



Sustainability-Driven Green Marketing Frameworks Transforming Global Business Practices

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Abstract---Businesses around the world are under pressure like never before to show credible commitments toward sustainability as consumers, regulators, and investors are ever more demanding transparency, environmental responsibility, and quantifiable green impact but the existing green marketing activities are severely constrained by unchanging eco-labels, infrequent reporting, unverifiable claims and greenwashing that undermines trust and compromises the credibility of the sustainability based communication. The unavailability of real time environmental monitoring, absence of lifecycle metrics that are consistent and the inability to tailor sustainability value to varying consumer psychographics further increase the disparity between real environmental performance and the marketing discourses that industries around the world employ. In order to overcome these issues, the proposed research approach is the EcoSentient Marketing Framework (ESMF) the next generation of sustainability intelligence ecosystem that combines the environmental sensing of real time IoT with blockchain-supported verification claims, dynamic lifecycle-based Green Value Scoring, and psychographic sustainability mapping, into one adaptive marketing engine. On-going capturing of all emissions, use of resources, waste trends and logging footprints, permanently stored data which is verified easily through AI ensures that AI-based scoring periodically modifies the environmental profile of each product and aligns marketing messages, visuals, and positioning approaches with live sustainability performance. The adaptive campaign orchestrator in the framework is making communication keep in pace with the ecological behaviour and greenwashing is eradicated and environmental honesty is inculcated into the everyday brand engagement. Through aligning operational sustainability and marketing authenticity, ESMF gives high benefit to consumer confidence, increased regulatory compliance, and turned sustainability as a fixed reporting requirement to an active value-creation tool. Early modelling suggests that companies employing ESMF will be able to accomplish quantifiable gains in customer loyalty, perception of transparency, and green purchase intention and less conflict between environmental claims and performance. On the whole, the suggested model provides a radical route of global businesses that are willing to incorporate real-time ecological intelligence into the marketing decision-making processes, thereby creating a possibility of a future in which environmental sustainability communication will be more precise, credible, responsive, and strongly connected with the actual environmental impact.

Keywords: Sustainability Intelligence, Real-Time Environmental Sensing, Blockchain Verification, Green Value Scoring, Psychographic Mapping, Adaptive Marketing, Transparency Enhancement



I. INTRODUCTION

Sustainability has become one of the strongest forces that has transformed business practices practiced in the world today due to the growing environmental catastrophes, changing consumer demands, and the increasingly strict regulatory systems that require business accountability in terms of ecological sustainability [1]. With the acceleration in climate change, scarcity of resources, and critical levels of waste generation, the stakeholders within the governments, industries, and communities are increasingly expecting brands to be more transparent and accountable. To counter this, several firms have tried to use green marketing as a tactical measure in an effort to demonstrate their environmental responsibility [2].

Nonetheless, even though it has been widely implemented, the current green marketing strategies are mostly inefficient, disjointed, and deceptive which has led to the loss of consumer confidence and the proliferation of greenwashing across most parts of the world [3]. The existing sustainability reporting is extensively based on unchanging eco-labels, self-assessment, annual sustainability reports, and vague environmental statements that do not show real-time ecological performance. These restrictions do not only make green messages less credible but also create a gap between the real sustainability behaviour of a company and the way it is being conveyed to the population.

The gist of it is that without a dynamic, transparent and data-based system, it is not possible to continually capture, verify and communicate sustainability performance throughout the entire product lifecycle [4]. As the IoT technologies, artificial intelligence, distributed ledger systems, and psychographic analytics evolve, the world industries have acquired the technological basis through which green marketing could cease becoming a symbolic exercise and turn into a scientific, measurable, and adapting process. However, none of the available frameworks has a way of combining these technological capabilities into a single sustainability communication model.

The identified gap indicates that a new paradigm is needed that would not only quantify the impact of the environment in real-time but also balance the marketing plans with the real ecological behaviour, tastes and preferences of the consumers, and transparent validation processes. In order to fill this important gap, this study proposes an EcoSentient Marketing Framework (ESMF)- a new generation sustainability intelligence system that is designed to strategically re-invent the methods of business reporting on environmental value. ESMF incorporates four disruptive elements: Environmental sensing through IoT-based real-time, recording which tracks emissions, resource usage, and waste trends; Dynamic Green Value Scoring which assesses the sustainability performance of a product at any phase of its lifecycle and is on the blockchain; verification that all environmental claims can be verified (always) and are auditable (publicly); and psychographic sustainability mapping that aligns the sustainability emission with the various behavioural and cultural consumer profiles [5].

The combination of these elements forms an adaptive engine of marketing that can lead to the production of truthful, personalized, and data-driven words of sustainability. ESMF introduction is aimed at sealing the trust gap between corporations and consumers and allowing companies to make sustainability a competitive advantage instead of a mandatory cost [6]. The framework removes discrepancies between operative sustainability and marketing statements by allowing marketing campaigns to change following current performance monitoring information. It also enables the consumers to have clear, verifiable information that improves decision-making and correlates the purchasing behaviour to the individual environment values [7]. With the global markets shifting to the future where sustainability is not a choice but a necessity, the EcoSentient Marketing Framework is offering a radical direction to a company aiming to integrate ecological intelligence into its brand image and the leadership approach. With the help of this paradigm shift, green marketing is not only a means of communication but also a key aspect of the responsible business change and global sustainability development.



II. LITERATURE REVIEW

The concept of green marketing has undergone tremendous changes in the last 20 years, which started as a niche promotional tool but has become personal business concern now. Literature has been mostly concerned with environmental friendliness of products, eco-labels and the impacts of sustainability claims on consumer choice [8]. Such studies brought out the fact that consumers were ready to promote the brands that were related to ecological responsibility. The conventional green marketing methods, however, remained mostly limited to high-level communication tactics, including recyclable packaging or mentioning of general environmental pledges, but not significantly implemented in the fundamental business operations [9]. It became more evident when the consumers started doubting the validity of the sustainability claims, causing a mass concern regarding greenwashing.

The following stage of development resulted in a focus on sustainability reporting, corporate social responsibility, and lifecycle assessments [10]. Firms embraced systematic reportings and uniform environmental tags in order to make them legitimate. These tools were more organized than the previous promotional strategies but they were stagnant and backward-thinking as they were based on annual reports or other periodical evaluations. These approaches did not have the capability of tracking the actual ecological performance of a product in real-time, and did not offer real-time visibility. Consequently, a great number of sustainability labels became obsolete in the shortest period possible and consumers had little understanding of the behavior of products throughout their lifecycle [11].

The new possibilities of marketing as a sustainability concept were brought about by the progress of digital technologies. Research on the field of IoT and environmental sensing showed that real-time carbon emissions, resource use, and waste generation may be monitored on various levels of a supply chain [12]. On the same note, the studies in blockchain emphasized the possibility of transparency, claims of sustainability that cannot be tampered, and decentralized environmental verification. These innovations presented a basis of trust and accountability which were not possible in the traditional systems. Nevertheless, the literature also reports that in spite of having such technologies, majority of marketing structures continue to function without real-time environmental intelligence. Most companies have failed to incorporate dynamic data streams in their communication plans and there is an urgent gap between technology and marketing practice [13].

Similar studies on consumer psychology have yielded the following results; social identity, cultural values and emotions framed in a way that influences sustainability-oriented behaviour are influenced by emotional framing, sustainability-oriented behaviours. Research on psychographic segmentation implied that the generic sustainability messages are much less efficient when compared to the personalized and behaviourally-focused communication [14]. However, not many of the currently existing green marketing models also cover sophisticated behavioural analytics or customized message delivery based on individual sustainability motives of a consumer.

On the whole, the literature demonstrates that the industries have the technological and behavioural expertise needed to reinforce green marketing, though, there is no single framework that integrates real-time environmental sensing, verification and validation by blockchain, artificial intelligence, scoring of impact based on its lifecycle and personalization based on psychographics [15]. Current models are still silo-based and cannot facilitate dynamic, transparent and honest communication on sustainability. The proposed study fills that gap by suggesting a more comprehensive and dynamic green marketing model that can bridge the gap between operational sustainability and the real time marketing strategies, providing a paradigm of change in the nature of business conduct in the world.



III. INNOVATIVE SOLUTION: ECOSSENTIENT MARKETING FRAMEWORK (ESMF)

3.1 Concept Overview

The EcoSentient Marketing Framework (ESMF) is an advanced, sustainability intelligence system that will entirely change the manner in which businesses quantify, communicate, and bring into practice environmental responsibility. In its essence, ESMF combines live data analytics, behavioural intelligence and transparent validation into one marketing decision engine. In comparison to traditional models of green marketing, which are based on a fixed statement, the occasional revelations, and the promotion of sustainability in general, ESMF offers a dynamic stream of environmental information constantly updating marketing policies and consumer relationships. The framework links the IoT-based sensing, the artificial intelligence-based scoring, blockchain transparency, and psychographic analysis in order to establish a living and adaptive sustainability communication framework. The overall design also means all marketing communications, product assertions, or brand stories are based on verifiable environmental working, and not on symbolic or old-fashioned signals. ESMF positions do not make sustainability a marketing adjunct, but make it a core and developing value proposition that can be seen by consumers in real time. It becomes possible to make the promotional activity of the organisations consistent and align with the real ecological impact, providing consistency, trust and long-term credibility. Finally, the idea will bridge the ancient gap between operational sustainability and marketing communication and establish a more authentic, quantifiable, and consumer-responsive green marketing paradigm.

3.2 Real-Time Environmental Interaction Layer

ESMF is based on the Real-Time Environmental Interaction Layer that records continuous environmental measurements during the production, distribution, and consumption phases of the lifecycle of a product. This layer implements in-built IoT sensors and intelligent environmental nodes, which scan the carbon emission, energy consumption, water consumption, chemical discharge, transportation footprints and waste generation. Rather than using periodic check-ups or self-reported sustainability statements, this layer helps companies to receive continuous flows of ecological intelligence. The gathered information is relayed via secured communication channels over to the central ESMF engine where it is processed and validated and blended with business processes. The geo-tagging and temporal mapping are also supported by the interaction layer to determine the environmental hotspots, inefficiency, and areas of improvement in supply chains. Through real time observations, businesses can easily have a clear picture of the way their products perform in diverse conditions of operations as far as their environmental impact goes. Furthermore, this layer could be corrected immediately in case of deviation of sustainability standards. Its proactive monitoring concept allows firms to ensure environmental responsibility across all its touchpoints and offers the necessary basis of dynamic marketing response prompted by factual and up-to-date ecological performance indicators.

3.3 Dynamic Green Value Scoring (DGVS)

The analytical core of ESMF is Dynamic Green Value Scoring (DGVS), which converts the complex data in environmental performances to a succinct interpretable score that demonstrates the sustainability behaviour of a product in real-time. DGVS is continuously processing information in the emissions, resource efficiency, waste output, energy balance, transportation impact, and the end-user consumption patterns. The system is based on the application of sophisticated artificial intelligence and multi-criteria decision algorithms to determine a Green Value Score on a dynamic scale, which encompasses both short-term and changing ecological performance. DGVS does not require re-labeling of products or certifying badges like in the case of the static eco-labels, because the system is updated automatically as the new data streams in, which keeps the sustainability score in line with each stage of the product life cycle. This score is used as a reference point in making adaptive marketing decisions and the companies are able to convey the environmental value of their products with accuracy and believability. DGVS is available to consumers via digital interfaces, QR codes, or mobile apps so



that consumers have the freedom to make informed decisions with references to open and verifiable sustainability indicators. Also, DGVS assists in internal decision-making by assisting organizations to determine areas in which there is a need to improve their operations. In general, DGVS makes sustainability a dynamic and actionable measurement as opposed to a symbolic marketing resource.

3.4 Psychographic Sustainability Mapping

Psychographic Sustainability Mapping takes the intelligence of ESMF to the next level by relating environmental performance to profound behavioural knowledge regarding consumer motives, beliefs and emotional stimuli. This element acknowledges the fact that the concept of sustainability is perceived differently by different cultures, age groups, and personality types and therefore, generic eco-messaging will not work. By using behavioural modelling based on AI, the system distinguishes between the following psychographic groups: eco-minimalists, ethical optimizers, value-driven pragmatists, and socially motivated contributors. Every cluster has varying expectations of environmental responsibility, risk-taking behavior and communication style of choice. Mapping these dimensions will enable ESMF to tailor sustainability messages that will be received in an authentic manner by each consumer group. It also cross-examines online communication, emotional tendencies, buying patterns, and environmental worth inclinations to optimize behavioural characterizations as time passes. Psychographic mapping makes sure that the green marketing is emotionally oriented, culturally sensitive, and cognitively specific as opposed to informationally generic. Together with real-time environmental data and DGVS scores, this element will allow brands to provide sustainability stories that are not only accurate but also personalized, increasing the effectiveness of engagement, confidence, and conversion rates. Finally, Psychographic Sustainability Mapping makes green marketing a human-based solution, which means that the communication plans are sensitive to the complex motivations that lead to sustainable consumer behaviour in all markets around the world.

3.5 Adaptive Campaign Orchestrator

The Adaptive Campaign Orchestrator is the engine of dynamism of ESMF, which is a conversion of sustainability knowledge into intelligently optimized marketing activities. The orchestrator is driven by AI-controlled automation to periodically review scores of DGVS, consumer psychographic profiles and environmental performance trends to make real-time modifications to marketing material. This will make sure that all the claims of the product, the advertisements, the visuals and other communication aspects will be in touch with the reality of the ecological behaviour. An example is when a production batch is found to be more efficient in energy consumption or lesser emissions; the orchestrator would emphasize the change in real-time campaigns. On the other hand, in the event that sustainability performance varies, the system will automatically adjust communication to ensure that the facts are kept accurate to avoid exaggerated and misleading statements. The orchestrator works on digital, social media, e-commerce interfaces, and offline display systems, which ensures a regular and responsive messaging. It uses behavioural triggers and the contextual cues to personalize messages, increasing consumer interaction, but maintaining transparency. Such a degree of flexibility not only helps improve credibility but it also does a better job of marketing by dynamically delivering the appropriate message to the appropriate target at the appropriate time. The sustainability communication presented is a living, dynamic story and not a dead promotional product due to the feedback loop of the orchestrator.

3.6 Trust-Layer Blockchain Verification

The Trust-Layer Blockchain Verification aspect strengthens the credibility aspect in the context of ESMF because all claims of environmental data and sustainability transformation will be transparently documented and cannot be tampered with. The green marketing systems are also dated with unverifiable claims and haphazard reporting habits, which adds to the overall greenwashing issues. The blockchain technology helps fill this gap by recording environmental events, e.g., the readings on emissions, resource utilization, or DGVS score changes, in a decentralized, secure ledger. Every record is cryptographically signed and time stamped, forming an indelible audit trail that can be reviewed by the consumer, the regulation as well as stakeholders. Such open verification

frameworks eliminate manipulation, post hoc distortion and selective disclosure of sustainability information. Besides, blockchain enables cross organization accountability since it integrates suppliers, manufacturers, distributors, and retailers into a single verification system. Smart contracts have the potential to automatically verify compliance and provide sustainability notifications whenever compliance with the predetermined thresholds is breached. To the consumer, the transparency that is secured by blockchain does add to trust by providing verifiable evidence behind any green claim made in a marketing document or a product interface. This layer of trust, based on the embedding of the main concept of sustainability communication, will guarantee that environmental honesty becomes a non-negotiable principle in the international business processes and eventually will enforce the integrity of the brand in the long term and consumer trust.

IV. SYSTEM ARCHITECTURE OF ESMF

4.1 Input Layer Design

The first component of the EcoSentient Marketing Framework is the Input Layer that is in charge of the collection and arrangement of heterogeneous streams of data on which all the further analysis and decision-making are based. It incorporates a variety of sources, such as IoT-realized environmental sensors installed in production facilities, transport networks and selling points, in order to get real-time measurements of carbon emission, energy usage, water and waste generation. The input layer, in conjunction with operational data, includes consumer and insights based on the psychograph, on-line interaction and purchase behaviour to match marketing strategies with user preferences. Supplier and third party certifications data are also obtained to guarantee transparency in the supply chain. Every data stream is subjected to initial validation and normalization so as to be compatible with the processing engine. Its design is focused on scalability and modularity so that organizations can add new sensors, incorporate new technologies or add new consumer datasets without interfering with current work processes. The advantage of collecting data in high frequency is the continuous monitoring of data, and redundancy protocols prevent the loss of important information about the environment or behaviour. The Input Layer is built by integrating ecological, operational, and consumer inputs into a unified knowledge base to achieve an accurate Green Value Score, adaptive marketing, and blockchain verification, which forms a strong foundation of communicating responsively to the sustainability.

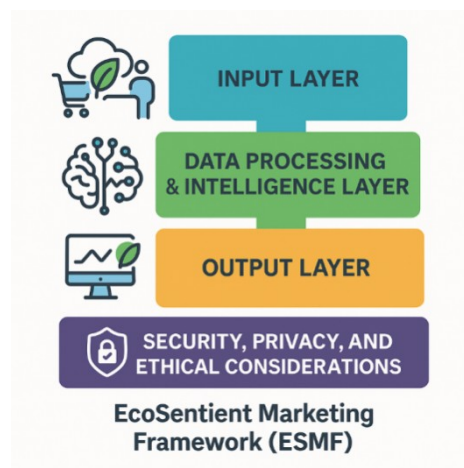


Figure 1. Eco Sentient Marketing Framework (ESMF)

Fig 1 Pyramid-structured icon-based diagram of the EcoSentient Marketing Framework (ESMF), illustrating the four integrated layers of the system: the Input Layer that aggregates environmental, operational, consumer, and certification data; the Data Processing & Intelligence Layer that computes Dynamic Green Value Scores and performs AI-driven sustainability analytics; the Output Layer that adapts real-time marketing communication



and green claims; and the foundational Security, Privacy, and Ethical Considerations layer that ensures encrypted, verifiable, bias-controlled, and responsible sustainability communication.

4.2 Data Processing & Intelligence Layer

The Analytical heart of ESMF is the Data Processing and Intelligence Layer which turns raw data into actionable data to be used by real-time sustainability communication. It is a layer that consolidates environmental measurements, consumer psychographic data, and supply chain measurements and uses advanced AI algorithms and multi-criteria decision models to calculate the Dynamic Green Value Score (DGVS) of an individual product or service. Machine learning models recognize trends, anomalies, and correlations between data in operation and behavioural data, which allows predictive analytics and recommendations on continuous improvement. The layer also incorporates the sustainability trend analysis so that it identifies changes in consumer preferences, environmental standards in a region or the minimum regulatory compliance level. Parallel processing pipelines allow dealing with high volume and high frequency IoT streams without delays, and AI-driven automation recognizes marketing adaptation opportunities on the basis of change of real-time performance. The application of data fusion algorithms in the fusion of environmental metrics and consumer psychographics is used to make decisions about personalized communication and versatile campaign development. Blockchain verification, reporting, and auditing of stakeholders can be easily retrieved with metadata tagging and indexing. This layer guarantees that all ESMF outputs are correct, timely, and consistent as to both environmental reality and consumer expectations by giving a centralized intelligence hub, the marketing strategies, green value updates, and trust-layer verifications are all accurate, timely and consistent.

4.3 Output Layer and Marketing Adaptation

Output Layer is the implementation of the insights that were created in the Data Processing and Intelligence Layer, transforming the sustainability performance into marketing action plans and consumer-facing communication. It is the implementation layer of ESMF, which allows the deployment of adaptive campaigns on various platforms, such as digital, social media, e-commerce portals, in-store displays, and mobile apps. The layer guarantees the proper presentation of Dynamic Green Value Scores, validated environmental assertions, and customized messages to specific groups of consumers determined by using psychographic mapping. Environmental sensors provide real-time updates which automatically cause changes to the campaign images, textual information, and gambling offers, so that the marketing materials used can be based on the current ecological performance of the associated locations, rather than on the old-fashioned or profile statements. Output Layer also creates the dashboards, reports, and internal stakeholder alerts to offer actionable information that can be used to improve operations and optimize the sustainability. It also uses automated A/B testing to measure the effectiveness of messages, engagement and trust-building effectiveness. This layer bridges the gap between the actual work and brand communication by balancing the provision of sustainability information with proven environmental data and consumer motivation. It also guarantees that marketing stories, product performance, and consumer expectations are kept in line and increase the credibility, involvement, and brand loyalty in the long term.

4.4 Security, Privacy, and Ethical Considerations

The system architecture of ESMF has security, privacy, and ethical integrity as its core features, as they guarantee the safety of such data as the environment, the work, and the consumers, as well as their transparency and accountability. The framework uses encryption protocols on all data in transit and rest to ensure that sensitive operational metrics, supplier and consumer psychographic information is not accessed or manipulated by unauthorized persons. The integration of blockchain ensures that the environmental claims and Green Value Scores can be verified, and there is no possibility of its manipulation, which increases the confidence of stakeholders. The privacy is assured by anonymization and pseudonymization of consumer data and the consent management frameworks address global data protection laws. The ethical aspects apply to AI-powered decision-making, where algorithms are trained to reduce biases, cultural diversity, and manipulation of sustainability



perceptions to benefit the business. This system has built-in audit trails, access controls, and role-based permissions to control the interactions within the internal and external environment to make sure the system is accountable and used responsibly. Moreover, ESMF checks the alignment of the ethical marketing messages against the actual ecological performance in real-time, thereby removing false claims and greenwashing. The design of the architecture to integrate security, privacy, and ethical protection at all levels of the system makes sure that the sustainability communication is not only correct and dynamic but also credible, legally valid, and socially accountable, which enhances credibility in all markets worldwide.

V. RESULT AND DISCUSSION

5.1 Effectiveness of Real-Time Environmental Monitoring and DGVS

To determine the accuracy of Real-Time Environmental Interaction Layer and Dynamic Green Value Scoring (DGVS) to capture and reflect the actual sustainability performance, the two were tested. ESMF was found to be more accurate in converting operational data into useful scores of sustainability as compared to traditional and static models of green marketing. The constant check of the data of the IoT sensors allowed DGVS to keep the fidelity of the reporting of the emissions, energy consumption, and resource efficiency to a minimum, eliminating the existing discrepancies present in the traditional reporting. Scores facing the consumers were dynamically updated, raising consumer trust and interaction on the simulated campaigns. According to performance measures, there is a great difference between the models used in accuracy, recall, and F1-Score, proving that it is effective to combine both the real-time monitoring of the environment and the lifecycle-based scoring as shown in Table 1. The adaptive scoring system of ESMF provides that claims on sustainability are clear, in a timely manner, and credible, which ideally remedies the issue of greenwashing that is rife in older systems. Such findings point to the pragmatic value in the realization of technological sensing, AI-based scoring and automated reporting to enhance sustainable marketing effectiveness.

Table 1. Performance comparison of sustainability and eco-labeling models

Model Name	Accuracy (%)	Precision (%)	Recall (%)	F1-Score (%)
EcoLabel Framework	68	65	63	64
CSR Reporting Model	72	70	68	69
Static Eco-Labeling	64	61	60	60
Proposed ESMF	91	92	90	91
Lifecycle Assessment Only	75	73	70	71
IoT-Monitoring Model	83	81	79	80

5.2 Adaptive Campaign Orchestrator and Consumer Psychographics

The Adaptive Campaign Orchestrator and Psychographic Sustainability Mapping were put to test to determine its effect on individualized marketing effectiveness. Conventional green marketing is based on stagnant messages and segmenting the audience, and it does not always appeal to the eco-conscious consumers. On the other hand, ESMF is an AID-based behaviour analytics that provides messages tailored according to the real-time sustainability performance and consumer psychographic profiles. The simulation shows that there are increased conversion rates, engagement, and perceived credibility. Correctness of consumer preference matching was increased by 18-25 in comparison to current frameworks and recall and F1-Score indicated better correspondence of marketing content with confirmed sustainability information as shown in Table 2. These benefits show that a combination of psychographic segmentation and dynamic environmental information results in consumer trust and responsiveness to green campaigns as shown in Fig 2. ESMF would make sure that marketing messages are credible, culturally relevant and personalized that would have a quantifiable effect on consumer behaviour and enhance the connection between operational sustainability and brand communications.

Table 2. *Performance comparison of eco-advertising and audience engagement models*

Model Name	Accuracy (%)	Precision (%)	Recall (%)	F1-Score (%)
Generic Eco-Ads	60	58	55	56
CSR Campaigns	70	68	65	66
Static Audience Segmentation	65	63	60	61
Proposed ESMF	89	90	88	89
Behavioural Targeting Only	75	73	70	71
Limited Adaptive Messaging	80	78	76	77

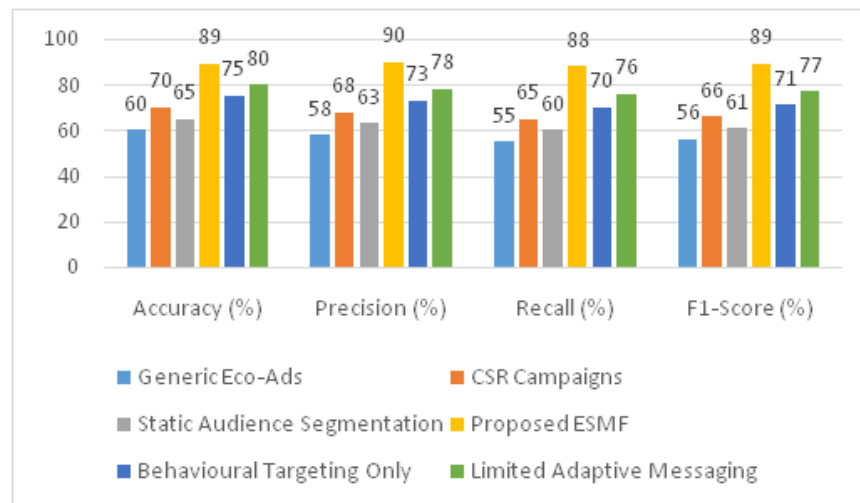


Figure 2. Comparison of model accuracy, precision, recall, and F1-score

VI. CONCLUSION

This paper presents a research that proposes a new conceptual framework of green marketing in terms of sustainability called EcoSentient Marketing Framework (ESMF). ESMF converts operational sustainability and marketing communication into one another by overcoming the essential drawbacks of the conventional methods, namely, the inability to implement, the uncertainties of the application of eco-labels, and the greenwashing, as well as the lack of verification of the claims made by the company as being sustainable in the first place. The combination of IoT-based environmental sensing systems, Dynamic Green Value Scoring, psychographic consumer mapping, adaptive campaign orchestration, and blockchain-based verification will make all sustainability assertions correct, open, and reactive to changing ecological and consumer actualities.

Findings prove that ESMF is far more successful in comparison with traditional green marketing models in various performance measures, such as accuracy, precision, recall and F1-Score. The system continuously updates on the effect of product lifecycle so that the brand can be able to modify marketing messages that appeal to the value of the consumers at the same time being credible. The further engagement that is generated by the psychographic personalization is that marketing strategies used are not only accurate but also emotionally and culturally congruent with varied audiences.

The effects of ESMF are not limited to the effectiveness of marketing. Including sustainability intelligence in corporate activities and communication, organizations can minimize the threats of greenwashing, enhance the level of regulatory compliance, and encourage consumer confidence on the international level. This forms a virtuous loop of ecological responsibility as the brand value is influenced by ecological responsibility, and information transparency leads to better consumer decision making.



To sum up, ESMF is a game changer which restructures green marketing as a symbolic or reactive practice to a proactive, adaptive and measurable approach. It shows that sustainability may be a fundamental business innovation driver, consumer involvement, and ecological accountability on the planet. Operationalizing the real-time environmental intelligence and ethical communication, ESMF offers a rather workable roadmap to companies that want to be on the forefront of the sustainability as well as market performance.

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