjusted R Sq.	Std. Error of the Estimate	
LS_REA	1.55	0.03*	0.00	0.46	0.21	0.07	0.94	Extreme Evidence for H1
LS_RES	1.20	0.21	0.00	0.40	0.16	0.03	0.97	No Influence
LS_EXP	1.41	0.08	0.00	0.41	0.16	0.05	0.96	
LS_ENE	1.25	0.17	0.00	0.39	0.15	0.03	0.96	
LS_DEL	1.05	0.40	0.00	0.37	0.14	0.01	0.98	
LS_HAR	0.88	0.67	0.00	0.36	0.13	-0.02	0.99	
LS_INS	1.48	0.04*	0.00	0.45	0.20	0.07	0.95	Extreme Evidence for H1

Note: \*\*p value between 0.000 and 0.010 – Highly Significant, \*p value between 0.011 and 0.050 – Significant.

Source: Derived from Primary data.

The results of BLR between Green Procurement and Learning Style are summarized in the Table 6.

From Table 6, it is observed that the predictor parameters LS\_REA and LS\_INS are likely to enhance the Green Procurement practices. The Bayes estimators of the significant predictor parameters are summarized in Table 7.

From Table 7, the posterior estimates of LS\_REA and LS\_INS show that it is likely that the Green Procurement practices may be enhanced in the organization, if Reactive LS and Inspired LS are encouraged.

For the BLR analysis between LS and GSCP\_GM, the hypothesis is defined as below:

$H_0$  – The parameters of LS (LS\_REA, LS\_RES, LS\_EXP, LS\_ENE, LS\_DEL, LS\_DEL, and LS\_INS) are not likely to enhance the Green Manufacturing practices

**Table 7.** Bayesian estimators of green procurement and learning style

Predictor Parameters	Bayesian Estimates of Green Procurement				
	Posterior Estimates			95% Credible Interval	
	Mode	Mean	Variance	Lower Bound	Upper Bound
LS_REA	0.88	0.90	0.01	0.75	1.08
LS_INS	0.89	0.91	0.01	0.75	1.09

Source: Derived from Primary data.

$H_1$  – The parameters of LS (LS\_REA, LS\_RES, LS\_EXP, LS\_ENE, LS\_DEL, LS\_DEL, and LS\_INS) are likely to enhance the Green Manufacturing practices

The results of BLR between Green Manufacturing and Learning Style are summarized in the Table 8.

From Table 8, it is observed that the predictor parameters LS\_RES, LS\_EXP, LS\_DEL and LS\_HAR are likely to enhance the Green Manufacturing practices. The Bayes estimators of the significant predictor parameters are summarized in Table 9.

From Table 9, the posterior estimates of LS\_RES, LS\_EXP, LS\_DEL and LS\_HAR show that it is likely that the Green Manufacturing practices may be enhanced in the organization, if Responsive LS, Experimental LS, Deliberative LS and Harmonic LS are encouraged in the organization.

For the BLR analysis between LS and GSCP\_GD, the hypothesis is defined as below:

$H_0$  – The parameters of LS (LS\_REA, LS\_RES, LS\_EXP, LS\_ENE, LS\_DEL, LS\_DEL, and LS\_INS) are not likely to enhance the Green Distribution practices

$H_1$  – The parameters of LS (LS\_REA, LS\_RES, LS\_EXP, LS\_ENE, LS\_DEL, LS\_DEL, and LS\_INS) are likely to enhance the Green Distribution practices

**Table 8.** BLR of green manufacturing and learning style

Predictor Parameters	Regression Estimates		Bayes Factor Model Summary					Evidence Category for Hypothesis Testing
	F Value	P Value	Bayes Factor	R	R Sq.	Adjusted R Sq.	Std. Error of the Estimate	
LS_REA	1.35	0.09	0.00	0.43	0.19	0.05	0.82	No Influence
LS_RES	0.88	0.01**	0.00	0.35	0.12	-0.02	0.85	Extreme Evidence for H1
LS_EXP	0.65	0.03*	0.00	0.29	0.08	-0.05	0.86	
LS_ENE	0.26	0.01**	0.00	0.39	0.15	0.03	0.83	
LS_DEL	0.79	0.02*	0.00	0.33	0.11	-0.03	0.85	
LS_HAR	0.89	0.04*	0.00	0.36	0.13	-0.02	0.85	
LS_INS	0.92	0.61	0.00	0.37	0.14	-0.01	0.84	No Influence

Note: \*\*p value between 0.000 and 0.010 – Highly Significant, \*p value between 0.011 and 0.050 – Significant.

Source: Derived from Primary data.

**Table 9.** Bayesian estimators of green manufacturing and learning style

Predictor Parameters	Bayesian Estimates of Green Manufacturing				
	Posterior Estimates			95% Credible Interval	
	Mode	Mean	Variance	Lower Bound	Upper Bound
LS_RES	0.51	0.52	0.00	0.43	0.62
LS_EXP	0.48	0.49	0.00	0.40	0.59
LS_ENE	0.38	0.39	0.01	0.25	0.50
LS_DEL	0.49	0.50	0.00	0.42	0.61
LS_HAR	0.45	0.45	0.00	0.38	0.55

Source: Derived from Primary data.

**Table 10.** BLR of green distribution and learning style

Predictor Parameters	Regression Estimates		Bayes Factor Model Summary					Evidence Category for Hypothesis Testing
	F Value	P Value	Bayes Factor	R	R Sq.	Adjusted R Sq.	Std. Error of the Estimate	
LS_REA	1.34	0.10	0.00	0.43	0.19	0.05	0.87	No Influence
LS_RES	1.16	0.25	0.00	0.40	0.16	0.02	0.88	
LS_EXP	0.83	0.74	0.00	0.32	0.10	-0.02	0.90	
LS_ENE	1.11	0.32	0.00	0.37	0.14	0.01	0.88	
LS_DEL	0.73	0.87	0.00	0.32	0.10	-0.04	0.91	
LS_HAR	0.76	0.84	0.00	0.33	0.11	-0.04	0.90	
LS_INS	0.69	0.92	0.00	0.32	0.11	-0.05	0.91	

Note: \*\*p value between 0.000 and 0.010 – Highly Significant, \*p value between 0.011 and 0.050 – Significant.

Source: Derived from Primary data.

**Table 11.** BLR of reverse logistics and learning style

Predictor Parameters	Regression Estimates		Bayes Factor Model Summary					Evidence Category for Hypothesis Testing
	F Value	P Value	Bayes Factor	R	R Sq.	Adjusted R Sq.	Std. Error of the Estimate	
LS_REA	1.10	0.33	0.00	0.40	0.16	0.01	1.21	No Influence
LS_RES	0.86	0.70	0.00	0.35	0.12	-0.02	1.23	
LS_EXP	0.84	0.72	0.00	0.32	0.11	-0.02	1.23	
LS_ENE	1.01	0.46	0.00	0.36	0.13	0.00	1.22	
LS_DEL	0.71	0.89	0.00	0.31	0.10	-0.04	1.24	
LS_HAR	0.91	0.63	0.00	0.36	0.13	-0.01	1.23	
LS_INS	1.23	0.18	0.00	0.42	0.17	0.03	1.20	

Note: \*\*p value between 0.000 and 0.010 – Highly Significant, \*p value between 0.011 and 0.050 – Significant.

Source: Derived from Primary data.

The results of BLR between Green Distribution and Learning Style are summarized in the Table 10.

From Table 10, it is observed that the predictor parameters of LS exhibit no influence on GSCP\_GD. Hence, the parameters of LS are not likely to impact Green Distribution practices.

For the BLR analysis between LS and GSCP\_RL, the hypothesis is defined as below:

$H_0$  – The parameters of LS (LS\_REA, LS\_RES, LS\_EXP, LS\_ENE, LS\_DEL, LS\_DEL, and LS\_INS) are not likely to enhance the Reverse Logistics practices

$H_1$  – The parameters of LS (LS\_REA, LS\_RES, LS\_EXP, LS\_ENE, LS\_DEL, LS\_DEL, and LS\_INS) are likely to enhance the Reverse Logistics practices

The results of BLR between Reverse Logistics and Learning Style are summarized in the Table 11.

From Table 11, it is observed that the predictor parameters of LS exhibit no influence on GSCP\_RL. Hence, the parameters of LS are not likely to impact Reverse Logistics practices.

## 5. Discussion

The findings of this study posit that understanding the learning styles and green supply chain practices in an

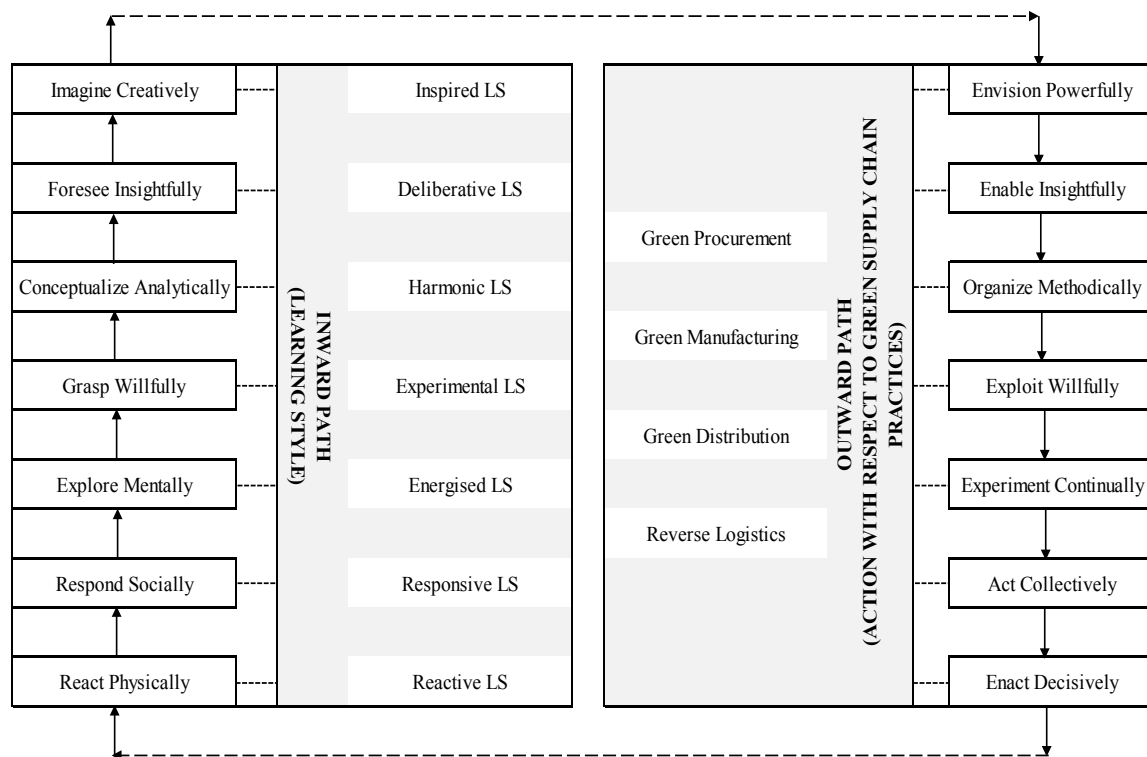
organization can strongly support the development and transformation of operational procedures to enhance environmental performance. This finding supports the claim of Boiral (2002) that adoption of green practices is influenced by environmental awareness and knowledge of the firms. Also, the view of Siebenhuner and Arnold (2007) is backed by this study as the findings illustrate that the learning flows and stocks enabled by learning styles of employees positively impact the implementation of green practices in the organization. The results of this study confirm the findings of Espinosa and Porter (2011) that understanding about the learning style of employees in the organization is essential to move towards greener practices. Thus, in line with the observations of Feng et al., (2013), this study proves that learning is antecedent to greening and the learning by employees promotes implementation of green practices. Further, this study complements the study of Dicle and Kose (2014) that learning flows and stocks, enabled by individual learning styles, facilitate green orientation amongst employees and enhances green practices.

In organizations, every employee works himself through the complete learning cycle which incorporates the learning styles from reactive to inspired, through responsive, experimental, energized, deliberative, and harmonic learning styles. By virtue of work experience, the employee may exhibit any one of the seven learning styles and then reach out successively or simultaneously into the other six to deliver his best

in the green supply chain areas. Different LSs of the employees have their respective attributes, orientations, strengths, and weaknesses. As the learning journey of an employee begins with Reactive LS and culminates in Inspired LS, the employee builds-up his knowledge repertoire about the GSCPs of the organization. The cycle of learning and implementation of learnt facts, i.e. action of every employee with respect to GSCPs follows an inward path (of learning) and an outward path (of action). The ‘Learn and Act Cycle’ of GSCPs is depicted in Figure 2.

The learning of employees in an organization begins with an inward reaction to the environmental issues, thereby stimulating the Reactive LS in them to ‘React Physically’ to the current learning needs with respect to green initiatives. Once the employee’s learning is physically underway, the employee gets dependent on the knowledgeable others in the organization and ‘Respond Socially’ to the common learning

needs of the organization, thereby stimulating the Responsive LS. As a (would-be) socially responsible employee in the organization, the employee with his intellectual curiosity will cull out the Energized LS to ‘Explore Mentally’ on the various possibilities of the effective implementation of GSCPs. On acquiring the basic know-how of the effective implementation, the employees will ‘Willfully Grasp’ opportunities to turn their learning into action prototypes, thereby exhibiting Experimental LS. With a firm grasp on the specific applications of GSCPs, the employees will ‘Conceptualize Analytically’ on cohesive benefits of the action prototypes by exhibiting Harmonic LS. From Harmonic LS, transitioning into the Deliberative LS requires in-depth intelligence and broad experience on the operational procedures of GSCPs so that the employees can ‘Foresee Insightfully’ on the significance of specific GSCPs. The culmination of an employee’s learning path is becoming a strategic planner, a knowledge assimilator, and a skilled



Source: Self-developed

**Figure 2.** Learn and act cycle of green supply chain practices.

motivator, marking the employee's Inspired LS. It is at this point of the 'Learn and Act Cycle' the ultimate leap of learning is brought out to link the inward path (of learning) with the outward path (of action) by making the employee 'Imagine Creatively'.

Up to this point, the emphasis of the 'Learn and Act Cycle' is on the cumulative learning of employees to acquire the necessary knowledge and competence on GSCPs. This learning is yet to make its desired impact on the functioning of GSCPs in the organization. In the outward journey (of actions), the transformation of employee's cumulative learning into competent action is represented.

The employees who 'Imagine Creatively' understand the internal effect of their learning and 'Envision Powerfully' on the action plans of GSCPs. GSCPs infused with powerful vision invites collective inspiration in the organization to enhance GSCPs for better benefits. No matter how brilliant the vision may be, it will fail to inspire, if the vision-oriented actions do not reach all the employees of the organization. Thus, it is essential to 'Enable Insightfully' the necessary systems and envisage collective action towards the vision. In a pragmatic approach, the visionaries and the enablers should 'Organize Methodically' the management principles of GSCPs to channelize the expected outcome of green initiatives. This enables the transition from analytical to resourceful management of GSCPs, thereby providing employees with opportunities to 'Exploit Willfully' the complete potential of GSCPs. In the next step, the employees are positioned to 'Experiment Continually' to develop effective methods and enhance current mechanisms of GSCPs. No enduring transformation in corporate actions can take place without the involvement and collective action of employees at all levels. Thus, organizations must establish platforms to bring all employees together on a common goal to 'Act Collectively' for implementation of GSCPs. And finally, the end of outward journey (of actions) fructifies only if the employees 'Enact Decisively', according to the work situations, in their specific roles related to the green supply chain process.

## 6. Conclusion

### 6.1 Summary

In organizations, collective action towards green supply chain practices can be mobilized through different learning styles of employees. Amongst employees, learning provides a common goal and enhanced motivation, paving way for a new culture in organizations towards green initiatives. Learning amongst employees will not only add value to the normal institutional developmental process, but also stimulate progress towards greening. In such cases, the intention of learning is both to improve the access, retention and delivery of knowledge, skills, values and perspectives related to green supply chain practices; and to reorient the existing programs and outcomes so as to change unsustainable supply chain practices at all levels.

### 6.2 Theoretical Contribution

From an epistemological context, this research paper contributes to the existing body of knowledge in the research areas of organizational learning and corporate environmentalism by validating the relationship between learning styles and green supply chain practices and the effect of the former on the later. The research study has empirically tested if learning styles of employees are likely to enhance the green supply chain practices. The 'Learn and Act' Cycle gives a framework to nurture learning styles, to develop appropriate learning interventions and to transform the routinised operational procedures to enhance green supply chain practices.

### 6.3 Implications

The research study implies that the learning styles of employees drive, support and exploit the full-fledged potential of Green Procurement and Green Manufacturing in organizations, thereby adding value to the green initiatives of businesses. It is imperative for learning and development managers to understand the importance of assessing learning styles of employees in the organization so that the right green supply chain

practices can be built, and in turn, the green supply chain practices can be deeply integrated in the learning initiatives of the organization. This facilitates the companies to manage the complexities involved with respect to greening initiatives. Further, in organizations, to enhance green supply chain practices, there are four main spheres of activity to be carried out by managers:

- Increase corporate wide understanding and awareness of the environmental issues.
- Reorient existing learning programs on green supply chain practices according to the learning styles of employees to derive the maximum benefit from the learners.
- Improve access to and retention in quality knowledge on green supply chain practices through well moderated knowledge flows and stocks.
- Implement professional development, in-service training courses and models to advance green supply chain knowledge across all domains in the organization.

The result of this study invites necessary attention of the managers to undertake an analysis of the learning styles of employees in their respective organizations and be conscious of the effects of the learning style on green supply chain practices to draw insights from the observations.

#### 6.4 Limitations and Scope for Future Work

The main limitation of the study is the limited geographic span and industry type chosen. Further research may replicate the study in other geographic areas and may include a variety of industries to enhance the generalizability of the results. This study has concentrated only on the learning styles to enhance green supply chain practices, thus, leaving scope to include other learning characteristics like learning mode, learning medium, learning process and learning abilities for further studies. It is also recommended that analysis based on contextual variables may be included in future research studies. The time frame used for this study is cross sectional, and further studies may undertake longitudinal study to observe and validate the findings.

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