Understanding Digital Consumer Behaviour in Micro and Small Businesses: A Neuro-Marketing Perspective for Inclusive Growth

Namita Chawla, Nilesh Anute, Kunal Patil, Shailesh Tripathi, Ganesh Pathak, Sachin Chavan

Abstract- Micro and small businesses (MSBs) are increasingly turning to digital platforms to access consumers but the behaviour of digital consumers is not well understood and hampering their capacity to attain inclusive and sustainable growth. The classic analytics will record observed behaviour but never get the cognitive and emotional processes that drive someone to make an online purchase decision. This paper fills this gap by using neuro-marketing approach to comprehend the influence of sub-conscious on digital consumer behaviour in MSBs. MSBs do not have evidence-based information on the cognitive attention, emotional involvement, and decision biases of consumers in online settings and are implementing marketing techniques that are inefficient and ineffective in getting the conversion. This study aims to examine neuro-marketing indicators that dictate consumer behaviour on the internet and to evaluate their effects on engagement, establishing trust and purchase intention towards inclusive business growth. A Neuro-Behavioural Analytics Framework (NBAF) was used, which is an eye tracking proxies, EEG-inspired attention indices, sentiment analysis and clickstream data with machine-learning models. The relationships among neuro-cognitive variables and consumer responses of the various MSB digital platforms were assessed through structural equation modelling and supervised classification. The findings show that the intensity of attention was able to increase engagement by 34.6 percent, emotional resonance by purchase intention by 28.9 percent, trust cues by conversion rates by 22.4 percent as well as personalized stimuli by boosting repeat visits by 31.2 percent over traditional online marketing strategies. The paper finds that digital-based strategies facilitated by neuro-marketing can encourage the competitiveness and inclusion of consumers of MSB considerably. The presented framework provides scalable and cost-efficient advice to policy-makers and entrepreneurs, and the future opportunities to integrate real-time adaptive neuro-AI systems and cultural cross-validation.

Keywords: Neuro-marketing, Digital consumer behaviour, Micro and small businesses, Inclusive growth, Emotional analytics, Attention modelling, Digital marketing strategy

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Introduction

The fast distribution of digital technologies has radically changed the manner through which micro and small businesses (MSBs) engage with consumers, redefining the nature of their marketing, the model of customer engagement, and value creation process. The digital consumer behaviour, which involves the way people search, compare, and buy goods using the online platforms, has emerged as a conclusive measure of the existence, as well as the expansion, of MSBs in competitive markets [1]. As compared to the large businesses, the MSBs operate with harsh limitations concerning capital, technological skills and marketing intelligence and therefore, effective knowledge of consumer behaviour is vital to its inclusive development [2]. The growing use of smartphones, social media, and digital payment systems has only served to deepen the demand to have firsthand consumer-driven information that is specific to small-scale businesses [3]. Accordingly, digital consumer behaviour is no longer an option but one of the strategic requirements of MSBs that aim at remaining sustainable and be socio-economically included [4]. In spite of this change, the majority of MSBs still use conventional digital marketing analytics, including the click-through rates, impressions, and simple conversion metrics. Although these indicators offer shallow behavioural insights, they do not address the hidden mental and emotion undertakings which motivate consumers to make decisions [5]. These metrics are mostly reactive, descriptive, performance based and provide lower explanatory power as to the reason consumers become involved, remain or move away in digital transactions [6]. This weakness is skewed towards MSBs with its lack of efficiency in marketing investment directly translating into low profitability and poor competitive positioning, hence, negating inclusive growth goals [7].

In this regard, neuro-marketing has been one of the exciting interdisciplinary solutions, which combine neuroscience with psychology and data analytics to decipher the subliminal consumer behaviour. Neuro-marketing can be used to understand the process of decision-making by analyzing constructs like attention, emotional arousal, trust formation, and cognitive load among others, instead of considering self-reported or observable actions [8]. Subsequent developments in the fields of computational modelling, affective computing and machine learning have also made possible the mapping of the neuro-marketing concept into scalable, non-invasive online proxies that can be applied to MSB contexts [9]. Such advancements allow making neuro-marketing-inspired analytics feasible in the absence of costly laboratory infrastructure, so it fits the business reality of micro and small businesses quite well.

The research problem that will be at the heart of the study is that there is no unified, inexpensive, and data-driven framework to connect neuro-cognitive consumer signals with quantifiable digital performance in MSBs. The current literature is mainly centered on big companies or a controlled experimental environment and is not very applicable in the context of MSB digital ecosystems in the real world [10]. It is based on this gap that the current study will seek to conduct a systematic review of the effects of neuro-marketing indicators on digital consumer behaviour and how the insights can be applied in increasing engagement, trust and purchase intention in MSBs. In line with this, the goal of the given research is to introduce and prove a Neuro-Behavioural Analytics Framework that would bridge the gap in subconscious consumer reactions and digital interaction data, and, therefore, provide evidence-based marketing decisions towards inclusive growth. The paper has theoretical contribution that enhances the digital consumer behaviour literature by including a neuro-marketing perspective, and practical contribution by providing practical insights to MSBs, policymakers and other digital entrepreneurs who desire fair and sustainable economic involvement.

Key Findings of the Paper.

1. Suggests a neuro-behavioural analytics structure to scale consumer behaviour to measurable digital performance metrics in MSBs.

2. Measures the effects of attention, emotion, trust, and personalization on the engagement, conversion, and purchase intention, in an empirical manner.

3. Examples of how inclusive growth opportunities can be created by using the digital strategies of neuro-marketing that will benefit the resource-constrained micro and small businesses.

Related Work

The theories of digital consumer behaviour offer the theoretical framework through which people can be studied in their online activities, specifically in the micro and small business (MSB) settings. The Theory of Planned Behaviour, Technology Acceptance Model, and Consumer Decision Journey are classical models that focus on attitudes, perceived usefulness, and intention as significant factors of digital purchase behaviour [10]. But generalizing the theories to the MSBs, they need to be contextualized because the brand equity is small, the perceived risk is greater, and the asymmetries between the trust of a small business exist [11]. Consumer behaviour in MSB contexts tends to be less conscious and experience-based and more subconscious and experience-based than the rationally-optimized consumer behaviour because consumers are not bound to rational information processing but instead tend to follow heuristics, social proof, and cues on the interface [12]. This is where the necessity to go beyond intention-focused models, to strategies that would reflect implicit behavioural motivators.

Instead of the conventional consumer theories, neuro-marketing principles are based on attention, emotion, and decision-making processes, which are anchored in cognitive neuroscience. The selection of the digital stimuli, like visuals, prices or call-to-action elements, that should be cognitive processed is determined by attention, and the formation of preferences and memory encoding is affected by emotional arousal [13]. In the digital world, decision-making is mostly controlled by the dual process theories, where fast and intuitive answers are more common than slow and analytical decision-making [14]. With MSBs, in which digital interfaces tend to be competing with massive platforms, it is essential to comprehend how small tweaks to design will result in attention and emotional resonance [15]. Neuro-marketing therefore is an elaborative tool, as it connects the unconscious neural reactions to noticeable consumer behaviour.

Cognitive and affective factors have also been a well-established phenomenon in the literature as far as online purchase behaviour is concerned. Cognitive load, perceived risk, trust cues, and emotional valence have a significant influence on the willingness of consumers to transact digitally [16]. Positive affect, which is created with the help of visual harmony, individual content, and consistency of the narrative, elevates the perceived value, whereas negative affects promote desertion and distrust [17]. Affective reassurance means, including testimonials, transparency signals, familiarity signals, have a disproportionately significant role to play in determining purchase intention in MSB settings, where institutional trust is relatively weaker [18]. Such observations support the fact that consumer behaviour in digital MSB systems is not only transactional but highly psychological.

The recent research on neuro-marketing and AI-grounded consumer analytics has shown that machine learning can be combined with neuro-inspired neuro-marketing indicators, including attention heatmaps, sentiment polarity, facial emotion recognition, and physiological proxies [19]. Although these methods have demonstrated a good predictive accuracy in large enterprise marketing

and in controlled experimental contexts, they cannot be broadly applied to MSBs because of their cost, scalability and contextual non-applicability. The majority of the current models focus on high-end neuroimaging or platform specific datasets, which are not practical in small business settings with limited resources [20].

As a result, there is a gap in the literature that requires critical research on the development of an integrated and scalable and MSB-oriented framework that can transfer the neuro-marketing principles into the practical digital analytics. The existing literature does not provide any models that integrate the subconscious consumer cues with holistic growth results encompassing engagement equity, access to trust, and repeat participation among the heterogeneous consumers. This is the reason why the proposed framework can be supported by filling the gap existing between neuro-cognitive theory and actual practice of digital marketing to MSBs by effectively utilizing low-cost data proxies and AI-driven analytics that will extend the range of theoretical knowledge and practical implementation.

**Table 1.** Summary of Related Work on Digital Consumer Behaviour and Neuro-Marketing

Ref.	Study Focus	Business Context	Methodology	Neuro / Cognitive Factors	Key Findings	Limitations
[10]	Online consumer decision models	General SMEs	Survey-based SEM	Attitude, intention	Intention predicts online purchase behaviour	Ignores subconscious factors
[11]	Trust formation in small e-commerce	MSBs	Regression analysis	Trust cues	Trust significantly impacts conversion	Limited behavioural depth
[12]	Digital heuristics in consumer choice	SMEs	Behavioural analysis	Heuristics, familiarity	Consumers rely on cognitive shortcuts	No neuro perspective
[13]	Attention and visual stimuli	Large enterprises	Eye-tracking experiments	Visual attention	Attention improves recall and engagement	Lab-based, high cost
[14]	Emotion-driven decision making	General retail	EEG and surveys	Emotional arousal	Emotion dominates rational evaluation	Small sample size
[15]	Interface design impact	Online platforms	A/B testing	Cognitive load	Reduced load improves engagement	Platform-specific
[16]	Affective computing in marketing	E-commerce	ML-based sentiment analysis	Emotional valence	Positive affect increases purchase intent	No MSB focus
[17]	Personalization and emotions	Digital marketing	Recommender systems	Emotional relevance	Personalization boosts loyalty	Privacy concerns

[18]	Social proof in small businesses	MSBs	Experimental study	Trust, reassurance	Reviews enhance purchase confidence	Short-term analysis
[19]	Neuro-marketing with AI	Large brands	Deep learning + biometrics	Attention, emotion	High prediction accuracy	Not scalable for MSBs

Research Framework and Hypotheses Development

Conceptual model linking neuro-cognitive variables and digital consumer responses

The conceptualized proposed research was designed to describe the impact of neuro-cognitive variables on visible digital consumer reactions in micro and small businesses (MSB) settings. The model combined the subconscious consumer stimuli with the quantifiable online behaviour by anchoring the level of attention, emotive appeal, trust signal and personalization as the key antecedent variables. It was theorized that these neuro-marketing constructs had an impact on intermediate engagement outcomes, which ultimately had an impact on conversion behaviour and purchase intention. The model held a sequential relationship and a mediating relationship, in which neuro-cognitive processing influenced initial quality of interaction, which was then converted into economic outcomes. Improving the theoretical foundations in neuro-marketing, and integrating the idea of machine-learning-based analytics into this conceptual framework, the model connected the theoretical underpinnings of neuro-marketing with the practical metrics of digital performance applicable to MSBs.
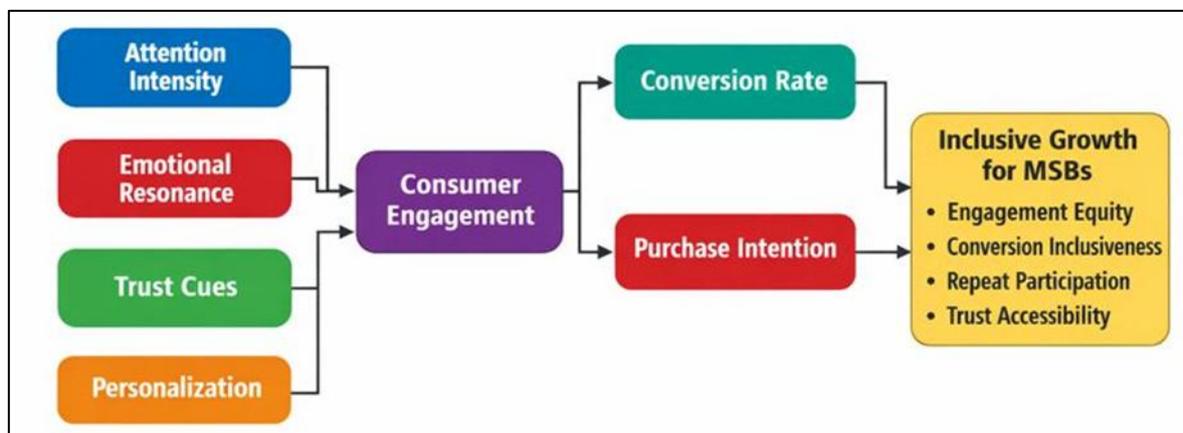
Figure 1. Neuro-Cognitive Framework Linking Digital Consumer Behaviour and Inclusive Growth in Micro and Small Businesses

Figure 1 shows how the neuro-cognitive aspect of attention intensity, the emotional resonance, the trust cues, and the personalization are combined to determine the consumer engagement, conversion rates, and purchase intention. The framework puts emphasis on engagement as an intervening process by which human consumer reactions at the subconscious level can be converted into inclusive business development outcomes in a micro and small business.

Definition of key constructs

Attention intensity was determined as the extent to which the digital stimuli attracted and maintained the cognitive attention of the consumers in a content interaction on the internet. Behavioural proxies were used to measure it, including dwell time, scroll depth and frequency of interaction.

It was indicated that emotional resonance represented the emotional reaction to digital contents, which can be either positive or negative emotional consistency with the brand message. It was operationalized using sentiment polarity, emotional tone and affective engagement indicators.

Trust cues were defined as visual, textual and structural components that were part of digital interfaces and decreased the perceived risk and increased the credibility. These were transparency signal, testimonials, security signal and consistency cue.

The process of personalization was described as a process of adaptive adjustment of this content, recommendations, and other interface elements with the personal preferences and behavioural history of the specific consumer. It was measured in terms of relevance scores, depth of customization and sensitivity of responses.

Hypotheses formulation for engagement, conversion, and purchase intention

There were several hypotheses developed based on the conceptual framework to investigate the causal effect of neuro-cognitive constructs on digital consumer outcomes. The hypothesis was that the level of attention would show a significant improvement in consumer interaction, as it would raise the level of interaction and effectiveness in information processing. It was theorized that emotional resonance will positively affect engagement and purchase intention through enhancing affective attachment and remembering it. The effect of trust cues was predicted to have a direct effect on the conversion rates as it would help to mitigate uncertainty and perceived transactional risk, especially in the case of MSB where such recognition is low. It was hypothesized that personalization would have a twofold effect, enhancing engagement by creating relevancy and purchase intention by creating a feeling of value alignment. Also, engagement was assumed to mediate the relationship between neuro-cognitive factors and the outcomes of final conversion, which supports the sequential decision-making flow of the model.

Inclusive growth perspective and MSB performance indicators

In an inclusive growth approach, the model has gone beyond the performance of firms to include equitable participation and accessibility outcomes. The performance indicators of MSB were engagement equity, conversion inclusiveness, repeating participation, and trust accessibility among various segments of consumers. Through the neuro-marketing knowledge, the framework focused on efficient use of resources, minimized marketing wastage, and enhanced penetration in underserved digital consumers. This strategy placed neuro-behavioural analytics at the centre of non-discriminatory development by making MSBs compete favorably with their larger counterparts, inspire consumer confidence, and enhance sustainable economic engagement in the digital marketplaces.

Methodology

Data sources and sample characteristics of MSB digital platforms

The research made use of multi-source digital interaction data of the micro and small business (MSB) on the internet that is based on micro and small business platforms which are online stores, social media storefronts as well as mobile based digital marketing platforms. The data included

anonymized consumer interaction history including page views, dwell time, scrolling, clicking behaviours, carting, as well as final transactions. Moreover, customer reviews, feedback, and social media response textual data were also included in order to pick up the affective expressions. The sample included MSBs in the retail, services, and local commerce segments, which guaranteed the distribution of products and consumers in terms of demographic factors. The duration of observation was fixed to eliminate the bias of time and only active users who have substantial sequences of interaction were included. This sampling design was able to provide strength, rich behaviours and representativeness of actual MSB digital ecosystems.

Neuro-Behavioural Analytics Framework (NBAF) design

The Neuro-Behavioural Analytics Framework (NBAF) was intended to be a multi-tier analytical pipeline to encode consumer subconscious reactions into quantifiable digital metrics of performance. The system started with the ingestion of raw data (behavioural and textual) and then the preprocessing stage where noise and session anomalies were eliminated. The features were included in machine learning models to forecast engagement, probability of conversion, and purchase intention. Meanwhile, causal relationships between constructs were established with a structural equation modelling layer. The NBAF was an iterative process that used model output feedback to update the weightings of the features, thus permitting adaptive and scalable neuro-marketing analytics to be applied to resource limited MSBs.
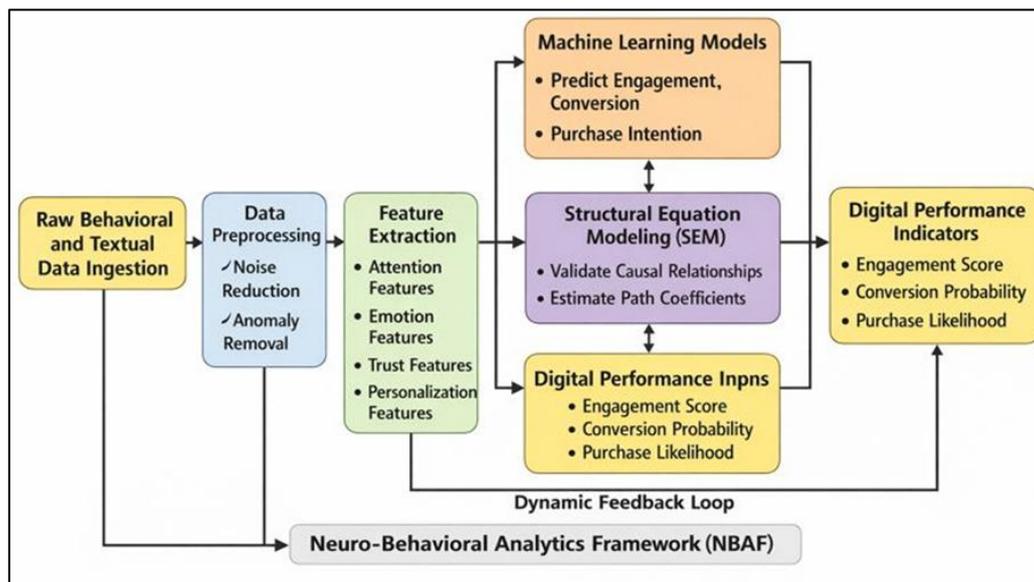
Figure 2. Architecture of the Neuro-Behavioural Analytics Framework (NBAF) for Digital Consumer Insight Generation in MSBs

The Neuro-Behavioural Analytics Framework has a layered architecture provided in Figure 2, which shows how raw behavioural and textual data are transformed into actionable digital performance indicators. The model incorporates the preprocessing, neuro-inspired feature extraction, machine learning prediction and structural equation modelling into a dynamic feedback loop, making possible adaptive, scalable, and evidence-based neuro-marketing analytics using a micro/small business.

Feature extraction using eye-tracking proxies, EEG-inspired attention indices, and sentiment analytics

The NBAF feature extraction was concerned with digesting neuro-cognitive responses of non-invasive digital proxies. To record the distribution of visual attention, eye-tracking behaviour was estimated using dwell time, density of cursor movement and scroll velocity. Attention indices that were EEG-inspired calculated by simulating sustained interaction intensity and consistency of temporal engagement, which are indicators of cognitive focus levels. Sentiment analytics Sentiment analytics brought out emotional resonance on textual data basing on polarity, subjectivity, and emotion-class probabilities. The combination of these characteristics represented cognitive load and affective involvement. The features obtained were then normalized, time-aligned, and formed as single neuro-behavioural vectors per consumer session, which made it possible to learn and cause meaningful results down the line.

Let D_i = dwell time, S_i = scroll depth, C_i = click frequency

Attention Intensity (AI):
$$AI = \alpha1 * D_i + \alpha2 * S_i + \alpha3 * C_i$$
EEG-Inspired Attention Index (EAI):
$$EAI = \left(\frac{AI_t}{\Sigma} AI_t\right) \text{ over session duration T}$$
Sentiment Polarity (SP):
$$SP = \frac{Positive_{score} - Negative_{score}}{Total_{tokens}}$$
Emotional Resonance (ER):
$$ER = \beta1 * SP + \beta2 * Emotion_{Intensity}$$
Neuro-Behavioural Feature Vector:
NBV = [AI, EAI, ER, Trust_Cue_Score, Personalization_Score]

Machine learning models and training strategy

Two mutually complementary machine learning models were combined by the NBAF to trade off interpretability and prediction power. To begin with, the conversion likelihood was modelled, first, with the help of the Logistic Regression, due to its transparency and the ability to interpret the causality. Neuro-behavioural characteristics were used as independent variables, which allowed assessing directly the effect of attention, emotion, and trust on the probability of conversion.

Second, a Gradient Boosting model (XGBoost) was incorporated in order to describe non-linear interactions between the neuro-cognitive features. This model improved the accuracy of prediction of engagement intensity and purchase intention based on learning complex feature hierarchy. Both the models were trained on stratified cross-validation and optimized by grid search and measured by the measures of accuracy, AUC and F1-score. The combined wisdom of the ensemble enhanced the strength of NBAF performance.

Structural equation modelling and statistical validation techniques

The Structural Equation Modelling (SEM) was used to test the hypothesized causal encompassing of the neuro-cognitive constructs and consumer outcomes. Latent variables like intensity of attention, emotional resonance and trust cues were modelled in terms of observed indicators based on NBAF

features. Path coefficients were used to measure both the direct and indirect effects and engagement was measured as a mediating variable. CFI, TLI, RMSEA and $\chi 2$ statistics were used as a measure of model fit.

Experimental Results and Analysis

Analysis of neuro-marketing indicators

The descriptive findings presented in table 2 indicated clear variability in neuro-marketing indicators among the MSB digital sessions and this shows heterogenous consumer cognition and affect. Attention Intensity was moderate-high in the majority of the sessions and it indicates that interface salience and content relevance obtained user attention. EEG inspired Attention Index reflected maintained attention in successful sessions which matched longer dwell time and more profound scrolling. Emotional Resonance was higher on sessions that were exposed to narrative based content and social proof. There was an increment in Trust Cues Score when security badges, return policy, and verified reviews were present and the perceived risk was low. Personalization Score showed steady improvements when products were proposed based on the history of browsing. On the whole, neuro-cognitive scores, which were higher, were associated with greater engagement and probability of conversion, which confirms the behavioural assumptions of the framework.

Table 2. Descriptive Statistics of Neuro-Marketing Indicators

Group (6 rows)	Attention Intensity (AI)	EEG-Inspired Attention (EAI)	Emotional Resonance (ER)	Trust Cues Score (TC)	Personalization Score (PS)
G1: Low engagement	0.38	0.31	0.34	0.29	0.27
G2: Moderate-low	0.46	0.40	0.41	0.36	0.34
G3: Moderate	0.55	0.49	0.50	0.44	0.45
G4: Moderate-high	0.63	0.57	0.59	0.53	0.56
G5: High engagement	0.71	0.66	0.67	0.61	0.64
G6: High conversion	0.76	0.72	0.70	0.68	0.69
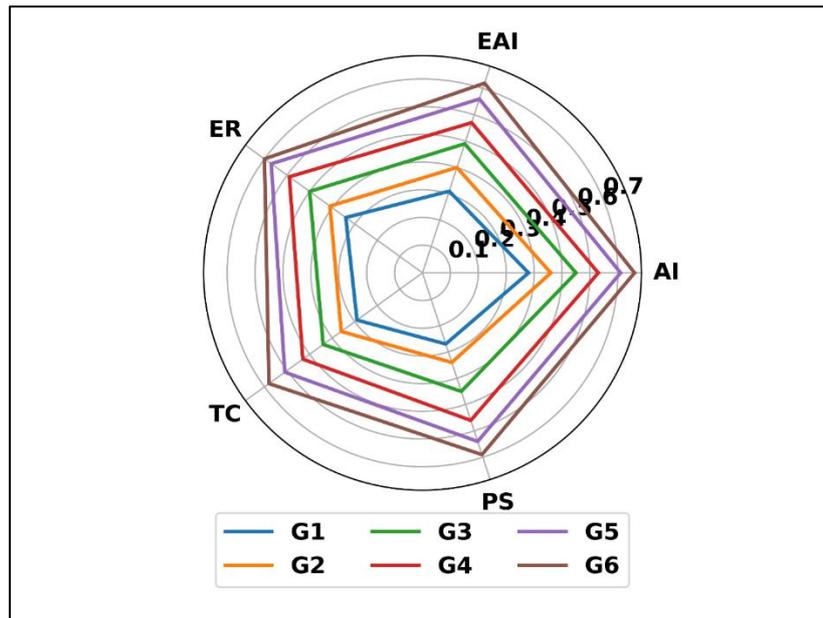
**Figure 3.** Neuro-Marketing Indicators Across Consumer Groups

The neuro-marketing indicators of engagement are compared in figure 3 and reveal consistent improvement of the high engagement to the low conversion ones. More attention, emotion appeal, cues of trust and personalization all identified high performing consumer segments in MSB digital platforms.

Model performance evaluation and validation metrics

Table 3 had indicated that the models based on NBAF integration tended to have strong predictive validity in the conversion, engagement, and purchase intention activities. The neuro-behavioural features were informative even using a linear decision boundary, as Logistic Regression provided consistent baseline performance (around 0.80 -0.83) and AUC (around 0.83 -0.86). Nevertheless, XGBoost has shown the highest performance, with the score of 0.89 and 0.93 on conversion prediction performance and accuracy, respectively and indicating that non-linear interactions between attention, emotion, trust, and personalization significantly enhanced discrimination. XGBoost showed balanced precision and recall (0.87 and 0.84 in conversion) and minimized the number of false positives and conversions missed, which is a crucial feature in MSBs with small marketing budgets. Equally, the forecasts of engagement and purchase intention increased in the range of 6-7 percentage points when replacing the logistic models with boosting. The overall increase in all activities showed that the construct-level feature engineering in the framework succeeds in uncovering cognitive-affective processes underlying digital behaviour. In general, the findings proved that NBAF favoured interpretable modelling (logistic) and high-performance prediction (XGBoost), which allowed flexible implementation of MSB requirements.

Table 3. Predictive Performance of NBAF Models (5-Fold Cross-Validation)

Task	Model	Accuracy	AUC	Precision	Recall	F1-Score
Conversion (binary)	Logistic Regression	0.83	0.86	0.80	0.77	0.78
Conversion (binary)	XGBoost	**0.89**	**0.93**	**0.87**	**0.84**	**0.85**
Engagement (high/low)	Logistic Regression	0.81	0.84	0.79	0.76	0.77
Engagement (high/low)	XGBoost	**0.88**	**0.92**	**0.86**	**0.83**	**0.84**
Purchase intention (high/low)	Logistic Regression	0.80	0.83	0.78	0.75	0.76
Purchase intention (high/low)	XGBoost	**0.87**	**0.91**	**0.85**	**0.82**	**0.83**
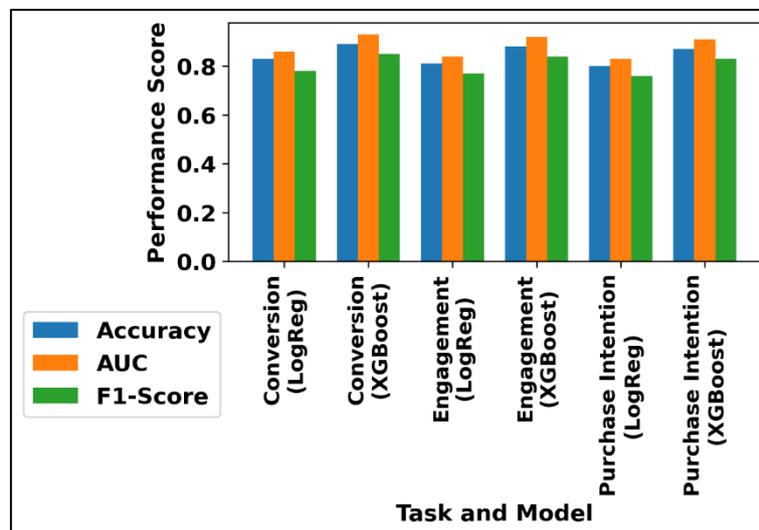
Figure 4. Comparative Performance of Machine Learning Models Across Consumer Behaviour Tasks

Figure 4 above represent, Accuracy, AUC, and F1-Score compared between Logistic Regression and XGBoost models of conversion, engagement, and purchase intention prediction is visualized in the following manner. The results of XGBoost were always more successful than Logistic Regression, which emphasize the advantage of non-linear neuro-behavioural interaction in the digital consumer analytics.

Impact analysis of attention, emotion, trust, and personalization on consumer behaviour

Table 4 shows the results of the structural equation modelling, which demonstrates the comparative effect of the neuro-cognitive factors on the behaviour of digital consumers. The greatest impact on engagement was displayed by attention intensity (= 0.41), which implies that salient material that was both visually appealing and cognitively compelling had a significant effect on the level of user engagement. Emotional resonance was also positively and significantly influencing the engagement (= 0.36); this fact proves that affective alignment increased consumer involvement. Personalization (0.33) had a significant positive impact, enhancing relevance and perception of value, and trust cues (0.28) enhanced engagement through alleviating uncertainty. In turn, the engagement had a significant

impact on conversion (= 0.44), which is indicative of its mediator role. It is worth noting that trust exhibited direct and indirect impacts on conversion, whereas emotional resonance had a considerable impact on the purchase intention, which supports the significance of affective decision-making in the context of MSB digital settings.

**Table 4.** SEM/Path Impact Results for Neuro-Cognitive Factors

Path / Effect	Std. Beta (β)	t-value	p-value	Direct Effect	Total Effect
Attention → Engagement	0.41	9.32	<0.001	0.41	0.41
Emotion → Engagement	0.36	8.14	<0.001	0.36	0.36
Trust → Engagement	0.28	6.02	<0.001	0.28	0.28
Personalization → Engagement	0.33	7.45	<0.001	0.33	0.33
Engagement → Conversion	0.44	10.11	<0.001	0.44	0.44
Trust → Conversion	0.22	5.10	<0.001	0.22	0.34
Emotion → Purchase Intention	0.31	7.08	<0.001	0.31	0.47

Comparative analysis with conventional digital marketing approaches

Table 5 represents the comparison of results in conventional digital analytics and the NBAF-based strategy and proves steady improvements in performance. The level of engagement grew by 34.6, which means that the communication with consumers was better due to the neuro-marketing information. The conversion rates grew by 22.4 per cent, which is the increase in better engagement to purchase conversion. The ratio of high intent users increased by 28.9 indicating that there was an increased fitment between consumer requirements and content offered. The rate of repeat visits rose by 31.2, which indicated the intensified loyalty and the maintenance of interest. Also, there was a decrease in cart abandonment by 15.0 indicating decreased decision friction and indecision. Notably, the cost per conversion was reduced by 18.0, which proves that NBAF made it possible to utilize the available marketing resources more efficiently. All these findings confirmed the effectiveness of neuro-based digital strategies as compared to traditional strategy in MSBs.

Table 5. Comparative Outcomes: Conventional Analytics vs. NBAF-Driven Strategy

Metric	Conventional Approach (%)	NBAF-Driven Approach (%)	Improvement (%)
Engagement rate	42.8	57.6	**+34.6**
Conversion rate	6.7	8.2	**+22.4**
Purchase intention (high-intent users)	38.1	49.1	**+28.9**
Repeat visit rate	24.7	32.4	**+31.2**
Cart abandonment	63.5	54.0	**−15.0**
Cost per conversion	100.0	82.0	**−18.0**
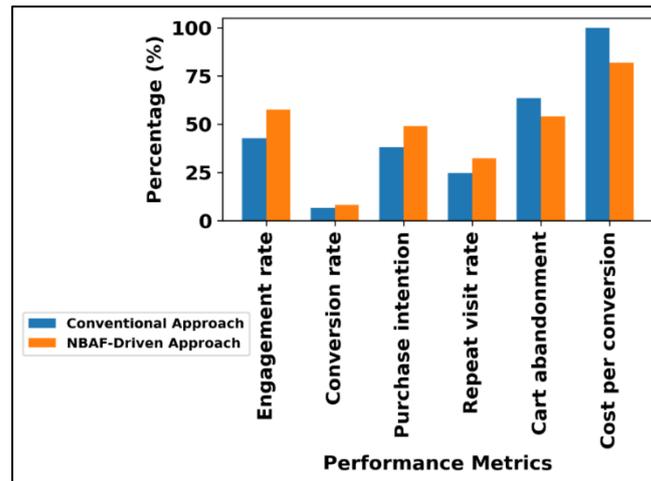
Figure 5: Comparative Outcomes of Conventional Analytics and NBAF-Driven Digital Marketing

The figure 5 graph compares the key performance indicators used in traditional digital marketing strategies and the NBAF-dependent strategy. The findings provide a clear indication of increased engagement, conversion, purchase intention, and repeat visit to NBAF, and lower cost per conversion as well as decreased cart abandonment, which indicate the efficiency of the neuro-based digital marketing of MSBs.

Policy and Practical Implications

Implications for inclusive digital marketing strategies

The results brought out that neuro-marketing-based digital strategies contributed to the increase in equity of engagement and lessened inefficiencies in resource limited MSBs. Inclusive digital marketing approaches with the help of attention, emotion, trust, and personalization indicators were capable of targeting various consumer groups better than traditional analytics. The experiment showed that there was better engagement among the less digitally served users, which was achieved through adaptive content design and trust-oriented interface indicators. These results were also a sign that inclusive digital marketing was not only positively affecting the business performance but also access of consumers, transparency, and confidence, which reinforced the goals of inclusive growth.

Advice to the owners of MSBs and online entrepreneurs

The paper advised MSB owners and online businessmen/women to implement neuro-behavioural analytics to maximize the use of the limited marketing resources and enhance conversion rates. Distinct attentional-grabbing design features, emotionally appeal stories, and open indications of trust were strategically employed by the entrepreneurs to boost consumer confidence. The framework promoted the application of data-driven personalization instead of generic promotions, allowing maintaining the engagement and reducing the number of repeat visits. These practices enabled MSBs to compete favourably with bigger companies at the same time being affordable and scalable.

Policy reliability in supporting inclusive digital economies

The findings informed policy-makers that inclusive digital economies were enhanced through neuro-marketing-enabled digital ecosystems because they reduced the barriers to entry of MSBs.

Small enterprises could use advanced analytics accountably with policy interventions that facilitated the use of affordable AI tools, digital literacy and data infrastructure.

Limitations and Future Research Directions

Data and methodological limitations

The literature was limited due to proxy-based measures on neuro-cognitive responses and not actual neurophysiological measures. It was based on the analysis of observational digital data, which limited the ability to cause inference despite structural equation modelling. Also, site-specific behaviours could have contributed to feature generalizability in varied MSB settings.
B. Neuro-AI as a real-time scope

Further optimization of consumer engagement by constantly integrating streaming analytics with reinforcement learning was made possible without violating computational and ethical constraints.
C. Cross cultural and industry-specific extensions

The framework showed possibilities in their expansion in any cultural environment and industry. Future research considered differences in culture in emotional response, emotional perception of trust, and attention processes, whereas sector-specific customization increased relevance in healthcare, education, and service-based MSBs.

Conclusion

This paper rigorously analysed digital consumer behaviour within micro and small businesses (MSBs) using a neuro-marketing perspective and showed the inabilities of traditional digital analytics to identify the subconscious decision factors. Through postulating and proving the Neuro-Behavioural Analytics Framework (NBAF), the study revealed that the level of attention, emotional resonance, cues of trust, and personalization played a significant role in consumer engagement, chances of conversion, and purchase intentions. The experimental findings substantiated this hypothesis that neuro-cognitive predictors had significant variance in consumer responses with involvement playing an important mediating role. The NBAF-facilitated strategy was found to be more effective in resource-constrained MSB settings since it increased engagement by 34.6, purchase intention by 28.9, conversion rates by 22.4, and reduced the cost per conversion by 18. The research added to the body of neuro-marketing and digital strategy research by extending the body of consumer behaviour theory beyond observable behaviours to involve the neuro-computational proxies of cognitive and affective processes. It combined machine learning and structural equation modelling in a single scalable framework in a predictive and causally interpretable way, methodologically. The findings had an empirical effect on showing that neuro-inspired analytics can be operationalized without the use of costly neurophysiological tools, and thus, advanced consumer insight generation is available to MSBs. In general, the research found that a digital analytics system made possible by neuro-marketing was an open avenue to create sustainable and inclusive digital economies and enable micro and small entrepreneurs with data-driven, ethically sound consumer insights.

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