Indian Public Policy Review 2026, 7(1): 01-19
https://doi.org/10.55763/ippr.2026.07.01.001

IPPR

Facilitating Resource Efficiency through Regulatory Reform for Sustainable Consumption in the FMCG Sector
The Case of Low TFM Soap Bar

Rijit Sengupta **K.P. Ananthapadmanabhan** **Praseetha P Kumar***

Abstract

This conceptual policy paper with a specific technology case study underlines the importance of using scientific evidence in strengthening regulation to promote resource efficiency for sustainable consumption in the Fast-Moving Consumer Goods (FMCG) sector in India. It explores how science-based innovations, facilitated through regulatory reform and informed consumer engagement, can help improve material use efficiency, thereby decoupling economic growth from resource depletion and negative environmental impacts. The discussion situates this need within the current market dynamics, highlighting rising consumer awareness, persistent intent–action gaps in sustainable consumption, and evolving business responses ranging from technology-driven innovation to choice influencing and choice editing. Using the example of one of the simplest and widely used FMCG products - the soap bar, it illustrates how reducing Total Fatty Matter in soap bar (TFM is derived from palm oil) through alternative structurants can optimise palm oil use without compromising its performance. The paper thereby underlines that efficient use of TFM in soap bars can contribute towards addressing the associated risk of deforestation, and makes a case for the national standard to be accordingly refined. Building on these insights, the paper outlines an integrated analytical approach that combines business reform strategies supported by science-based research and innovation, leadership thinking, and policy engagement, with enabling regulatory frameworks and consumer education.

Keywords: Resource efficiency, Sustainable consumption, FMCG sector, Low-TFM soap bars, Policy engagement

Publication Date: 28 February 2026

---

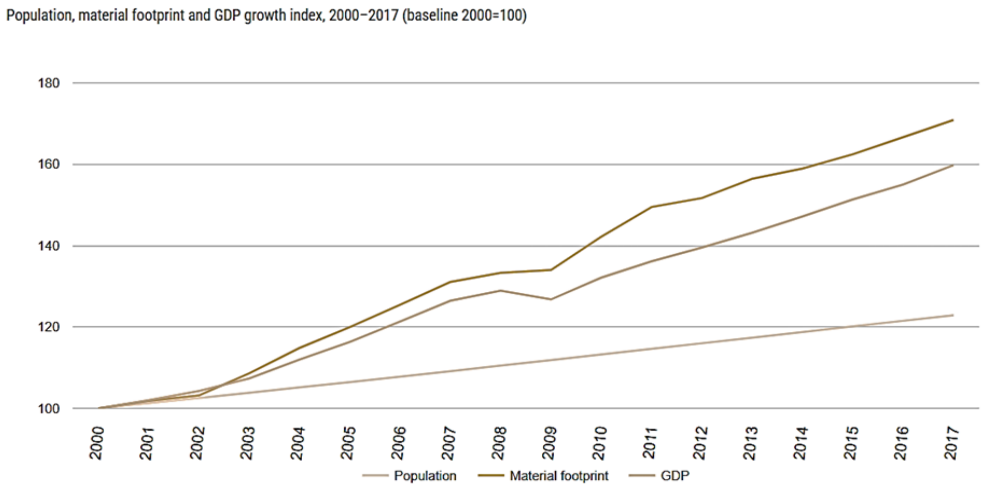
* **Rijit Sengupta** is the CEO of Centre for Responsible Business (CRB). **Ananthapadmanabhan** is Professor and Director of Cosmetic Science Programs, James L Winkle College of Pharmacy, University of Cincinnati, **Praseetha P Kumar** is a Programme Officer at CRB.

1. Background: Global Material Footprint & the Imperative for Sustainable Production and Consumption

Increased global population, urbanization, and rapid industrialization have drastically raised global material consumption, placing unprecedented pressure on natural resources (Charlton 2024)

This trend is evidently reflected in the growing 'global material footprint', a prominent indicator of the pressures placed on the environment to support economic growth and to satisfy the material needs of the people (Thomas O. Wiedmann 2015). According to the United Nations 2019 report on Sustainable Development Goals (SDGs), the global material footprint rose from 43 billion metric tons in 1990 to 54 billion metric tons in 2000, and further to 92 billion metric tons in 2017; and is expected to reach 190 billion metric tons by 2060 ((UN) 2019). An even more concerning fact is that this global material footprint is increasing at a faster rate than both population and economic output (illustrated in the Figure 1 below).

Figure 1: Graph depicting population, material footprint, and GDP growth index, 2000-2017 (baseline 2000=100)



Source: UNSD-The Sustainable Development Goals Report 2019

As per the United Nations Environment Programme's Global Resources Outlook 2024, the global material use at present continues to grow by an average of more than 23% per year (United Nations 2024). This further reiterates how the need to decouple economic growth from environmental degradation and resource depletion has become more pressing than ever. Goal 12 of the United Nations Sustainable Development Goals (SDGs) also reinforces the importance of promoting responsible production and consumption patterns and their role in addressing resource depletion, environmental degradation and fostering sustainability. Achieving this goal necessitates a shift towards resource efficiency, particularly in high-impact sectors like the Fast-Moving Consumer Goods (FMCG) sector.

Globally, the FMCG sector has witnessed a considerable surge in demand, significant pressure on resource consumption, expansive and widespread global supply chains, and significant emphasis on high production volumes. Findings of the International Resource Panel (IRP) of the United Nations Environment Programme (UNEP) also establish that achieving increased resource efficiency is both practical and indispensable for sustainable development and for meeting global climate targets.

As an emerging economy with an aspiration of accelerated economic growth and development, sustainable production and consumption and resource efficiency will remain central to India's economic and industrial development pathway over the next few decades. Based on a tradition of frugality, and leveraging this current need, scientists, business and opinion leaders are increasingly becoming practitioners and advocates of resource efficiency, across sectors of the India economy.

Several successful circular economy and resource efficiency-driven innovations can already be observed; for example, the Ethanol Blended Petrol (EBP) programme aimed at reducing fossil fuel dependence (Shifali Goyal, Rajat Verma 2024); scrap-based steel production (Bonaplata 2023) that utilises approximately 650 million tons of scrap annually, significantly reducing energy consumption and carbon emissions (World Steel Association's fact sheet); and the Perform, Achieve & Trade (PAT) Scheme, under the National Mission on Enhanced Energy Efficiency (NMEEE) which has delivered substantial energy and emissions savings in energy-intensive industries (Ministry of Steel 2022).

Achieving resource efficiency in the Indian FMCG sector should remain a priority, given the significant demand for products and associated volume of resources used in the sector. Let us consider soap bars, one of the most ubiquitous household FMCG products in the country. Soap bars have witnessed a sustained expansion in production and market size over recent years; the product was valued at USD 4.03 billion in 2024 and is projected to reach USD 6.89 billion by 2030, at a compound annual growth rate of 7.89% (2025)

This scale of production has direct implications for the material inputs used in soap manufacturing. These material resources include palm oil used for saponification, which has significant environmental, climate and social implications. The Food and Agriculture Organization (FAO) data shows that palm oil accounts for 7% of the global deforestation from 2000 to 2018 (FAO 2022). Indonesia and Malaysia, producing 85% of the world's palm oil, had already cleared over 3.7 million hectares of natural forests by 2015 (Yale School of Management n.d.). This deforestation has continued, with recent statistics showing that an additional 28,600 hectares of primary forest were converted to plantations in 2021 alone (Gaveau DLA 2022). The emissions associated with the palm oil value chain are quite large. This further gets accounted for in the 'scope 3' emission of specific FMCG products, given the use of palm oil and its derivatives in the FMCG sector (Seeta Salgia Patel 2022).

The growing demand for palm oil globally is expected to result in increased production (with some estimates indicating global production surpassing 100 MMT by 2030, which is currently around 70MMT). Market demand is likely to pressurize production and aggravate these risks and vulnerabilities in the supply chain, unless strategies are adopted that drive sustainable production, supply chain checks and balances, and ultimately, efficient use of the commodity for retail products.

Let us now closely examine the production system and supply chain of an example used earlier in the paper: soap bars, which use palm oil as an active ingredient. Are there possibilities to redesign this product for material efficiency while maintaining its consumer functionality and production efficiency? This is a product that has undergone little change since it was industrially produced in the late 1800s. The efficiency of surfactant use, particularly the optimization of Total Fatty Matter (TFM) content in soap bars, presents a unique opportunity to explore how resource optimization in this area could contribute to more sustainable production and consumption patterns.

This paper delves into this possibility of improving the efficiency of TFM content in soaps, and proposes a science-based techno-policy-driven approach to pursue such a goal. The analysis is conceptual and policy-oriented in nature, drawing on a technology case study, and does not extend to consumer trials, cost-curve evaluations, or life-cycle assessments, etc.

2. Where do Consumers Stand on Sustainable Consumption?

Consumers, including in developing markets like India, are becoming increasingly interested in buying products that are purpose-driven, sustainable, and environmentally or climate-friendly. This shift in consumer behavior is no longer just confined to the affluent markets but is now gaining momentum in emerging economies as well. What we are witnessing today is a gradual but steady shift in consumer priorities that is driven by growing awareness of climate change, resource scarcity, and the adverse social impact of profiteering. This trend is well documented across multiple global and national consumer surveys.

- According to a 2023 Deloitte survey, over 64% of Asia Pacific (APAC) consumers strongly believe climate change is an emergency, and 52% said they had changed their activities or purchase behaviors to respond to climate concerns (Deloitte 2023).
- Similarly, a 2024 PwC study shows that consumers globally are prepared to pay more (a premium of approximately 9.7% on average) for goods that are sustainably produced or sourced (PwC 2024).
- A 2023 Bain & Company report highlighted that consumers are prepared to pay up to a 12% premium for sustainable products, while 64% of respondents expressed concerns about environmental sustainability (Bain & Company 2023).
- These global insights also find resonance in India.
    - According to the Ipsos India Sustainability Report 2024, about 66% of Indian consumers believe the environment is at risk and recognize the need for action.
    - A December 2023 survey by Rakuten Insight reveals that about 60% of Indian consumers understand the importance of making purchases that are sustainably made or environmentally friendly (Statista 2023).

However the willingness to pay extra for sustainably sourced/climate-friendly products remains limited to a particular class/type of consumer (particularly the young millennials and Gen Z) (Bhavit Pant 2024) and thus the actual transaction of such products in the market remains limited (Elisabeth Hoch 2023). This explains to an extent the existing 'Intent-Action' gap in consumer behavior in a country like India.

While a majority of consumers are interested in choosing sustainably, systemic and market related bottlenecks prevent this intent to be translated into actions to be addressed. The disconnect between consumer intent and action could also be attributed to factors such as limited availability of such products in the market; lack of awareness about standards and what they represent; and finally, increasing cases of greenwashing especially in competitive segments of the market (also refer Fig 2.below). This necessitates the need for simple and unambiguous communication of product sustainability information to consumers, through (public or private) standards, storytelling, and other credible means.

Figure 2: Eight Key Barriers that Constrain Consumers from Purchasing More Sustainable Products

(Source: BCR Climate and Consumer Sustainability Survey, June 2022) and BCG Consumer Insights on Overcoming the Eight Barriers to Making Green Mainstream)

Taken together, these findings indicate that while consumer interest and intent to adopt sustainable consumption practices are increasing, their translation into market outcomes is contingent on factors beyond individual choice. This creates an important context for examining the role of resource-efficient product design grounded in scientific and technical considerations, as well as the enabling function of policy and regulatory frameworks, particularly standards, in shaping sustainable consumption pathways.

3. How are Businesses responding to growing interest on Sustainable Consumption?

Businesses around the world are increasingly adopting diverse approaches to engage consumers in sustainable consumption practices, driven by rising awareness of environmental and social challenges. Some of the prevailing practices are the use of Voluntary Sustainability Standard (VSS); as well as approaches like tech-based innovation, choice influencing, and choice editing. Through technology-driven innovation, businesses increase the availability of sustainable products and services, integrating sustainability into design and production processes, and focusing on eco-friendly innovation without compromising product performance, quality, or affordability.

By 'choice influencing' businesses build markets for sustainable products and business models, collaborate with stakeholders to showcase benefits of sustainable options, and ultimately use marketing and communication to guide consumer behavior towards sustainability. Through 'choice editing' businesses can gradually remove unsustainable products and practices from the market, partner with policymakers and retailers to eliminate unsustainable options, and focus on promoting sustainable choices in collaboration with social actors.

To effectively engage consumers in sustainable consumption practices, businesses can also leverage a variety of tools and approaches that provide clear, credible, and actionable sustainability information of their firms (overall), or of specific products. The foundation of these tools/approaches has to be informed by robust scientific evidence and analysis. The One Planet Network's 'Guidelines on Providing Product Sustainability Information' (One Planet Network 2017) is one such example.

These approaches thus highlight how sustainable consumption can be enabled through the combined actions of businesses and consumers, supported by scientifically-informed innovation, credible information tools, and enabling policy and regulatory frameworks. This perspective motivates a closer examination of how the alignment of business strategies, standards, and consumer information plays out in creating pathways for resource-efficient production and more sustainable consumption outcomes, especially in high-volume, consumer-driven FMCG products, including the soap bar case discussed in the following section.

4. Innovations in addressing Resource Use efficiency in consumer products: The Case of Soap Bars

Personal care and cosmetic products include skincare, oral care, and haircare products such as cleansing bars, shampoos, toothpastes, moisturizing creams and lotions and advanced skin and hair benefit agents. This market, valued 650-million-dollar in 2025, is expected to reach about one trillion US dollars in the next 10 years. Given the scale and frequency of consumption of these products, improvements in resource efficiency within this sector have the potential to influence sustainability outcomes at a global level.

4.1. Focus on Surfactants in Common Soaps

The cosmetic and personal care industry uses very many ingredients including surfactants, polymers, preservatives, fragrances, skin benefit agents such as moisturizers, sunscreens, antioxidants, antiaging actives, and antimicrobial agents. While there is opportunity to review and explore opportunities for increasing materials efficiency in each one of these ingredients, we focus on surfactants, which are found in almost all the personal care products for one function or another. Surfactants, also commonly known as detergents, are found in common personal cleansing formulations and a multitude of other cleaning products. Surfactants are also used as emulsifying agents, dispersing agents, wetting and spreading agents, penetration enhancers, structurants, solubilizers, and even as conditioning agents in personal care products.

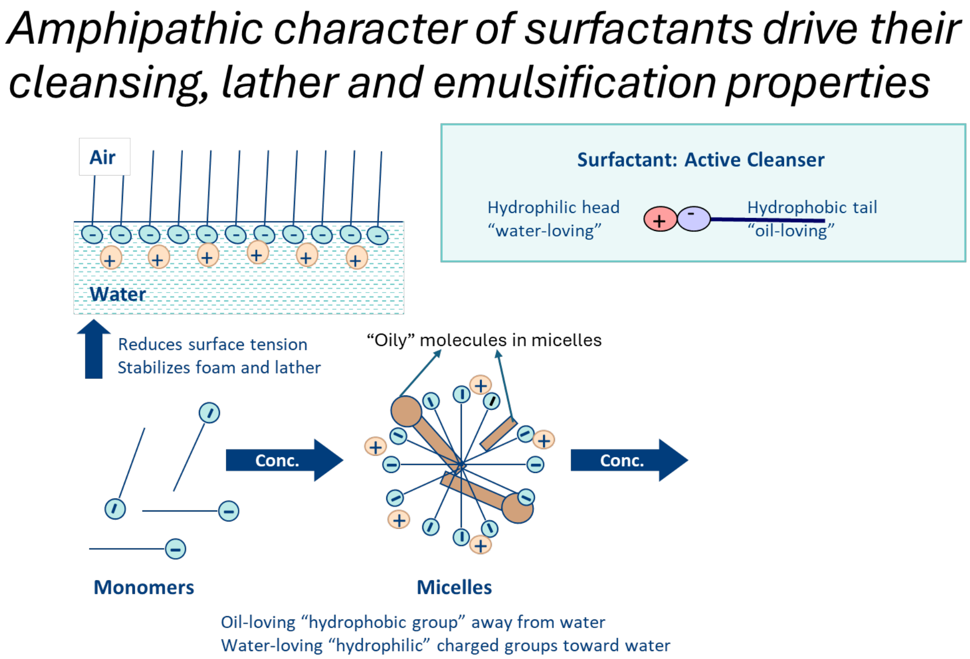
A soap molecule, which is essentially metal salt of fatty acid, is one form of surfactant that has the highest usage level in the personal care area. Soap bars consisting of soap molecules represent the most affordable form of a cleansing format that provides hygienic and personal cleansing benefits around the world. A brief history of soap bars and why this may be an ideal candidate for exploring its resource efficiency described below.

4.2. The chemistry of soap bars:

A typical soap bar consists of 80+ percentage by weight of alkali metal salts of fatty acids, commonly known as soap molecules (Dastidar et al. 2023). The typical structure of a soap molecule (given in Figure 1) shows that it has a long tail which is hydrophobic (water-repelling) and a polar head group (acid group) which is water loving. This dual nature of these molecules imparts their unique properties such as self-assembling as molecular clusters in aqueous solutions often referred to as spherical micelles (see Figure 3) or even higher order structures such as lamellar liquid crystalline phases.

These spherical micelles can trap oily materials including sebum and remove it during the cleansing process, which gives rise to their detergency properties. Their dual nature also allows them to concentrate at interfaces of immiscible phase (such as oil and water or air and water) by having their hydrophobic tail in the oil or air phase and the water loving polar group in the aqueous phase. This ability to concentrate at interfaces imparts them the ability to create and stabilize emulsions of oil in water or water in oil or generate foam and lather that consumers desire from cleansing products (see Figure 3). The interior of the micelle is like an "oil" phase that can dissolve water insoluble actives and make them compatible in aqueous solutions. Because of these unique solution and interfacial properties, soap and surfactant molecules find applications in many personal care and industrial formulations.

Figure 3 : Surfactants and their typical micro-structures in aqueous solutions.

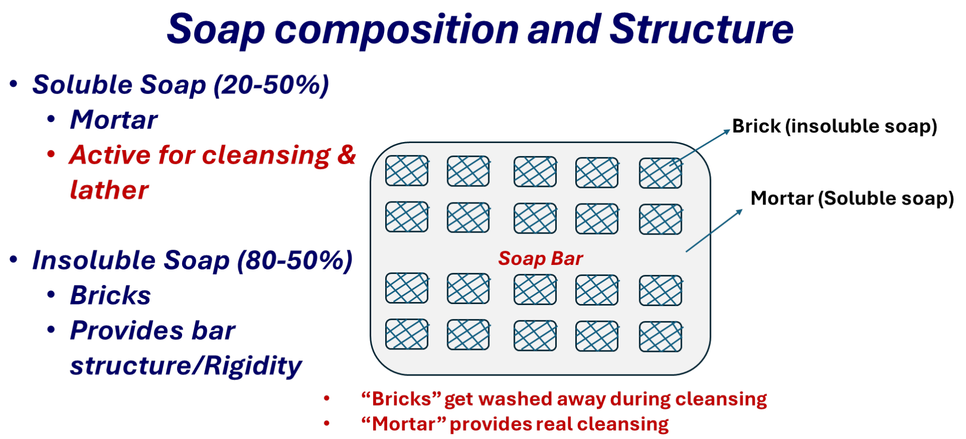


Note: Micelles can solubilize oils & organics in their interior. Lamellar structures correspond to solid crystals. Surfactant molecules adsorbed at the air-water interface stabilize foam and lather. Soap molecule is one type of surfactant.

The properties of surfactants depend on the relative size of the fatty tail and the polarity of the head group. In general, optimal properties of surfactants in aqueous solution centre around 10 to 14 -CH2- groups in the hydrocarbon tail. If the chain length is too high, they become insoluble and form solid crystalline structures. Note that it is the soluble fractions that give rise to various properties of the surfactants. However, shorter chain fractions on their own tend to form a soft solid at higher concentrations, but cannot form a rigid soap bar. For this reason, a more rigid solid component that is compatible with soft matter is required to form stable soap bars.

The simple solution in the early day soap making was to use longer chain soap molecules as the solid fraction. Thus, in a typical soap bar, the chain length of the hydrophobic group can vary from 10 to 18, with the lower chain lengths forming the soluble fraction and the longer chain ones forming the insoluble crystalline fraction. A typical structure of a soap bar is given in Figure 4. The insoluble fraction provides the solid bar structure whereas the soluble fraction that dissolves upon contact with water will form the active cleansing fraction.

Figure 4: Soap bar structure showing insoluble soap bricks and soluble soap fractions inter-dispersed in a solid bar



During use, the insoluble soap fraction typically gets washed down the drain, whereas the soluble fraction contributes to creating lather and cleansing.

4.3. History of soap making

Mass marketing of soap bars started in the 1800's. The source of fatty matter (the hydrocarbon tail of the surfactant molecules) comes from vegetable or animal fats and oils. The basic soap-making technology involves treating vegetable or tallow oils (triglyceride oils) with alkali to "saponify" them and removing the glycerin as a byproduct. In a place like India, because of cultural and religious reasons, the main source of fatty matter for soap bars is vegetable oils, specifically palm oils which naturally occur with hydrocarbon chain lengths of C8 to C18. The wide variation in chain lengths offered a cost-effective solution to obtaining both the soluble lower chain length fraction as well as the structuring longer chain length fractions from the same source.

The basic soap technology has not changed much over the last two centuries with the combination of long and short chain fatty matter constituting their insoluble and soluble fractions, respectively. However, the worldwide demand for personal cleansing products has been going up steadily. This was particularly evident during the recent pandemic, when the importance of hygiene and cleansing was fully recognized all over the world.

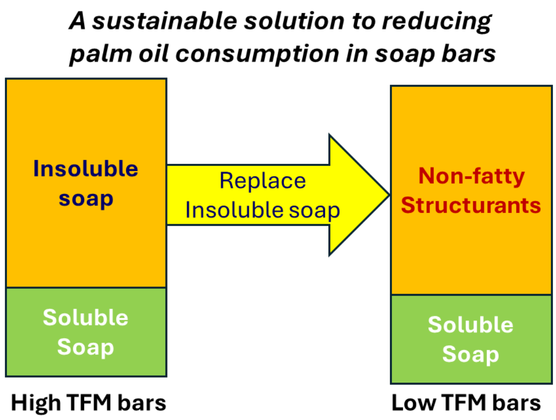
4.4. Sourcing of fatty matter for soap bars

Oil palm is the primary and most dominant source of total fatty matter (TFM) used in soap bar making. The current demand for palm oil for soap-making alone is estimated to be about 10 million tons per year, and is expected to reach about 18 million tons in the next 10 years. Palm oil is also used heavily in the food industry, where the demand is even higher than the non-food segment. Given the growing demand for palm oil underlined in this paper, a key question is whether resource-efficiency-driven considerations, integrated into soap bar making, would reduce the increasing demand for palm oil, and reduce deforestation pressure and other adverse socio-environmental impacts that are associated with palm production?

4.5. An approach to minimizing palm oil consumption for soap bars:

One approach to reducing the palm oil consumption in soap bars is to replace the insoluble soap fraction that is being used for structuring the soap bars (See Figure 5).

Figure 5: A Sustainable Solution



Replacing the long chain insoluble fatty soap that are in-active from a cleansing perspective and present simply as structurants with alternate structurants can lead to a more environment-friendly bar. The challenge is in ensuring consumer-desired cleansing, antibacterial, and sensory properties from such alternate low TFM bars.

The insoluble fraction in our current soap bars simply gets washed away during cleansing and does not offer any functional skin benefits. From a formulation perspective, this suggests that the structural role currently played by insoluble soap could, in principle, be fulfilled by non-soap additives with lower associated environmental impacts. Typically, cleansing liquids such as body wash formulations contain less than 20% by weight of soluble surfactants. The soluble fraction of soap molecules in a soap bar is in the 20 to 40% range. Thus, by simply replacing the long chain structuring fraction of the soap molecules in a typical bar, it is possible to significantly reduce the use of palm oil derivative (TFM) in soap, thereby potentially lowering palm oil demand.

The challenges in implementing this change have been the following:

- The first is the technical feasibility of creating a soap bar with less fatty matter (Low TFM soap bars) by replacing the structuring fraction of soap molecules with alternate structurants that are functionally effective in providing consumer-desired cleansing, hygiene, and sensory benefits expected from a typical soap bar at comparable cost.
- The second challenge is regulations-related. In a few developing countries, including India, regulatory standards prescribe a minimum threshold of Total Fatty Matter (TFM) for a product to qualify as a toilet soap. Similar provisions exist in parts of South Asia and Africa. Historically, these standards emerged in contexts marked by heterogeneous manufacturing practices, limited testing infrastructure, and concerns related to adulteration and baseline quality assurance. Composition-based metrics (such as TFM) provided regulators with administratively simple, enforceable proxies for minimum product quality and consumer protection.

In contrast, developed countries and regions such as the United States, Canada, the European Union, and Australia etc. do not prescribe ingredient levels. Instead, regulatory oversight in these contexts relies more heavily on product safety requirements, ingredient disclosure, post-market surveillance, and claims substantiation mechanisms. These approaches place greater emphasis on functional performance and safety outcomes rather than compositional thresholds, thereby creating greater scope for scientific innovation and resource efficiency. Table 1 illustrates the divergence between various countries.

Table 1: Comparative overview of national and regional standards for soaps, highlighting whether Total Fatty Matter (TFM) minima are prescribed and the regulatory focus across jurisdictions

Country/region	Regulator/standards body	Standard / document	Prescribes ingredient minima?	TFM requirement (if specified)
European Union	European Commission; European Committee for Standardization (CEN)	Regulation (EC) No 1223/2009 on cosmetic products. (EUR-Lex)	No	–
United States	U.S. Food & Drug Administration (FDA)/Consumer Product Safety Commission (CPSC)	FDA: guidance on cosmetics vs soap/ CPSC: Soap Business Guidance	No	–
Australia	Australian Industrial Chemicals Introduction Scheme (AICIS) / TGA	AICIS: Cosmetics and soap guidance. (AICIS)	No	–
Canada	Health Canada	Health Canada: Cosmetic Regulations/guidance	No	–
India	Bureau of Indian Standards (BIS)	IS 2888:2004-Toilet soap- Specification.	Yes	Grade 1 ≥ 76%; Grade 2 ≥ 70%; Grade 3 ≥ 60% TFM
Pakistan	Pakistan Standards & Quality Control Authority (PSQCA)	PS:13/2018-Toilet Soap (4th Rev.) (PSQCA)	Yes	Grade 1 ≥ 76%; Grade 2 ≥ 70%; Grade 3 ≥ 60% TFM

East Africa (regional)	East African Community / national adoptive bodies (KEBS, UNBS, RSB etc.)	EAS 186:2011 / EAS 186:2013 - Toilet soap - Specification.	Yes	Minimum TFM 76% for toilet-soap grades

Taken together, these contrasting regulatory approaches reflect a lack of consensus on the relationship between fatty matter content and soap performance.

Within this broader comparison, the Indian regulatory framework provides a particularly instructive illustration of how compositional standards continue to shape product design. BIS specifications for toilet soaps (IS 2888), bathing bars (IS 13498), and liquid toilet soaps (IS 4199) remain anchored in Total Fatty Matter as a primary classificatory parameter.

The Indian toilet Soap standard (IS 2888), which was originally published almost 50 years ago, is primarily based on the quantum of saponified oil/fat incorporated in the bar (Total Fatty Matter). In India, soaps have been classified into 'Grades' based on the level of TFM used, leading to a misconception that higher the TFM, the better the quality of soap.

The fact that quality of soap is determined not by the level of TFM but the type of TFM has previously been acknowledged and documented in the preface of IS 13498 in the 1990s. The quote from the standard is: *"The concerned technical committee of this Bureau felt that the present compositional standard based primarily on the total fatty matter (TFM) does not necessarily correspond to the performance of toilet soaps. The performance of soap depends more on the type of fatty matter present rather than the total fatty matter in the soap. For example, the solubility of soap depends on the characteristics of the fatty acids, namely chain length, unsaturation and on the cation".*

Therefore, from a scientific perspective, the level of TFM is not a reflection of the performance of a soap bar.

In fact, a recent peer-reviewed publication by Dastidar et al. has examined the technical feasibility of creating a low TFM soap bar by identifying several alternate structurants to long chain soaps (3). Possible alternate structurants identified by this group include clays, zeolites, and starch. The authors also have explored the possibility of structuring the bar with structured water, where the water can be gelled with organic or inorganic gellants, polymers, clays as well as through the use of polyols and electrolytes. A comparison of the compositions of current high TFM bars to some of the proposed low TFM bars is given in Table 2 (below).

Table 2: Broad composition of current high total fatty matter (TFM) bars and low TFM Bars proposed by Dastidar et al. 2023.

Ingredients	Current soap bars (TFM ≥70%)	Technology soap bars (TFM≈30% - 60%)
Soap (R-COONa)	75% - 85%	35% - 55%
Water	15% - 17%	17% - 23%
Minors (fragrance/color)	2% - 5%	2% - 5%
Electrolytes ($NaCl/Na_2CO_3/Na_2SO_4$)	1% - 3%	1% - 5%
Polyols (Glycerol, Sorbitol)	2% - 6%	2% - 6%
Gellants (organic/inorganic for water structuring)	-	2% - 4%
Solid structurants/fillers (starch/talc/zeolites/clays)	2% - 5%	15% - 30%
Synthetic detergents (AOS/SLS/LAS)	1% - 2%	2% - 4%

The authors have examined the functional and material properties of several soap bars with different levels of non-fat structurants in their paper.

Selected results reproduced with permission from their publication show the following:

Low TFM bars provide parity cleansing and similar antibacterial activity against common bacterial and viral strains. (See Figure 6 below).

Figure 6: Cleansing and antibacterial activity

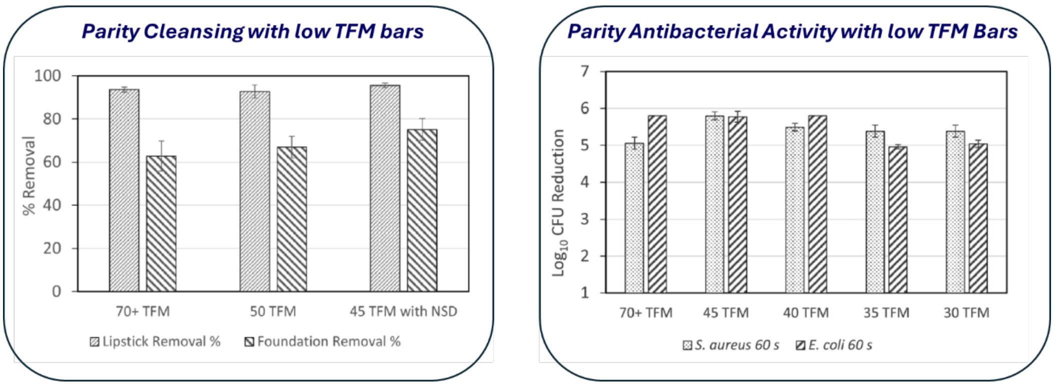
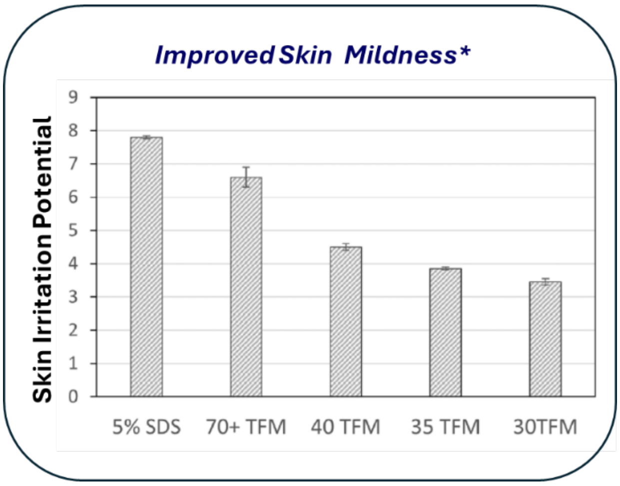


Figure 6: (Left)-A comparison of cleansing performance of current high TFM soap bars vs low TFM bars in a clinical study with 10 subject in removing lipstick and foundation in a 60-seconds wash. Figure reproduced with permission from Dastidar et al. 2023. (Right)-A comparison of the antimicrobial activity of a typical high TFM

soap bar vs low TFM bars in in-vitro antibacterial time kill tests using a typical gram positive and gram negative organism. Figure reproduced with permission from Dastidar et al. 2023.

Low TFM bars show lower skin irritation potential as measured by an established protein denaturation test, the Zein Dissolution test (which correlates the degree of denaturation to in-vivo skin irritation). This is indeed an additional benefit consumers would find highly desirable (See Figure 7).

Figure 7: Skin mildness



A comparison of skin irritation potential of a typical high TFM soap bar vs low TFM bars in an in-vitro protein denaturation test, i.e. Zein dissolution test. Figure reproduced with permission from Dastidar et al. 2023.

Dastidar et al also showed that the low TFM bars provided parity foam and lather performance, an attribute that is highly desired by consumers (Dastidar et al. 2023)

A major concern while structuring with a non-fatty structurant is the wear rate of the bar, which is an indicator of rate of use of the product. Typically, hydrophilic structurants (water-soluble structurants) can be expected to soften the bar and increase the rate of wear. Dastidar and team have investigated this aspect of their experimental bars and have shown that the rate of wear of the bar can be about the same as that of fatty matter structured bars (Dastidar et al. 2023).

Thus, it is evident from Dastidar et al's work that it is possible to create a low TFM soap bar with similar cleansing and hygienic properties as a high TFM bar, while potentially providing enhanced skin mildness, a desirable consumer benefit.

One of the main hurdles, however, of getting low TFM soap bars accepted as commercial soap bars is linked to the fact that depending upon the level of fatty matter, soap bars are ranked as Grade 1, Grade 2, or Grade 3. It is evident from the above discussion that the level of fatty matter does not reflect the quality or performance of a soap bar, and can be misleading to the consumer. In fact, a recent survey conducted by Nova et al shows that 80% of consumers tend to avoid 2nd and 3rd grade soaps and prefer to use soaps bars with 77+% TFM content. Even though this survey had just 50 subjects, it shows the general consumer perception that high TFM bars are superior. Further, there is no scientific evidence about consumers being able to differentiate between bathing bars and toilet soaps and their grades.

To address such consumer misconception that high TFM bars are better for cleansing, educational campaigns will be needed. The aim of this paper is to encourage the FMCG corporations and government regulators to review the definitions and regulation in view of the facts and analysis presented herein, especially in the context of promoting resource efficiency and ultimately India's net zero ambitions.

5. Conclusion

Achieving resource efficiency and sustainable consumption in the FMCG sector requires a re-examination of how products are conceived, produced, and promoted in the market, as is evident from the analysis of the soap bar case in this paper. Creating an opportunity for informed consumers to switch to low TFM soap-bar (without compromising its quality) can help reduce the pressure on the demand for palm oil – a commodity widely linked to global deforestation. At the same time, the role of policy and regulatory frameworks, particularly standards, remains an important enabling factor in this regard.

Thus, the transition towards resource efficiency for sustainable consumption can be understood as being shaped by three key drivers or determinants.

The first driver of this transition is the growing demand and intent of consumers to adopt climate and environment-friendly products. This shift in consumer expectations can be interpreted as structural change in market dynamics that presents an opportunity for the FMCG industry. Harnessing this opportunity involves leadership thinking that is forward-looking and based on strategic business considerations and scientific information.

The second driver is realising the imperative for development of products that are resource-efficient and environmentally friendly, grounded in robust scientific research and innovation. Strategic investments in science and technology play a key role in enabling manufacturing systems and product designs that minimize material use intensity and reduce environmental footprints along the entire product life cycle. Financial support and incentives could help facilitate the manufacture of resource-efficient products at scale, especially in a country like India. Such developments also align with the broader objectives of responsible consumption, including those articulated under the Government of India's Mission Lifestyle for Environment (LiFE).

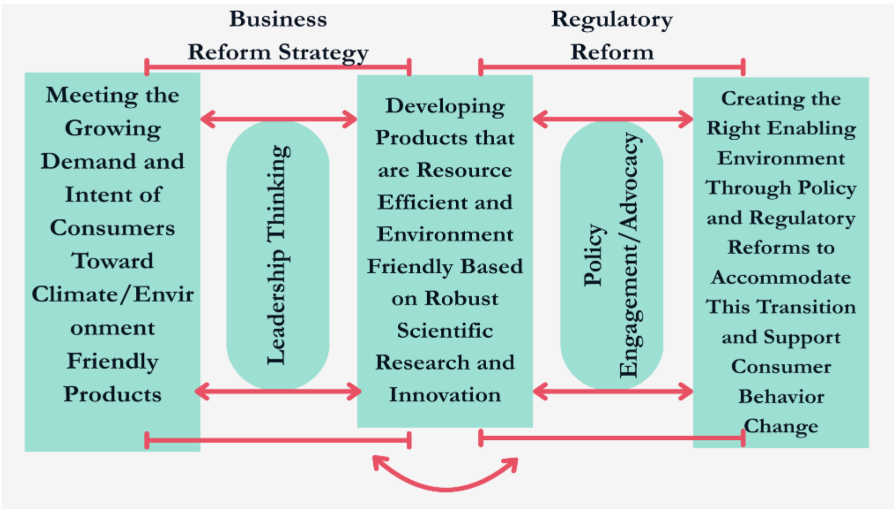
The third determinant is the presence of enabling policy and regulatory frameworks to support business innovations for achieving resource efficiency to meet emerging consumer demand for such (environment or climate friendly) products. Regulatory frameworks informed by scientific enquiry and research can help create conditions conducive to business innovation towards sustainability.

In India, the recent institution of the *Environment and Ecology Division* at the Bureau of Indian Standards (BIS) illustrates a relevant institutional development in this direction. This Division has the potential to review existing FMCG product standards and identify potential reforms in standards and regulations to drive business-driven, scientific innovations towards resource efficiency in India. Such processes are likely to involve trade-offs to balance the interests of the environment, the consumer, and the industry and drive a bold future-looking (and future-proof) narrative for the Indian economy and industry.

In parallel, consumer engagement and communication remain important for enabling informed purchasing decisions, thereby reinforcing demand for sustainable products. All of this is captured in the model presented in Figure 8 below, which links consumer demand for sustainable products with resource-efficient production and business strategy, supported by the right enabling policy and regulatory frameworks. As the model demonstrates, this continuum is supported by two enablers:

a) Leadership thinking, which positions sustainability as a strategic consideration within business decision-making
b) Policy engagement, which strengthens institutional and legislative support for change

Figure 8: An integrated model for driving resource efficiency and enabling sustainable consumption in the FMCG sector.



Source: Model developed by the author

References

(UN), UnitedNations. 2019. "The Sustainable Development Goals Report." *https://unstats.un.org/sdgs/report/2019/The-Sustainable-Development-Goals-Report-2019.pdf.* Accessed 2019. https://unstats.un.org/sdgs/report/2019/The-Sustainable-Development-Goals-Report-2019.pdf.

ASCI. 2024. "Greenwashing No More: ASCI Introduces Guidelines to Ensure Honest Environmental Claims in Advertisements ." 18 January. Accessed June 20, 2024. https://www.ascionline.in/wp-content/uploads/2024/01/PR-Guidelines-for-Enviormental-Green-Claims-Final.pdf.

Bain & Company. 2023. "Consumers say their environmental concerns are increasing due to extreme weather; study shows they're willing to change behavior, pay 12% more for sustainable products." *Bain & Company.* 13 November. https://www.bain.com/about/media-center/press-releases/2023/consumers-say-their-environmental-concerns-are-increasing-due-to-extreme-weather-study-shows-theyre-willing-to-change-behavior-pay-12-more-for-sustainable-products/.

Bhavit Pant, Bhavya Sharma, Antra Ragini. 2024. *Mindful Brew.* Centre for Responsible Business.

Bonaplata, Javier. 2023. "Energy Transition: What is steel scrap and how can it help us reach net zero?" *World Economic Forum.* 17 Jan. https://www.weforum.org/stories/2023/01/davos23-steel-scrap-decarbonization/.

Charlton, Emma. 2024. *Our resources are running out. These charts show how urgently action is needed.* World Economic Forum's Centre for Nature and Climate.

Council on Energy, Environment and Water. 2021. "CREEW: Precision Farming in India." *CREEW.* https://www.ceew.in/publications/sustainable-agriculture-india/precision-farming.

Dastidar Sudipta G., Yarovoy Yury, Leopoldino Sergio R. et al. 2023. Revisiting the role of total

fatty matter in soap bars, J Surfactants and Detergents. 1–10.

https://doi.org/10.1002/jsde.12699

Deloitte. 2023 . "Deloitte Insights." *Deloitte Center for Integrated Research: Sustainability Signals.* https://www.deloitte.com/us/en/insights/topics/environmental-social-governance/deloitte-global-sustainable-behaviors-survey.html#sustainability-attitudes-and-beliefs.

Elisabeth Hoch, Maximiliaan Tetteroo, Rijit Sengupta, Sabarish Elango. 2023. *Driving Sustainable Consumption through Policy Innovations in Value Chains.* Centre for Responsible Business.

European Union. 2023. *European Union (Energy, Climate change, Environment): Green claims.* Accessed January 15, 2025. https://environment.ec.europa.eu/topics/circular-economy/green-claims_en#:~:text=Overview,of%20their%20products%20and%20activities.&text=This%20is%2

0a%20modal%20window.&text=Beginning%20of%20dialog%20window.,cancel%20and%20close%20the%20window.

FAO. 2022. *FRA 2020 Remote Sensing Survey.* Rome, Italy;: FAO.

Gaveau DLA, Locatelli B, Salim MA, Husnayaen, Manurung T, Descals A, et al. 2022. "Slowing deforestation in Indonesia follows declining oil palm expansion and lower oil prices." *PLoS ONE 17(3): e0266178.*

Ipsos. 2024. *IPSOS INDIAI SUSTAINABILITY REPOR T 2024: Environment Sustainability Segmentation and its Implication for Marketers.* Ipsos.

Ministry of Steel. 2022. "Indian Steel Industry Reduces its Energy Consumption and Carbon Emissions Substantially with Adoption of Best Available Technologies in Modernisation & Expansions Projects." *Ministry of Steel.* 02 Feb. https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=1794782.

One Planet Network. 2017. "The Guidelines for Providing Product Sustainability Information." 1 August. Accessed January, 2025. https://www.oneplanetnetwork.org/knowledge-centre/resources/guidelines-providing-product-sustainability-information.

PwC. 2024. "PwC 2024 Voice of the Consumer Survey." *PwC Global.* 15 March. https://www.pwc.com/gx/en/news-room/press-releases/2024/pwc-2024-voice-of-consumer-survey.html.

SEBI. 2023. "Dos and don'ts relating to green debt securities to avoid occurrences ofgreenwashing." Accessed February 13, 2024. https://www.sebi.gov.in/legal/circulars/feb-2023/dos-and-don-ts-relating-to-green-debt-securities-to-avoid-occurrences-of-greenwashing_67828.html.

Seeta Salgia Patel, Aviva Intveld, Evan Seeyave, Emily Moberg, Virginia Barreiro. 2022. " Measuring and Mitigating GHGs: Palm Oil." *worldwildlife.org.* https://files.worldwildlife.org/wwfcmsprod/files/Publication/file/1l7ynjrq3a_MOBERG_GHG_Brief_PALM_OIL_08_22_v3.pdf.

Shifali Goyal, Rajat Verma. 2024. "Ethanol-Blended Petrol: Progress, Challenges, and Untapped Potential." *The Centre for Social and Economic Progress (CSEP).* 18 December. https://csep.org/blog/ethanol-blended-petrol-progress-challenges-and-untapped-potential/#:~:text=EBP%20programme%20is%20believed%20to,blending%20by%20ESY%202025%2D26.

Simi TB, Rijit Sengupta, Anusha Das. 2024. *Combat Greenwashing in India .* Centre For Responsible Business(CRB).

Statista. 2023. "Consumer readiness to pay for sustainable products in India 2023." *Statista: Consumer Goods & FMCG.* https://www.statista.com/statistics/1320623/india-consumer-willingness-to-pay-for-sustainable-products/.

Thomas Day, Silke Mooldijk, Frederic Hans, Sybrig Smit, Eduardo Posada, Reena Skribbe, Santiago Woollands, Harry Fearnehough, Takeshi Kuramochi, Carsten Warnecke, Aki Kachi, Niklas Höhne. 2023. *Corporate Climate Responsibility Monitor 2023.* NewClimate Institute.

Thomas O. Wiedmann, Heinz Schandl, Manfred Lenzen, Daniel Moran, Sangwon Suh, James West, and Keiichiro Kanemoto. 2015 . "The material footprint of nations." *Proceedings of the National Academy of Sciences* Vol. 112 | No. 20.

UN Enviroment Programme. 2013. "ECO CIRCLE(TM) FIBERS." *UN Enviroment Programme: Connecting Countries to Climate Solutions.* June. Accessed March 5, 2025. https://www.ctc-n.org/products/eco-circletm-fibers#:~:text=ECO%20CIRCLE(TM)%20FIBERS%20is,manufactured%20using%20recycled%20polyester%20fibers.&text=Ministry%20of%20Economy%20Trade%20and%20Industry%2C%20Japan.&text=1.,percent%20reduction%20in%20CO2%20emis.

UNFSS. 2018. *Voluntary Sustainability Standards Trade and Sustainable Development Voluntary Sustainability Standards Trade and Sustainable Development.* United Nations Forum on Sustainability Standards (UNFSS), Voluntary Sustainability Standards Trade and Sustainable Development .

United Nations. 2024. "United Nations Environment Programme (2024): Global Resources Outlook 2024: Bend the Trend – Pathways to a." *https://wedocs.unep.org/20.500.11822/44901.* Accessed 2024. https://www.resourcepanel.org/reports/global-resources-outlook-2024.

World Bank. n.d. "Fly Ash bricks reduce emissions (English). India Innovations in development ; issue no. 7 Washington, DC: World Bank." Accessed 2013. http://documents.worldbank.org/curated/en/698491468266407713.

Yale School of Management. n.d. "Palm Oil in Indonesia: Environmental and Social Aspects." *Yale Center for Business and the Environment.* https://cbey.yale.edu/research/palm-oil-in-indonesia-environmental-and-social-aspects.