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Leadership & Innovation Challenges in Adoption of Sustainable Packaging

Anil Kant[1], Dr. Anureet Kaur[2]
[1] Research Scholar, G D Goenka University, Gurugram.
[2] Assistant Professor, G D Goenka University, Gurugram.
Email ID: anilkant999@gmail.com

Abstract
The importance & relevance of sustainable packaging emanates from the UN established seventeen Sustainable Development Goals (SDG), which aim towards achieving sustainable future. Sustainable Packaging impacts many of these SDG's like sustainable consumption & production (SDG 12), conserving marine resources (SDG 14), achieving food security (SDG 2) etc. Sustainable Packaging implies integrating & implementing the objectives of Sustainable Development to packaging's complete life cycle, encompassing its raw materials, their sources to the end-of-life disposal of the packaging material, while considering the Triple Bottom Line impacts of packaging, i.e. Environmental, Social & Economic. Sustainable Packaging is a continuously evolving concept and has been facing multi-pronged challenges. Its facets include absence of an absolute definition, multitude of actors' involved, technical complexity of materials used, diverse functional requirements and sophisticated technologies. Using Stakeholder Theory as framework, a systematic literature study is conducted to identify challenges being faced in 'leadership' and 'innovation' dimensions in effectuating Sustainable Packaging. Study elicits lack of motivation & commitment, scepticism about potential benefits, long gestation or perceived lower return on investment, risk avoidance as the challenges being faced by the leadership dimension. Innovation challenges include risk of new technology, existing technological lock-in's in the supply chain, insignificant collaboration within value chain, high cost structures, potential competitive disadvantage and missing suitable infrastructure. This study guides appropriately, organisational resources & industry efforts to eliminate/ mitigate the challenges and reinforces need for greater collaboration of stakeholders to continuously improve sustainable packaging & contribute towards to a sustainable future.

Keywords: Sustainable, SDG, Sustainable Packaging, Innovation, Leadership.

1. INTRODUCTION

If societies are to see future, then there this no alternative to sustainable development (Nidumolu et. al., 2013). Sustainable future would expectedly be the outcome of the extent to which sustainable strategy, solutions & practice etc. gets incorporated in our continual actions encompassing all societies, environments and economies, whether developed or not. Sustainable development cannot occur randomly but has to be a systematic & a collaborative effort (Gray & Purdy, 2018). Over three decades back, what got initiated in The United Nations Conference on Environment & Development 1992, (aka The Rio Earth Summit 1992) where 178 countries adopted a comprehensive plan to build global partnership for sustainable development, to improve human lives & protect the environment, got shaped onto as the Agenda 2030 for sustainable development. The Agenda 2030, for now & future is an outline for peace & prosperity for people and the planet. At core of it are the seventeen Sustainable Development Goals (SDG) which guide collaborative global actions for eliminating poverty, improving health & education, reducing inequality, foster economic growth while considering climate change & preserving ocean and forests, per se environment (The 17 Goals, Sustainable Development, n.d., & Home- SDG Indicators, n.d.)

Packaging is related & interconnected with these Sustainable Development Goals. Increasing usage of packaging aids achievement of some SDG's, whereas many of packaging's existing designs & its life cycle negatively impacts them. For example SDG 2 relates to hunger free world, food security, improved nutrition & promotes sustainable agriculture. Its relevant target 2.1, to achieve SDG 2, aims to end hunger & ensure access of all people, to safe, nutritious & sufficient food throughout the year. Packaging positively contributes in achieving this target by moving food from production to consumption points while protecting the food (Barlow & Morgan, 2013) from physical or chemical damages, ensuring hygiene, avoiding contamination (Iacovidou et al., 2019)) and allowing year round availability through increased shelf life (Sundqvist-Andberg & Akerman, 2021).

Simultaneously packaging waste especially multilayer plastic, has found its way into the environment, including oceans & water bodies and polluting them. Globally, as reported in WRAP 2022, it is estimated that one-third of plastic packaging does not get captured in recycling stream and ends up polluting the environment. This leakage into the environment threatens planetary boundaries, causing adverse impacts to carbon and nutrient cycles, terrestrial habitat, and aquatic ecosystems too (MacLeod et al., 2021). This conduct negatively impacts SDG 14 which propounds conservation & sustainable use of oceans.

Packaging, an evident excess of modern consumption, becomes waste, a discarded material post-delivery or product usage, offering no further value and reflecting upon its ephemeral existence (Fisher & Shipton, 2010). Irrespective of the implications of packaging waste, the importance of packaging cannot be undermined as it provides protection, containment,

communication, convenience, enhanced shelf life etc to the products (Dopico-Parada et al., 2021) and remains an integral part of modern society. Ubiquity of packaging in contemporary life- economic as well as social, cannot be solely attributed to functionality, efficiency or cost advantage but additionally been driven and influenced by newer technology (eg microwave), advent of organised retail, shifts in societal demographics, rise of nuclear families and consumerism etc. (Lewis et. al., 2018, Evans et al., 2020). Packaging, through preservation & transportation (Mehrishi et al., 2019) has aided large scale production and consumption thereby supporting development & welfare of societies, but simultaneously has created significant environmental issues (Oreskes, 2018), forcing consumers, governments & society at large, to seek actions to reduce its impact by improving packaging designs at industry level, as well as proper disposal behaviour by consumers (Boz et al., 2020, Esslinger 2011).

Concurring to the perils of packaging waste and yet its ineluctable nature, this juxtaposition can be successfully overcome when packaging itself can be made sustainable i.e. Sustainable Packaging, a concept which goes beyond ideas of reusability, recyclability or circular economy (Dörnyei et al., 2023).

Circular economy concept intends keeping the material in circulation so that the reliance on virgin resources is lessened. Among many alternate business models, it is generally operationalized through: 3R's - Reduce, Reuse, Recycle (Ghisellini et al., 2016) or 9R's- Refuse (make product redundant), Rethink (intensifying the product's use), Reduce, Re-use, Repair, Refurbish, Remanufacture, Repurpose (new product with different function), Recycle & Recover (incineration of materials with energy recovery) (Kravchenko et al., 2019; Saidani et al., 2019). Beyond the R's other avenues like Slowing (extending product lifetime), narrowing (using fewer resources per product) (Bocken et al., 2016), Intensifying (product use) & dematerialising have also been employed (Geissdoerfer et al., 2018). Circular economy which relies on keeping more material in circulation does not necessarily signify greater sustainability for eg. recycling hazardous additives may not be environmentally or socially desirable, or recycling glass into bottles offers lesser environmental performance as compared to converting glass into insulation material (Haupt et al., 2018).

Sustainable packaging goes beyond circularity. Circularity relevantly but unilaterally focusses on resource efficiency, with the ultimate goal of being independent of primary raw materials. On contrary sustainability is broader concept and includes energy usage, carbon dioxide emissions, climate objectives, social impacts amongst others. Therefore circular packaging cannot be an end in itself, but could be a means of achieving sustainability.

The vast scope & coverage of sustainable packaging may appear overwhelming, but the main motivation in quest of sustainable packaging are the economic gains, which co-generate environmental gains (Gustavo et al., 2018) and deliver social benefits too. However, this pursuit is challenging and costly as scope to compromise on packaging's integral functions does not exist (Afif et al., 2022). The accompanying decision making process on sustainable packaging too, tends to be complex as it involves multiple stakeholders, who at times have conflicting needs & priorities (Niero et al., 2017), highlighting the complexity involved in sustainable packaging.

As proposed by Lekesiztürk & Oflaç, (2022), key aspects of sustainable packaging practices model are to raise awareness, innovate sustainable raw materials & processes, reduce packaging material & carbon footprint, reuse, use sustainable energy sources, recycle material, recycle water, certify and to co-create. It is also acknowledged that 'sustainable packaging practices' is an evolving field, and suffers from lack of repository in literature. Study & analysis by Gardas et al., (2021), approached obstacles to sustainable packaging in developing economies, through Decision Making Trial and Evaluation Laboratory (DEMATEL) approach. This mathematical approach helped to establish cause–effect relationship between the factors and presents the same into a visible structural model and also used to determine contextual association and interdependence within the factors under consideration. The study first identified eleven important factors as barriers to adoption of sustainable packaging and subjected these to DEMATEL. The findings showed that customer resistance to design changes is the most significant challenge and avoidance of sustainability is the least, while other challenges being conflict with functional requirements, complexities involved & additional costs etc. This research overtly mentioned that only 11 important factors were identified and analysed and there may be other factors that may be influencing the adoption of sustainable packaging practices.

This research is grounded on this very premise that there may be more & wide reaching challenging factors apart from eleven mentioned, involved in adoption of sustainable packaging and such challenges may arise from anywhere within the value chain- inside or outside organisation or even beyond these, like regulatory, innovation etc. Sustainable development and therefore sustainable packaging too, needs disruptive changes and radical innovations (Ritzen & Sandstrom 2017). The organisational capability to deliver, amongst other factors, immensely relies on the leadership & innovation capability (Hart et al 2019) as the key driver & competency, respectively to achieve sustainable packaging. In accordance with these alignments, this review paper studies the challenges associated to leadership & innovation aspects of organisation while it adopts sustainable packaging in order to achieve sustainable future.

2. METHODOLOGY

In this study, a scoping review was conducted considering the broad scope of this research and heterogeneity in the body of evidence. The scoping review is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) (Tricco AC, Lillie E, Zarin W, et al, 2018)

For identification of articles, databases were systematically searched for published literature on sustainable packaging with no defined period. Article selection & data extraction covered empirical researches including original & reviews, covering barriers and drivers of sustainable packaging, circular packaging, reusable packaging, green packaging. Restricted to English language articles, initial screening was conducted based on title & abstract. Data extraction was done using standardised format wherein captured details included title, first author, publication year, objective, methodology, theoretical framework used, reported findings & conclusion.

A matrix was drawn up for based on the themes of inquiry around leadership & innovation challenges in adopting sustainable packaging. Considering that sustainable packaging has been under focus and acted upon, more so in last decade & half, no time period based filtering criteria for articles was applied. Articles were searched and identified on ebscohost, scopus, web of science, google scholar databases limited to journals as 'source type' and articles as 'document types', and for set of keywords like sustainable packaging, barriers, drivers, leadership, innovation, recyclability, challenges. This resulted in 353 articles, out of which 207 were excluded post review of the abstract. The remaining 146 articles were screened further based on relevance of objectives and key theme to derive a final list of 92 articles.

3. LITERATURE REVIEW

3.1 Packaging

Packaging is a solution enclosing the product in order to protect its contents from internal & external factors while providing information about it and improving the consumption experience (Dopico-Parada et al., 2021). In simplistic terms, packaging consists of all activities of designing & producing the container for a product.' (Kotler et al., 2005), a definition which does not try to capture the technicalities or functionalities of packaging yet explicates the essence of its existence.

Traditionally the role of packaging focussed on protection & containment of product, communication & convenience (Parada et al., 2021). The literature highlights various roles of packaging like it provides protection to product during handling & shipment or against theft, influences & impacts logistical efficiency of supply chains (Pålsson & Hellstrom, 2016), improves shelf-life (Keranen et al., 2021), carries information (Lindh et al., 2016), and delivers an unboxing experience which helps reinforce brand experience (Prendergast & Pitt, 1996), apart from communication and regulatory information.

Newer packaging technologies & developments can monitor conditions inside & outside of the packaging as it moves through the supply chain environment, provide information about products origin, traceability, authenticity and storage conditions through electronics tags, sensors incorporated in the packaging (Dopico-Parada et al., 2021). These incorporated indicators & sensors can highlight freshness and presence or growth of toxins (Schaefer & Cheung, 2018; Young et al., 2020). Communicating about branding aspects through the visual elements-logo, colour scheme, font, shape, material etc i.e. the packaging design aspects, packaging can augment shelf impact through enhanced brand imagery (Metcalf et al., 2012; Wyrwa & Barska, 2017). Pertinently, packaging can potentially create competitive advantages due to its influence on consumers' multisensory experience & their purchasing behaviour (Velasco & Spence, 2019).

Yet protection of products takes centre stage as packaging exists because of the product (Dörnyei et al., 2023), and therefore without any compromises, the quality & safety of the product it contains is the foremost function (Han et al., 2018). Packaging is a resource which ensures that greater resources used in manufacturing of products are not wasted. Through facilitating proper storage, it helps to decrease price variability. Like all resources packaging also has environmental foot print (Morgan et al 2022) & a cost associated with it irrespective of its recyclability or reusability (Dörnyei et al., 2023).

Current packaging systems are vast, diverse & carry differentiated features based on supply chain conditions, product properties, consumer convenience, product positioning envisaged & consists of varied substrates, materials, technologies, methods etc to achieve the objectives. Packaging assists improved shelf life of products and reduces wastage through damage avoidance including physical & chemical etc. It offers convenience to consumers either through use of design (zipper pouch or sprout pouches) or through flexible packaging structure which allows consumption on the move (small packs). Such features which extend convenience, movement, storage etc of products at affordable cost points especially through use of plastics, coupled with changing lifestyles have pushed packaging consumption to enormous levels (Evans et al., 2020).

The ever increasing usage of packaging has helped in reducing food & product wastages, but the post-consumption discarded packaging materials' increased volume has posed grave challenge & threat to the environment, especially land & marine. These environmental challenges have become crucial & complex issues. With increased consumer & societal awareness, & concern about the impact of packaging waste on environment, coupled with adoption of Sustainable Development Goals has duly oriented the packaging users & producers, to find solutions (Granato et al., 2022) & expectation from manufacturers to use socially & environmental friendly packaging (Parada et al., 2021; Prendergast & Pitt, 1996; Rundh, 2005), i.e. to incorporate sustainability and switch to sustainable packaging.

3.2 Sustainability

In 1970's, the idea that human population growth would gravely diminish resources, appeared in the global environmental policy, bringing the concept of sustainability in the mainstream (Purvis et al., 2019). This concept considers environmental, social & economic well-being as the main agenda and is based on Triple Bottom Line approach of Planet (Environment),

People (Social) and Profit (Economic) (Bachman 2012). Recognised today as a key strategic goal of global policy, WCED defines sustainable development as development which meets present day needs, without jeopardizing the needs of the future generations (Report of the World Commission on Environment and Development, 1987). It has also been expressed as the goal of sustaining economic growth while maintaining natural ecosystems & assuring the equitable distribution of goods & services (Lowitt et al., 2009).

The US Environmental Protection Agency considers sustainability as the ability to achieve continuing economic prosperity while protecting planetary natural systems & providing high quality of life for its people (Robertson 2014), implying balance between resource usage rates and renewal rates, and moving away from non-renewable sources. Sustainability is leaving the world better than you found it, taking no more than you need, trying not to harm life or the environment, and making amends if you do (Bachman et al., 2012). Sustainability aims at having a stable, ongoing & non-depleting resource base and a secured, stable social system extending just standards of living for everyone on a continuous basis. (Lowitt et al. 2009).

Suarez-Eiroa et al. (2019) voiced for three principles linked to sustainability, with these being- (a) to adjust the inputs to move from fossil fuels to renewable energy, (b) to adjust the outputs to minimise waste generation & (c) to reduce the general requirement of resources. Ruminating these definitions it can be stated that depending upon the perspective- scholars, practitioners etc have defined sustainability in different ways (Lowitt et al., 2009), reflecting upon sustainability as a dynamic & non-universal concept with contextual perceptions. (Schiano et al., 2020).

3.3 Sustainable Packaging

Sustainable Packaging implies integrating & implementing the objectives of Sustainable Development to packaging's complete life cycle, encompassing its raw materials, their sources to the end-of-life disposal of the packaging material, while considering the TBL (Triple Bottom Line) Impacts of packaging- i.e. Environmental, Social & Economic.(Parada et al., 2021). For defining Sustainable packaging most studies rely on Brundtland Report 1987 which states sustainable as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" – a basis which garnered a lot of initial interest (Dornyei et al., 2023; Keeble, 1988). Therefore, sustainable packaging refers to sustainable sourcing, production of packaging material and post consumption potential for recovery of resources used through recycling- upstream/ downstream or compostability/ biodegradability.

Sustainable packaging goal is not an absolute number but an improvement over current standards. It is a complex issue & there is no common definition or exactness about sustainable packaging (Santi et al., 2022). Associations, companies & academicians have formulated different definitions- neither these are aligned nor capture the essence of sustainable packaging. (Peano et al.,2019; Schiano, 2021). While packaging experts concur that sustainable packaging cannot be defined in absolute terms, (Verghese et al., 2012) the popular criteria or guidelines being widely referred are those provided by Sustainable Packaging Coalition (SPC) USA & Sustainable Packaging Alliance (SPA) Australia.

Sustainable Packaging Council, USA considers sustainable packaging as an approach, rather than descriptor or format, to design, produce & distribute packaged goods. This approach is being guided by principles considering impact of complete life cycle of the package and clearly conveys that sustainability depends on trade-offs in the material, format, design etc of the package and perpetually sustainable packaging does not exists (Definition of Sustainable Packaging, n.d.).

The five principles of SPC are designed to help the packaging value chain approach sustainable packaging comprehensively with minimum negative environmental and social impacts & maximum performance and purpose of packaging. These five principles are that sustainable packaging (a) uses SMART design (b) advances the use of recycled materials and/or sustainably-sourced, renewable feedstocks (c) is designed for reusability, recyclability, or compostability and labeled with appropriate end-of-life instructions (d) that the product-package system engages with reuse and refill models, and (e) Company owning the product-package system to invest in the growth of recycling and composting infrastructure, collection, and access.

SPC further elaborates that the SMART design reflects Systems Approach (to avoid unintended consequences of design choices), Material Health (priority to safety than circularity so that hazardous chemicals are not introduced in recycling or composting streams), Accessibility (packaging which is easy to use & open by all), Reduction & Elimination (Reduce amount & number of materials used i.e. optimise and eliminate over-packaging) and Life Cycle Thinking (consider impacts of all aspects of the complete life cycle of package- from extraction, sourcing to end-of-life and everything in between).

Sustainable Packaging Alliance (SPA) Australia details the criteria for sustainable packaging as being effective (delivers on functionality of packaging to provide social & economic benefit), efficient (more with less use of material and being energy efficient too), cyclic (packaging materials used allows repeated recycling through natural or industrial systems with minimal material degradation) and Clean (packaging components used like inks, additives etc are safe to humans or ecosystems and cleaner production programs are utilised through the packaging lifecycle).

Irrespective of the diverse and different definitions of sustainable packaging as propounded by other constituents, the common themes are to reduce adverse impact of the packaging life cycle on environment, to meet the needs & expectations of the consumers/society, to decrease cost of production, distribution & disposal thereof, to have no or minimal effects on future of environment/ generations and the ability to continuously innovate. (Scipioni et al. 2021). Therefore, complexity of sustainable packaging warrants contemplations to assess complete life cycle of packaging along with interactions of the

product-package- between themselves as well as the environment through which they move and incorporate their triple bottom line impacts at design stage itself.

Consequent to the varied principles, definitions, context etc of sustainable packaging, which has led to confusion among stakeholders including consumers who fail to identify real sustainable solutions. At times, this has resulted in usage of terms like Eco-Friendly, Ecologically Conscious, Green, Circular, Recyclable, Closed Loop, Refillable, Bio based, Biodegradable, Compostable etc to signify sustainability. As no uniform terminology exists, harmonisation is required in overall approach of sustainable packaging to ensure uniform resolution strategies (Dornyei et al., 2023).

Sustainable Packaging may look to contribute towards sustainable future, but it has its own challenges. Literature highlights factors like legislation, organisational motivation, financial restrictions, supplier capability, process limitations (Palsson and Sandberg, 2022), infrastructure, consumers psychological capability to understand sustainability, physical access to appropriate waste management (Allison et al.,2021), lack of uniform regulations (Razniewska 2022) and limitations on recovery of materials & components (Hahladakis & Lacovidou, 2018) as the impediments to embrace sustainable packaging.

Similarly consumer demand for sustainable solutions is acknowledged, but actual purchase behaviour may not reflect this (Schiano & Drake, 2021) while consumer's willingness-to-pay for sustainability varies depending on product category, demographics & psychology (Xu et al., 2012).

Enhanced costs of sustainable packaging solutions (Silva & Palsson, 2022), costs of packaging & packaging practice (Palsson & Sandberg, 2022), cost impact through reorganising supply chains (Coelho et al., 2020) and lack of financial incentives to shift to sustainable options (Razniewska 2022) reflect that costs is one of the major challenges. Contrary to this Sustainable Packaging Association advocates that sustainable packaging implies reduced amount of packaging, resource conservation, efficient use of materials, benefits in supply chain leading to overall beneficial cost impact. These contrarian views exists due to specific situational perspective & remain concurrently valid. Additionally, circular economy is one of the means to achieve improved sustainability and hence concepts like refuse, reduce, reuse, repair, repurpose, recycle and recover would have a positive bearing on the cost impact of sustainable packaging. Sustainable Packaging, thus is a complex idea requiring systematic approach & critical thinking & may not offer a perfect solution, but solutions which are contextual, suboptimal & are being constantly validated (Dörnyei et al., 2023).

4. THEORETRICAL FRAMEWORK

Theoretical guidance in sustainable packaging is inadequate (Lahiti et al., 2018) with researchers using different frameworks like transaction cost theory, resource based theory, paradox theory, natural resource view, ecological modernisation theory, social capital theory etc in their studies, while many relying on stakeholder theory.

Sustainable packaging decision-making process is complex and involves multiple stakeholders which at times have conflicting requirements (Afif et al., 2022; Niero et al., 2017). Further, Sustainable Packaging Business Model innovations requiring partnerships with other stakeholders (Pfoser et al., 2022) with stakeholder collaboration being a key enabler (Chan, 2007) i.e. internal & external collaborations are necessary (Gerassimidou et al., 2022; Palsson & Sandberg, 2022; Roy, 2022). Based on this most authors have preferred to use Stakeholder theory to gain insights in this subject. This supports the fact that to improve packaging sustainability, integrated packaging decisions are taken at three different levels –external, internal to organisation- both vertical as well as horizontal. Sustainability may be a simple concept at intersection of economic growth, social wellbeing and environment preservation but involves variety of stakeholders. (Moshood et al., 2022) and there exists a significant disparateness, connectivity and matrix of networks involved in sustainable packaging. (Gerassimidou et al., 2022).

As a result, stakeholder theory has gained increased attention in sustainability policy & practice (Chiappetta et al., 2020), with the vast number & role of stakeholders in complex systems (Freeman et al., 2010) being dealt well through improved understanding of the multidimensionality of stakeholders' activities. Grand challenges like sustainable packaging hitherto sustainable future, represent international problems and require coordinated & collaborative effort to seek solutions, making stakeholder cooperation crucial. (Schwab & Vanham, 2021). More so Brundtlands' definition (WECD 1987) as mentioned previously and concerning sustainable development "is not centred on the role of organizations/ corporations, but concerned with the development of entire societies". (Rasche et al., 2023). Hence, stakeholder theory supports to generate insight & clarity about nature of multifarious sustainability problems. (Freudenreich et al., 2020; Schaltegger et al., 2019).

The scope of Stakeholder Theory is broader than transaction cost theory, as cooperative adoption is the core of sustainability & value creation process. While transaction cost theory assumes that the situational parameters are known to stakeholders (i.e. contractual partners), stakeholder theory on contrary urges to build stakeholder relationships to discover these potentials through collaborative efforts (Valentinov 2023).

Beyond collaboration, the aspect of limited network horizon (Grönberg & Hulthén 2022) where the individual participant of value chain can only view one or two stages away from his position, leads to non-awareness of capabilities of entire value chain resulting into failure to identify realistic & pragmatic solutions. This knowledge problem can be addressed through stakeholders-to identify both sustainability problems and solutions (Valentinov, 2023), and to establishing

common definitions, vocabularies and cultivating "inter-subjective agreement around a common purpose (Mitchell et al., 2020).
Stakeholder engagement as a process can create win-win solutions, especially in cases where trade-offs seem to be pervasive & insuperable, and therefore stakeholder theory justifies its relevance & use in this research.

5. FINDINGS

Challenges of sustainable packaging and in turn for sustainable future are manifold. Literature highlights these impediments as well as drivers for sustainable packaging, which are attributable to diverse stakeholders which are internal as well as external to the organisation. This study focusses only on leadership & innovation challenges amongst others challenges like regulatory, technological, marketing or consumer related etc.

5.1 Leadership Challenges:

Leadership has major impact on organisation and its constituents and existing literature clearly highlights the challenges pertaining to leadership towards establishing sustainable future through sustainable packaging.
Lack of commitment from management (Dhull & Narwal 2016), lack of commitment from management as well as employees (Weinrich et al 2024), top management's commitment (Menon & Ravi 2021), or not able to secure buy-in from top management for sustainability initiatives creates challenges which are not easy to overcome. This underlying cause of this could be leaderships' lack of awareness, knowledge, interest or their failure to find or develop sustainability ambassadors with required skillset (Stewart et al 2016). Inadequate performance measurement tools of sustainability, key performance indicators of sustainability established at company level but not percolated down implying less focus and organisational predominant focus on financial or marketing results (Pålsson & Sandberg 2022) have also led to reduced commitment of leadership to install sustainability actions within the organisation.
Leadership view of sustainable packaging as being cost escalatory and hence being a potential source of competitive disadvantage (Bachman et al., 2012) influences leadership to refrain from moving on sustainability path. Competitive disadvantage can also get created by higher developmental cost, requirement of additional investments and lost economies of scale. Competitive disadvantage may arise from limited sources of raw material or lower operating efficiency and lower yields pushing up per unit costs. At times, it may necessitate change in product packaging in order to conform to sustainability parameters, but these changes may not find acceptance with customers creating a potential competitive disadvantage (Eissenberger et al., 2023) making leadership wary of potential risk.
Sustainable packaging requires shifting and bringing multiple changes in the organisation, but foremost the culture of organisation needs to align towards sustainability concerns. Building up such culture which pervades throughout the organisation is a challenge leadership has to confront (Rizos et al., 2012).
Factors like avoidance of sustainability ambition (Gardas et al., 2021), locked-in situation of capital or equipment investments (Stewart et al., 2016), low priority attached with sustainable packaging, inability to assess trade-offs, multiple competing priorities (Bachman et al., 2012), leaderships' short term orientation (Takacs, 2022) have resulted into leadership challenges in implementing sustainable packaging.
Sustainable packaging is an evolving field facing external challenges, thereby creating & getting exposed to risks in the operating environments. With pressure to perform, risk aversion takes precedence causing a challenge to leadership adopting sustainable packaging. The risk factor increases when required technical resources to evaluate environmental impact are not available or the regulatory environment is unclear and varying (Pålsson & Sandberg, 2022). Further, value proposition of sustainable packaging depends on internal and external factors. Leadership may not be motivated if the value proposition is not proven, its implementation does not hold to financial parameters, it does not result into incremental financial results or leadership wants to avoid poor financial results in short term (Bachman et al., 2012).
Leadership also encounters conflict of functional requirements, lack of operational targets, supply chain complexities, coordination among departments, lack of knowledge (Salmenperä, 2022), resistance to change within organisation as well supply chain (Menon & Ravi 2021), unclear decision making levels, hierarchy and implications thereof (Stewart et al 2016) while working towards a sustainable future through sustainable packaging.

5.2 Innovation Challenges

Packaging is heavily dependent on the diverse input providers like polymers, base metals, glass, chemicals, equipment manufacturers etc. To create sustainable packaging developments can occur at one point or multiple points in the value chain, but irrespective of the origin, the entire value chain has to align & support the developments. Innovation towards sustainable packaging thus is not only internal to organisation but operates as a part of overall ecosystem.
As collaboration within value chain is a critical aspect, low willingness to collaborate with suppliers (Silva & Palsson, 2022), lack of information & interaction between relevant actors, lack of communication with packaging developers (Salmenperä, 2022) and communication among shareholders becomes a challenge for carrying out innovations in sustainable packaging. Specific to suppliers the impediments could arise due to low level of interaction, their lack of knowledge about sustainability or supplier's interest limited to work on market advantageous packaging projects (Pålsson

& Sandberg, 2022). Inadequate collaboration leads to limited access to data from other supply chain members making innovations even more difficult.

Innovations are driven by knowledge & experimentation, amongst others. Therefore aspects like lack of knowledge (Silva & Palsson, 2022), lack of proper data including ecological (Pfoser et al., 2022), low understanding of expectations (Jacobsen et al., 2022), unclear responsibility to support innovation (Ritzén & Sandström, 2017), inadequate knowledge of tools & approaches for sustainable packaging design (Weinrich et al., 2024), lack of technical know-how (Rizos et al., 2016), technical difficulty in handling material flows and lower homogeneity of raw material (Tura et al., 2019) – are documented challenges for innovation to happen within the sustainable packaging arena.

Innovation becomes challenging if there is rigidity and rootedness into current packaging structures and systems. Rigid practices of existing value chain (Salmenperä et al., 2022) and existing lock-in's (Simoens et al., 2022) have been identified as challenges in the shift towards sustainable packaging. Source & drivers of these lock-ins can be multiple. Product design, product process (Ritzén & Sandström 2017), high dependency on current value network, risk of scrutiny by stakeholders (Stewart et al 2016), lack of network support partners, strength of linear model and lack of validated circular or sustainable model (Tura et al 2019) have resulted in organisations refraining from innovating. Lock-in in packaging value chain assumes significance as any change requires multiple changes across the value chain. The packing lines including labelling & marking are designed for specific packaging type and thus shifting from flexible pouch to bottle is not feasible on the same filling & packing line. Therefore any innovation will entail changes within the firm as well as entire value chain, including finding & developing new partners. Thus collaboration, effort & change required to overcome rigidity, & lock-in of existing processes becomes a challenge for innovation.

Challenges in innovations in Sustainable packaging also arise from lack of capital (Bachman et al., 2012), high investment costs, low focus on packaging competence (Pålsson & Sandberg 2022), lack of technological infrastructure (Dhull & Narwal 2016), changing regulation (Stewart et al 2016), high cost of sustainable raw material & scarcity of them (Lekesiztürk & Oflac, 2022) and scale economics (Simoens et al, 2022).

6 DISCUSSION

Sustainable future through sustainable packaging faces challenges emanating from leadership and innovation are two important aspects. Leadership is responsible for delivering current performance while ensuring the organisation is future ready too. Innovation creates potential competitive advantage prolonging organisations existence & performance.

Many leadership challenges have been identified and documented. Importantly among these are lack of sustainability ambition, lack of management commitment & knowledge about sustainability, inadequate tools & performance metrics, goals not cascaded to larger organisation, scepticism about cost escalation, lack of environmental culture, locked in capital, Short term orientation, risk aversion and assumed inadequate value proposition.

Lack of collaboration within and beyond value chain, apprehensions about information exchange, existing lock-ins, lack of knowledge, data, technical know-how, infrastructure & availability of raw material are factors impeding innovations in sustainable packaging.

Multitude of these diverse factors, though appearing disjointed are seemingly related amongst themselves to some extent. Organisations on sustainability path need leadership to have sustainability ambitions and commit themselves to these ambitions. This will guide appropriate actions by leadership to install right culture, invest in technical know-how and gain knowledge. Sustainable solutions are not necessarily cost prohibitive but can reduce costs through better efficiencies, a view opined in Fritz & Cordova, 2023 or by SPC. Better efficiencies can be achieved through reduced packaging material usage, improved packaging efficiency by better weight/ volume ratios of product and package, reduced transit losses, improved inventory managements etc. Acknowledging & investigating these can largely eliminate the argument on investments, capital & Return on Investment.

Extending further, leadership has the capability, mandate and resources to interact with the value chain to nurture collaboration amongst the larger set of actors. Enhanced collaboration germinates collective innovations or allows garnering of suitable support for innovations from the relevant stakeholders. Collaboration reduces challenge emanating from rigid practices or lock-ins, while promoting partnerships which allow value chain to reap appropriate benefits.

Viewed differently & contrarily, presence of collaboration and ambitious attributes can propel organisation to fast-track their sustainable journey.

7 CONCLUSION & FURTHER RESEARCH

As reflected in the review, leadership & innovation are important challenges in adoption of sustainable packaging and have far reaching impact on the wider organisation as well the value chain. To overcome these may not be easy and would require adequate display of motivation & ambition of the leadership within the organisation as well as to exercise influence in the broader value chain to bring out necessary collaboration. Therefore the many challenges for adoption of sustainable packaging can be attributed to leadership and innovation, and resolving them through appropriate measures, can drive the efforts to attain sustainable future through sustainable packaging.

Relying on Shareholder theory, it can be expected that many more stakeholders like consumers, suppliers etc will be involved or impacted by organisation's shift towards sustainable packaging, apart from the causal factors like regulatory,

technological etc. These perspectives need to be delved deeper. Additionally all stakeholders and factors may not have equal importance or impact on organisation's adoption of sustainable packaging, hence a quantitative research to establish relative strength of these factors can be further researched.

DECLERATION OF INTEREST STATEMENT

The authors of this paper have no conflict of interests to declare

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