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Prioritising Lean, Agile, Resilient and Green Supply Chain Practices: An Application of Analytical Hierarchy Process (AHP) in FMCG sector of Pakistan

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ABSTRACT

This study prioritises the lean, agile, resilient and green (LARG) supply chain practices in Pakistan's FMCG sector. This study utilises the AHP methodology to rank the different LARG practices in Pakistan's FMCG sector. The primary purpose of this analytical study is to recognise and prioritise the usage of these practices to develop the LARG paradigm in the FMCG sector. In this study, various methods have been identified with the help of extensive literature review and discussion with subject matter experts. The results demonstrate that an organisational structure (infrastructure) that can deal with disruption is one of the most critical practices among all LARG practices. The result also indicates that firms should establish resilience in their supply chain network, and described as the most vital supply chain phenomenon among the LARG category. The study findings provide the direction to the supply chain professional as to which practices are critical for establishing the LARG system in the organisation. Prioritising LARG practices is scant in literature; hence, this study contributes. Also, other recent multi-criteria assessment tools may be used for significant contributions in the future.

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INTRODUCTION

Given the global supply chain perspective, complexities and dynamism in the business environment have risen dramatically with globalisation (Behzadi et al., 2018; Zhang et al., 2018). During the last several decades, the firms and their supply chains have faced various internal and external operating issues (Wong et al., 2020). A wide range of external factors, such as varied and unpredictable customers' demand (Piprani, Jaafar, & Mohezar, 2020a), shorter product life cycles due to technological innovation (Singh & Vinodh, 2017), and the most recently COVID-19 (Karmaker et al., 2021) are all examples of disruptive factors that hampered continuity of supply chain operations (Paul & Chowdhury, 2020). These obstacles or issues render the supply chain ineffectual, unstable, susceptible, and tumultuous (Brusset & Teller, 2017; Junaid et al., 2020). As a result, supply chain management is taken into account as a vital and strategic priority for achieving superior organisational competitiveness (Sahu et al., 2016), mainly because such a dynamic landscape has fundamentally altered the importance of competition from firm vs firm to supply chain vs supply chain (Qrunfleh & Tarafdar, 2013).

Furthermore, in a rapidly evolving global environment, there is a growing recognition that companies need to develop their operations and business processes to remain dynamic and versatile and to accommodate the ongoing shifts in the global economy (Kırılmaz & Erol, 2017; Piprani, Jaafar, & Mohezar, 2020b). Among various supply chain paradigms discussed in the past, lean, agile, resilience and green paradigms are considered key in building a competitive and sustainable enterprise (Anvari, 2021). A Lean supply chain is a cost-saving approach used by many organisations worldwide (Adebanjo et al., 2016; Qrunfleh & Tarafdar, 2013). The Lean paradigm recognises and removes all non-value-added or waste activities (Anand & Kodali, 2008) to enhance product and operational efficiency. It includes optimising the business processes through the life cycle of the goods, from the product's design to the product's distribution, from the customer's order to receiving that order by the customer (Govindan et al., 2013; Vonderembse et al., 2006). However, it is to mention that where organisations are exposed to potential shocks triggered by unexpected and unpredictable incidents (such as economic and political crises or environmental disasters), lean activities could not be fit in that turmoil situation and may have led to the decline in economic growth and progress (Ruiz-Benítez et al., 2018).

As firms are more prone to risks currently because of global business practices, outsourcing, and increased external dangers like terrorism and global pandemic (Das & Lashkari, 2015; Ivanov & Dolgui, 2020), the volatile event in COVID-19 pandemic, supply chain's all over the globe have been seriously damaged. Supply chain operations have become more complex since November

2019 due to the interruption risk posed by the most recent new coronavirus (SARS-CoV-2) (Jabbour et al., 2020). Restrictions on air transportation facilities, border closures, lack of raw-material supply and total shutdown of industrial activity are all caused by this pandemic epidemic (Guan et al., 2020). In addition, new estimates have indicated that the current pandemic epidemic is a rare example of supply chain disruption that has had a significant effect on the global economy (Vidya & Prabheesh, 2020). The COVID-19 pandemic, according to the UNCTAD (2020) would result in a USD 2 trillion deficit in global GDP. The World Commerce Organization (WTO) has concluded that international trade would decrease between 13 and 32 per cent in 2020. (WTO, 2020). As a result, developing a strategy to manage supply chain interruptions is critical to minimise the effect of such a calamity (Shahed et al., 2021). Sreedevi and Saranga (2017) argued that a lack of readiness and response mechanism for such disruptions could damage firms in the supply chain, leading to order delays and unfulfilled orders.

Furthermore, a supply chain strategy relying on efficiency may not have the capability to quickly respond to the dynamic business need (Azevedo et al., 2016). For example, the countries were forced to lock down in the present pandemic. Factories, especially automobile companies that mainly rely on the lean system, had petite buffer stock due to their just-in-time pull production system, have severely been affected (Ivanov & Dolgui, 2020). Furthermore, firms can lose market share or be pushed to quit when their response mechanism is ineffective compared to the rival firms. For example, a fire at a Phillips semiconductor facility in Albuquerque, New Mexico, in 2000 disrupted both Nokia and Ericsson's production of semiconductors. (Chowdhury & Quaddus, 2016). However, Nokia managed to secure its supply chain by swiftly switching to alternative suppliers, but Ericsson experienced a loss of over US $400 and eventually discontinued business (Zsidisin & Wagner, 2010). So, from a strategic point of view, it appears that firms' ability to act upon any volatile event is vital and significant for long-term and sustainable competitive advantage. It would be disastrous for the firms if they cannot be agile and stable enough to restore the operations quickly in catastrophic and volatile times. Hence, supply chains need to be more agile and resilient to disruptive events (Carvalho et al., 2013).

In addition to this, environmental sustainability is another pertinent issue that needs to be thoughtfully addressed. Green supply chain management is the business philosophy that deals with establishing environmental protection mechanisms across the supply chain (Linton et al., 2008; Zhu et al., 2008). During the COVID-19 pandemic, customers especially were more conscious of traceability in the food supply chain, raw material origin, food safety, the environmental effect of goods and procedures, and other social concerns. This

is because the food sector may be seen as a connection between people and their natural environment. This concern is connected to the production of processed foods that are both environmentally friendly and resistant to virus and bacterial infection (Laksmanawati, 2021). Hence, the aim of green is to minimise environmental risks and their consequences while strengthening the firm's environmental performance and it's partnering firms (Carvalho et al., 2011). Meanwhile, the environmental impact of industrial waste generated from industrial production can be reduced by incorporating green supply chain practices without jeopardizing quality, cost, reliability, and ultimately overall performance (Srivastava, 2007). Firm complying with the stated environmental regulations mitigates ecological harm and contributes to overall economic performance (Carvalho et al., 2011).

In recent years, academicians and practitioners have paid adequate attention to the study on integrating different combinations of lean, agile, resilient, green, and sustainable paradigms into the SC domain. Prior study has examined the synergies and distinctions between these paradigms and their associated characteristics, focusing on a handful at a time. However, only a handful have researched all of these paradigms (LARG) in an integrated way. The literature is silent on the significance and relative importance of various practices under each paradigm in the FMCG supply chain. The integration of LARG makes the whole supply chain efficient, robust and sustainable.

Furthermore, it is essential to mention that in these turbulent times, even integrating these paradigms through certain practices is a daunting challenge keeping in view the scarcity of resources. Hence, this study prioritises the various practices under each paradigm for the FMCG sector. The current research focuses on the FMCG industry of Pakistan, which is regarded as one of the catalysts to Pakistan's economy. The value chain of FMCG is quite fragmented and geographically dispersed, leading to greater complexity and supply chain risks across the whole supply chain network. In the context of Pakistan, studies like investigation on lean and agile strategies (Ahmed & Rashdi, 2020; Rai et al., 2017), prioritising resilient factors (Piprani, Mohezar, & Jaafar, 2020) and green supply chain practices (Zhou et al., 2019) are some of the studies that employed some of the combinations of LARG in SMEs and large scale manufacturing.

However, to the best of our knowledge, integration of all these paradigms reported to be a comprehensive and holistic paradigm in the supply chain domain has not been studied in the Pakistan context yet. Hence, this study significantly contributes to the practitioners and professionals in identifying and working on those factors that are more important in establishing the LARG framework in the organisation. With this prioritisation matrix, the firm can target appropriate measures to set up or build relevant capabilities to achieve business,

economic, and environmental goals.

LITERATURE REVIEW

Lean

Ohno (1998) initially introduced the lean management concept focusing on waste reduction and continually improving business processes by eliminating non-value added activities across the value chain. Waste is generally considered non-value activity, and eliminating this waste significantly affects the firm's operational and business performance (Birkie, 2016; Ruiz-Benítez et al., 2018). Wastes are generally created by a lack of appropriate information and inefficiencies in material flow in the system. Hence, lean management can be considered an integrative approach through which organisations can design a high volume flexible manufacturing system using marginal raw material inventories (Agus & Hajinoor, 2012). The lean concept is not just limited to the upstream supply chain. Still, it has been extended to the downstream supply chain to eliminate non-value-added activities while ensuring the right product is available at the right time and location (Reichhart & Holweg, 2007).

Several lean practices have been reported at the operational level, which includes Just in time (JIT) system to minimise inventory level, visual housekeeping tool such as 5S, Kanban; an optical pull production system, an error-proofing technique called Poke yoke, developing a continuous improvement culture and system through Kaizen initiatives (Carvalho et al., 2011). Visual stream mapping enables identifying value and non-value added activities implementing a quality management system in the organisation (Govindan et al., 2013). At the same time, other lean initiatives such as lean training (Ruiz-Benítez et al., 2018), developing collaborative relationships and extending the initiative to other supply chain partners (Carvalho et al., 2011) are also considered as vital lean initiatives that have been found in the extant literature. Applying these initiatives and practices facilitate the firm to aggressively reduce redundant activities and improve the business process across the supply chain network. This would enhance manufacturing efficiency and augment the operational and overall business performance.

Agile

With the volatility in a business environment and changing customer requirements, firms need to keep abreast and aggressively respond to the market requirements (Carvalho et al., 2011). The firm with setting up lean enterprise can only improve the business processes. However, incorporating agility in the sys-

tem enhances the capability of the firm to respond actively and aggressively to current and future market requirements (Carvalho et al., 2013; Tarafdar & Qrunfleh, 2016). The agile system can react to any uncertain situation rapidly and swiftly to unpredictable and diverse market requirements (Tarafdar & Qrunfleh, 2016). Literature has reported several measures that would facilitate the firm's agility across the supply chain network, including speed in introducing a new product to the market, reduction in lead time, improving delivery capability, and the rate in adjusting customer requirements.

Resilience

In today's era, firms are increasingly relying on the global marketplace and working with global business partners (Wong et al., 2019). However, this resulted in complexity in the supply chain. Still, firms were also exposed to sever internal and external supply chain risks and disruption that would threaten the company's long-term survival and profitability (Colicchia & Strozzi, 2012; Gölgeci & Kuivalainen, 2020). Disruptive events like terrorism, natural calamities like earthquakes, tsunami (Das & Lashkari, 2015) and global pandemics such as COVID 19 (McKenzie, 2020), political and macroeconomic uncertainties (Piprani, Jaafar, & Mohezar, 2020b), diverse supply chain partners needs and internal issues like strikes (Sahu et al., 2016) and malfunctioning of business process(es) (Chopra & Sodhi, 2004) are some of the risk factors that may impaired and hampered the continuity of supply chain operations and consequently resulted to poor financial performance. Hence, to curtail the negative impact of these disruptions, there is a dire need to establish a resilient enterprise and inculcate resiliency across the supply chain network. A resilient supply chain may not be cost effective but it improves the capability of the firm to prepare of any disruptive and respond accordingly with minimal damage. Supply chain resilience is concerned with the ability of the system to get back to its original and / or desirable form after the disruptive event has been occurred (Jabbarzadeh et al., 2018; Piprani, Mohezar, & Jaafar, 2020). The extant literature has reported various resilient practices at pre-disruption, at the time of disruption and post-disruption phases (Abubakar et al., 2017; Piprani, Jaafar, & Mohezar, 2020a, 2020b). These resilient practices include creating end to end visibility in the supply chain, building a risk management infrastructure, improving flexibility, increasing redundancy in the supply chain and incorporating sourcing strategies. These resilient practices have been included to investigate the extent to which its significance is relevant to the FMCG sector in Pakistan. The objective of the analysis of resilient practices is to identify and signify the type of practices that can prevent and respond to the undesirable and volatile situation.

Green

Green supply chain management (GSCM) has appeared as contemporary supply chain management philosophy (Carvalho et al., 2011), with the focus on sustainable development through reducing ecological and environmental hazards (Govindan et al., 2013). GSCM places a premium on the environmental impact of each step in the supply chain. This applies to a single company and other relevant organisations by integrating suppliers and customers into the product life cycle, from material procurement, through product design, manufacture, distribution of goods, to customers, and reverse products (Pinto, 2020). The rise in environmental issues, such as rapid diminution of resources, pollution, and resulting global warming, all lead to worsening ecological balance (Çankaya & Sezen, 2019). Hence, there is a dire need to convert the conventional supply chain system into a sustainable supply chain model. This includes integrating the best environmental protection practices in product design, material procurement, manufacturing operations, distribution of goods to customers, and establishing reverse logistics systems into the system model (Srivastava, 2007; Zhu et al., 2008). The existing literature highlight multiple green practices, some of the highly recognised practices are a collaboration with suppliers and customers on all green issues such as packaging, reuse material, energy consumption (Azevedo et al., 2016); setting up reverse logistics infrastructure (Srivastava, 2007), implementing ISO 14001 system (González et al., 2008; Pun & Hui, 2001) and environmental monitoring upon suppliers (Paulraj, 2009).

AHP METHODOLOGY

Analytical Hierarchy Process (AHP) is a practical and widely accepted tool for prioritising or evaluating multiple attributes' effectiveness. This study deployed AHP through the following stages to rank or prioritise LARG practices implemented in the manufacturing environment.

Stage 1:

The first stage comprised of formulation of hierarchy tree using goals, criteria and sub-criteria. Altogether four criteria were defined, and thirty-six practices were shortlisted to develop a hierarchy tree. The levels and sub-criteria are presented in Table 5.

Stage 2:

The second stage deals with the development of the questionnaire, Saaty (1990) defined the nine-point scale format as presented in Table 1. The questionnaire was given to experts in the subject area and had industrial exposure in the subject domain. A total of 10 experts filled out the questionnaires. However, only six replies were incorporated for the study since three surveys had partial and empty answers. The demographic profile of the experts and their associated firms are presented in Table 2.

Table 1.
1-9 fundamental scale for pairwise comparison

Priority - Intensity	Definition	Description
1	Equally important	Two factors equal to one another
2	Weak or slight	
3	Moderately important	Slightly favour one factor over another.
4	Moderate plus	
5	Strongly important	Strongly favour one criterion over another.
6	Strong plus	
7	Very strongly important	A factor has a significant advantage over another factor.
8	Very, very important	
9	Extremely important	The priority of one aspect over another at the greatest level.

Source: Saaty (1990)

Stage 3:

On the scale of 1-9 proposed by Saaty (1990) , the third step entails comparing two pairs of experts. The combined pairwise comparison matrix was constructed using a geometric mean to incorporate all views. The priority value are presented in Table 3

Stage 4:

The next step is to calculate the eigenvector by normalising the geometric means of each row. It is followed by estimating priorities or weights by computing the average eigenvector value according to row. The weights and rankings are specified in Table 4

Table 2.
Demographic profile of responding firms

Characteristics	Case Firm 1	Case Firm 2	Case Firm 3	Case Firm 4
Firm features				
Annual revenue(PKR) Size in terms of employees Age of organisation	> than 1 Billion Approximately 500 > than 25 years	1-5 billion > than 1000 > than 30 years	1 billion Approximately 500 > than 25 years	More than 5 billion > than 2000 > than 50 years
Expert attributes				
Job role Rank Experience in the firm Total-experience	Procurement Senior Manager 5 15	Sourcing Specialist / Manager 3 15 years	Supply Chain Senior Manager 2 Around 20 years	Supply Chain Deputy GM 4 20
Attributes	Case Firm 5	Case Firm 6	Case Firm 7	Case Firm 8
Firm features				
Annual revenue (PKR) Size in terms of employees Age of organisation	More than 25 Billion Around 5000 > than 50 years	Around 10 billion Approximately 2500 Around 50 years	> than 5 billion Around 1000 > than 30 years	Around 10 billion > than 2000 Approximately 50 years
Expert attributes				
Job role Rank Experience in the firm Total-experience	Quality Manager 3 20	Plant Operations General Manager 5 25	Store / Warehouse Manager 3 > than 10 years	Production planning Manager 4 13

Table 3.
Priority value

	Lean	Agile	Resilient	Green
Lean	1	0.589	0.297	0.741
Agile	1.698	1	0.416	1.070
Resilient	3.360	2.402	1	2.904
Green	1.348	0.934	0.344	1

Table 4.
LARG - Weights and Ranks

	Lean	Agile	Resilient	Green	Weights	Rank
Lean	0.135	0.120	0.144	0.130	0.132	4
Agile	0.229	0.203	0.202	0.187	0.205	2
Resilient	0.454	0.488	0.486	0.508	0.484	1
Green	0.182	0.190	0.167	0.175	0.178	3

λmax = 4.0072, C.I = 0.0024, R.I = 0.89, C.R = 0.003 $\leq$ 0.1

Table 5.
LARG – practices consolidated results

Phase	Relative weights	Practices		Relative weights	Ranks	Global weights	Ranks
Lean	0.132	L1	Collaborative relationship with suppliers	0.079	5	0.013	22
		L2	Quality certification	0.095	2	0.016	20
		L3	JIT delivery practices to customers	0.053	9	0.009	25
		L4	JIT work flow in organization	0.072	6	0.012	23
		L5	Pull production system	0.079	5	0.013	22
		L6	Value stream mapping	0.094	3	0.016	20
		L7	Training in lean initiatives	0.063	8	0.011	24
		L8	Total productive maintenance	0.072	6	0.012	23
		L9	Poka Yoke / Visual control	0.068	7	0.011	24
		L10	JIT delivery from suppliers	0.081	4	0.014	21
		L11	5S / Visual House keeping	0.079	5	0.013	22
		L12	Kaizen / / setup time reduction / work standardization	0.165	1	0.027	13
λ_{max} =12.22, C.I = 0.02, R.I = 1.54, C.R = 0.013 $\leq$ 0.1							
Agile	0.205	A1	Speed in reducing manufacturing lead-time	0.176	1	0.046	5
		A2	Speed in reducing development cycle time	0.134	3	0.032	11
		A3	Speed in improving customer service	0.092	7	0.022	16
		A4	Speed in increasing levels of product customization	0.080	8	0.019	17
		A5	Speed in adjusting delivery capability	0.113	6	0.027	13

Continued on next page

Table 5 continued

		A6	Speed in increasing frequencies of new product introductions	0.132	4	0.032	11
		A7	Speed in improving delivery reliability	0.143	2	0.035	9
		A8	Speed in improving responsiveness to changing market needs	0.130	5	0.031	12
λ_{max} =8.14, C.I = 0.02, R.I = 1.40, C.R = 0.014 $\leq$ 0.1							
Resilient	0.484	R1	Building redundancy by strategic stocking	0.084	7	0.034	10
		R2	Creating total SC Visibility	0.189	2	0.076	2
		R3	Building a risk management infrastructure	0.252	1	0.101	1
		R4	souring flexibility / flexible supply base	0.138	3	0.055	3
		R5	production flexibility	0.118	4	0.047	4
		R6	Anticipate and preparedness to changes	0.104	6	0.041	7
		R7	sourcing strategies to allow switching of suppliers	0.115	5	0.043	6
λ_{max} =7.12, C.I = 0.02, R.I = 1.35, C.R = 0.015 $\leq$ 0.1							
Green	0.179	G1	Environment collaboration mechanism with suppliers	0.085	8	0.016	20
		G2	Setup a reverse logistics infrastructure	0.100	4	0.019	17
		G3	ISO 14001 certification	0.193	1	0.037	8
		G4	Green procuremen-t/sourcing	0.121	3	0.023	15
		G5	Collaborative measures to reuse / recycling materials and packaging	0.096	6	0.018	18

Continued on next page

Table 5 continued

	G6	Environmental monitoring upon suppliers	0.083	9	0.016	20
	G7	Environment collaboration with customers	0.088	7	0.017	19
	G8	Supplier environment management system requirement	0.136	2	0.026	14
	G9	Collaborative measures to reduce energy consumption	0.098	5	0.019	17
λ_{max} =9.24, C.I = 0.03, R.I = 1.45, C.R = 0.021 $\leq$ 0.1						

Step 5:

Finally, a consistency ratio was produced to assess the consistency of judgments made in a series of paired comparisons for quality and effectiveness. Inconsistency arose when thoughtless judgments were made at the time of pairwise comparison. Consistency ratio (CR) exceeding 0.10 shows inconsistent judgments and thus need to be re-evaluated until the acceptable limit of 0.10 is achieved. The consistency ratio is calculated using C.I / R.I, where C.I represent Consistency index, and RI represents relative index which is dependent upon several comparisons

Table 5 demonstrate the four major supply chain principles, indicating that the resilient principle (48.4%) is the widely accepted and recognised principle in the FMCG industry of Pakistan, followed by agile (20.5%), green (17.9%) and lean (13.2%). This shows that the importance of implementing resilient supply chain capabilities and practices is far more significant in the current global pandemic and volatile global business environment.

The priority weights of the practices within each supply chain principle category regarding the extent to which they are helpful in a specific type were calculated and then ranked. It can be seen that Kaizen/setup time reduction/work standardisation (16.5%) under lean principle is the most effective practice in improving the lean system in the FMCG industry of Pakistan, followed by Quality certifications (9.5%) and value stream mapping (9.4%), while JIT delivery practices to customers (5.3%) contributed least to the lean implementation practices in the FMCG sector.

Table 5 shows that speed in lowering production lead-time is the essential agile practice in the FMCG industry (17.6 per cent), followed by the speed in improving

delivery reliability (14.3%) and speed in reducing development cycle time (13.4%), whereas speed in increasing levels of product customisation (8%) considered to be the least essential practice for the implementation of an agile system in the firm

As demonstrated in Table 5, building a risk management infrastructure was observed to be the most significant contributor in setting up a resilient enterprise (25.2%), followed by creating total supply chain visibility (18.9%) and sourcing flexibility (13.8%). In contrast, building redundancy by strategic stocking (8.4%) appeared to be the least important factor in the FMCG sector.

Within the establishment of the green enterprise, ISO 14001 certification (19.3%) was considered to be the most effective practice, followed by Supplier environment management system (13.6%) requirement and green procurement (12.1%), while setting up environmental monitoring upon suppliers (8.3%) considered to be the least effective green practices.

The global priority weight of all the practices is demonstrated in Table 5. It was observed that building risk management infrastructure (10.1%) appeared to be the essential practice among all the LARG practices, followed by creating total supply chain visibility (7.6%) and sourcing flexibility (5.5%). It is interesting to mention that the top four practices are part of the resilient dimension that shows the significance of resilient practices in the global business-rugged environment. It is also observed that JIT delivery practices to consumers (0.9%) appeared to be the least effective practice among all LARG practices.

DISCUSSION AND CONCLUSION

This analytical research was explicitly related to Pakistan; therefore, the results of this study are helpful for the supply chain professionals, manufacturing companies, associations and other stakeholders in prioritising capability measures in implementing LARG practice in the organisation. In line with experts' opinion, resilient supply chain practice in the FMCG sector is most significant in demand, followed by the agile approach. With the high level and intensity of supply chain risks in Pakistan which include the war against terrorism, macroeconomic uncertainties, political instability, corruption, escalating utility expenses, ambiguity in investment policies, and a poor pro-business environment, the local companies are experiencing difficulties in conducting their business operations efficiently and effectively. This situation requires the local manufacturing companies in Pakistan to establish resilience into their system through specific supply chain capabilities to ensure progressive and sustained business performance.

Further to this, agility in the supply chain is also significant keeping in view the unforeseen and astonishing expectations from the downstream side of the supply chain. FMCG sector is considered a highly competitive sector, where manufacturing firms need to offer various options to satisfy current customers' expectations and keep attracting potential customers. Implementing an agile supply chain system facilitates the firm to constantly meet the changing customers' requirements and cover up variations on the demand side (Carvalho et al., 2012). The green supply chain dimension is next in line in the priority matrix, followed by the lean dimension. This shows that experts from the FMCG sector mainly believe that the lean principle is somewhat less significant than green practices. Setting up a green supply chain in the value chain would have the long-term benefit of gaining market share, improving the company's image, and ultimately improving sustainable performance (Çankaya & Sezen, 2019).

Next, the ranking of the practices within each paradigm demonstrated that several approaches need to be incorporated to develop the practical and successful implementation of the LARG paradigm.Experts' opinions uncovered that building risk management infrastructure and creating total supply chain visibility is considered the top-notch priority for establishing a resilient enterprise. At the same time, building redundancy through strategic stocking appeared the lowest weighted practice within the resilience paradigm. Keeping in view the volatility in the business environment, a firm needs to invest heavily in building risk management infrastructure to develop better information mechanism across the supply chain system that enables them to build a readiness culture and react swiftly to market and environment requirements (Piprani, Mohezar, & Jaafar, 2020).

Within the green supply chain practices, ISO 14001 is the standout priority practice that largely influences the firm's environmental concerns. Having ISO 14001 certification drives the firm to teach other green management practices. It is equally essential for the supplying firm to follow the environmental management system requirement (Ali et al., 2017). Otherwise, the long-term sustainability goal would have been compromised. The experts thus support that supplier environmental management system requirement is also the key in implementing the effect green management system across the value to attain sustainability in terms of superior environmental and economic performance.

The priority matrix through the AHP technique presents some meaningful insights related to the most reasonable lean practices within the lean paradigm. Kaizen emerged to be the essential lean practice for developing lean organisation. With KAIZEN initiatives, firms always strive to continuously improve business processes and different performance measurements, including cost, quality and flexibility (Ma et al., 2017). This enables them to build a responsive culture and drives them to become competitive. In addition to this, quality certification

is also the key to creating a lean enterprise. It enables the firm to build a quality culture and implement quality management philosophies at the enterprise level.

The primary purpose of this analytical study is to recognise and prioritise the usage of these practices to develop the LARG paradigm in the FMCG sector. In this study, various methods have been identified with the help of extensive literature review and discussion with subject matter experts. These practices are grouped into the LARG paradigm. The extant literature documented various procedures, but these practices' ranking is scant. Hence, this study mainly prioritises these practices within the LARG paradigm. The AHP technique applied the multi-criteria decision-making tool using six experts' opinions. The overall results reveal that the top five practices are building risk management infrastructure, creating total supply chain visibility, sourcing flexibility, production flexibility, and reducing manufacturing lead time. This shows that experts agree that building a resilient enterprise requires time. With the increasing complexity and intensity of supply chain risks, the firm must take specific measures by building capabilities to prepare for fierce and turbulent times.

This study has some limitations as well. This study incorporated the opinions of eight professionals working in the FMCG sector in Pakistan. Hence, to improve validity, it is advised to have more respondents to confirm the research findings. Furthermore, the study is confined to the companies located in Pakistan; hence this study could be the pathfinder for implementing the LARG paradigm in other regions. A similar study in different parts of the world can compare the findings. In addition to this, the LARG paradigm needs to be checked in other industrial sectors, as the focus of the study is limited to only the FMCG sector.

Last but not least, this study relied on the AHP approach, which has its own set of problems concerning unpredictability and human bias. Fuzzy AHP should be employed in future studies to reduce the amount of ambiguity, uncertainty, and prejudice. As with ISM and DEMATEL, additional strategies may improve connections across diverse activities.

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