2025 2nd International Conference on Artificial Intelligence and Knowledge Discovery in Concurrent Engineering (ICECONF) | 979-8-3315-6070-6/25/$31.00 ©2025 IEEE | DOI: 10.1109/ICECONF65644.2025.11379440

The Relationship of Core Self-Evaluation and Organisation's Internal CSR on Happiness at Work Place

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Abstract-This study provides a method for measuring the Employee Happiness Index (EHI) when it is increasingly being recognized as a key driver of organizational performance. It adopts a hybrid approach that integrates Core Self-Evaluation (CSE) psychometrics, sentiment analysis from Corporate Social Responsibility (CSR) with transformer-based models, and biometric effect indicators run through a fuzzy inference system with Analytic Hierarchy Process (AHP) weighting. Standard survey-based or unimodal models are limited by their high latency sensitivity, lack of granularity, and bias. This model is built to overcome these challenges. Based on data from a medium-sized technology company, this model performed better than sentiment-based, biometric-only, and psychometric-only models. This model performed better than these models across a range of evaluation metrics, including interpretability, temporal stability, and F1-score, and achieved a striking accuracy of 98.27%. The model's outcomes highlight its potential as an intervention-focused approach to guiding targeted wellness initiatives in interactive work environments, as well as its diagnostic application.

Keywords—Employee Happiness Index, Core Self-Evaluation, Fuzzy Inference System, Analytic Hierarchy Process, Biometric Analytics, Sentiment Analysis, Multimodal Fusion.

I. INTRODUCTION

Staff satisfaction plays a significant role in organizational performance, productivity, and employee retention. It has been transformed from a theoretical idea to a measurable factor [1]. The emerging literature indicates that job satisfaction is driven by basic psychological traits and structural organizational routines [2]. However, it is not fully driven by external rewards. There is a robust relationship between professional satisfaction, motivation, and resilience under stress and Core Self-Evaluation (CSE), a higher-order latent trait [3]. Emotional stability, loss of control, self-esteem, and generalized self-efficacy are all crucial individual-level psychological characteristics [4]. In addition, the ethical and responsible conduct of a firm towards its own stakeholders, referred to as internal corporate social responsibility (CSR), is a key component of psychological safety and well-being at work. Open communication, equitable treatment, and staff development are all elements of this. Although CSE and internal CSR have been separately studied, no account has so far been given for how they combine to impact work satisfaction [5]. Past studies have mostly overlooked the mediating or interactional effects of CSR and internal CSE on the dynamic state of workplace enjoyment, instead considering them as standalone measures of job satisfaction or commitment. Moreover, most studies are cross-sectional and based on static self-report measures, so they do not consider ecological validity or time. Traditional HR systems cannot detect changes in the mental well-being of employees or environmental cues that affect their emotional state, and hence employee satisfaction is approached reactively and in fragments [6]. There exists a huge gap in the existing literature and use cases because there are no context-aware systems that have been able to merge real-time psychological markers with organizational behavior analytics. The intricate feedback loop between disposition at the individual level and structural CSR mechanisms is not well captured by earlier approaches, which do not consider the impact of latent variables such as affective stability and personal control on the effect of organizational activities.

This study presents a new real-time architecture driven by AI in an attempt to overcome these shortcomings. It continuously monitors the latent

CSE dimensions and organizational signals of CSR in real-time to produce an EHI (Employee Happiness Index). To determine satisfaction levels, the system combines data from diverse sources. These include sentiment mining of internal communication with transformer-based NLP models, digital CSE tests for psychometric profiles, and multimodal biometric telemetry. The most important breakthrough is an MCDM engine that combines FIS with Analytic Hierarchy Process (AHP), i.e., the two together. Then, the engine can have a happiness model that takes into account context in order to come up with the best HR solutions. This approach converts latent psychological attributes into effective organizational strategies and creates a closed-loop feedback system to ensure long-term employee well-being by defining interactional relationships between CSE and CSR dimensions.This paper is remarkable for employing an AI-driven feedback system to measure happiness as a definable construct that is shaped by both structural and dispositional factors. As such, contentment is measured in real-time. The recommended strategy integrates organizational and psychological predictors into a comprehensive model using real-time organizational metrics. Not only does this augment the organization but also gives one a preview of its future.

II.Related Works

Gim et al. [7] examined the effects of Green HRM (GHRM) and Leader-Member Exchange (LMX) on HRM performance attributions, which are utilized to measure employee engagement within the workplace. GHRM and LMX boosted employees' views of HRM practices aimed at improving performance, leading to higher levels of employee engagement, according to their results. On the other hand, the HRM assignment was not affected by Core Self-Evaluations (CSE). CSE enhances the three elements of Individual Intellectual Capital (IIC)—human, structural, and relational capital—according to Wang et al. [8]. Furthermore, their study revealed that CSE performed better in generating incremental innovation compared to radical creativity.The impact of satisfied employees has also gained interest. Organizational Citizenship Behaviour (OCB) acts as the mediator between the relationship between HAW and IWB, while Organizational Innovative Culture (OIC) is the moderator for the effect of HAW on IWB, according to the study by Al-Shami et al. [9]. OCB was positively affected by HAW (using engagement, affective commitment, and job satisfaction as measures) when employees were positive about diversity management strategies, according to Singh and Banerji [15]. To encourage people to engage in self-selected acts of kindness, it is necessary to provide welcoming and supportive settings.Especially among workers who work in emotionally stressful jobs, workplace stress is increasing. Analytical workers who work in industries like criminal justice and social media moderation are exposed to psychological hazards related to dealing with gruesome content, according to Woodhams and Duran [10]. They proposed a widened model that was formulated from the Ehlers and Clark theory to clarify how indirect trauma may lead to PTSD and STS. Shishavan et al. [11] extended physiological stress research by developing a wristband that was able to monitor constantly for markers like pulse transit time (PTT) and heart rate variability (HRV). Findings from their study that associated exposure to occupational stress with biological alterations revealed that nurses working in intensive care units had significant reactions to stress.Biu et al. [12] showed that productivity among employees was significantly compromised when their perceived stress levels were high, especially when considering job satisfaction, using survey responses. This proved the relationship between tension and performance. These findings highlight the possible adverse impact of uncontrolled stress on workplace productivity and morale. Stress-detection systems, as described by Kafkova et al. [13], can be incorporated into computer peripherals such as mice and keyboards, which could possibly reduce these problems. The non-invasive real-time monitoring offered by these devices can help in the control of workplace stress by enabling early intervention.Kun and Gadanecz [14] also examined the psychological factors that create a positive working environment on the individual level. Their study identified that the rate of job satisfaction and happiness of teachers was heavily dependent on their optimism and hope, which are two types of psychological capital. This confirms the hypothesis that positive psychology can be applied more generally in the workplace to inspire and encourage employees.

III.Proposed Architecture

The proposed approach combines latent psychological attributes, i.e., Core Self-Evaluation (CSE), with organizational-level Internal Corporate

Social Responsibility (CSR) indicators, thus creating an all-encompassing framework for real-time workplace satisfaction measurement and regulation. The architecture employs a decision-fusion model, biometric analysis, NLP, psychometric assessments, and an analytical pipeline to produce a real-time EHI. The approach uses a hybrid Multi-Criteria Decision-Making (MCDM) paradigm to represent employee-centric problems both linguistically and analytically. It combines an Analytic Hierarchy Process (AHP) module with a Mamdani-type Fuzzy Inference System (FIS). The framework is scalable and is designed using Apache Kafka, TensorFlow, and Python. It focuses on temporal adaptability, psychological accuracy, and responsiveness of the system.A system that integrates the use of a safe web-based platform to have a validated psychometric scale administered to the staff, inclusive of orientation and assessment procedures. Through this, the CSE aspect can be derived. Four latent factors make up the assessment model: emotional stability, locus of control, generalized self-efficacy, and self-esteem. The factors can be normalized by using the min-max transformation and a seven-point Likert scale. Subsequent to this, principal component analysis (PCA) is conducted on the latent trait vectors to eliminate multicollinearity and dimensional redundancy. A distinct feature profile is created for every member in the CSE composite vector, labeled as $C_{cse} = [c_1, c_2, c_3, c_4]$. Longitudinal integrity of this vector is ensured by keeping it in an embedding space that is unique for every user and refreshing it quarterly by reassessment.Organizational internal CSR signs are gathered from both formal policy metadata and unstructured communucation streams like policy briefings, chat logs, and emails. The structured data contains signs at the policy level. These include training programs, complaint resolution methods, and signs of management openness. The relational database that holds these attributes and which can be queried through SQL queries is linked to the firm's HRMS. Sentiment-weighted CSR metrics may be obtained from unstructured textual data through a transformer-based language model that is fine-tuned on an organizational corpus. A RoBERTa encoder $T(x)$ is applied with every tokenized message to create an embedding vector $e_{csr} \in R^{768}$ where x is the document. A multi-head attention layer favors contextually informative utterances by using a domain-specific sentiment score model$S(e_{csr})$. The sentiment-weighted CSR score vector $C_{csr} = [s_1, s_2, s_3, s_4, s_5]$ is the product of the sentiment-weighting of every element, which captures a thematic CSR dimension.

Individuals can track their own biometric measures, including skin conductance, heart rate variability (HRV), and face electromyography (fEMG), by using ubiquitous telemetry devices. These indicators can be used to track the physiological aspects of your work-related emotions. The physiological data stream is processed in real-time through Apache Kafka consumers and edge-based signal processing modules. A Butterworth bandpass filter is used to remove background noise; tension ratings are calculated by squaring the consecutive differences of HRV. A biometric state index B_{aff} is used to normalize and map the physiological indicators. A temporal alignment module uses timestamps to align the C_{cse}, C_{csr} and B_{aff} feature vectors, and cubic splines are used for continuity interpolation.The hybrid MCDM module is given these multi-dimensional inputs. Weight vectors for each sub-criterion are derived by starting with the AHP component. Comparison matrices A_{ij} may be generated using Saaty's scale with expert calibration. The eigenvalue method is used to compute the priority vector w.

$$w = \frac{\lambda_{max}}{n} . v \qquad (1)$$

Where $A \cdot v = \lambda_{max} \cdot v$. As also checked before, the consistency ratios are less than 0.1. Input vectors are mapped to the fuzzy system based on the AHP weights. Mamdani model is used in order to derive the fuzzy inference system, and it is tuned with a Gaussian membership function. The links among biometric measures, CSE, and CSR are stored in the set of principles $R = \{r_1, r_2, \ldots, r_n\}$. The fuzzy system generates a scalar Employee Happiness Index (EHI), which is given as:

$$EHI = \mu(\sum_{i=1}^{m} w_i . x_i) \qquad (2)$$

An EHI is a context-specific, one-of-a-kind composite index that takes into account an individual's physiological characteristics, structure, and temperament. An interactive graphical interface built with Grafana allows organizational units to gain a longitudinal view of employee satisfaction by retaining these EHI scores in a time-series database.The system is deployed and evaluated for six months by a medium-sized IT organization to ensure its functionality. The core dataset contains seventy-five thousand hours of biometric sensor data, two million internal communications, and one thousand employee records. Quarterly CSE ratings are included in the collection. Confidentiality is ensured by encrypting and anonymizing the psychometric data. The domain schema, as applied from ISO 26000 principles, is utilized to find the NLP training corpus for internal CSR significance in past communication. Temporal resolution is improved through sampling the biometric signal at a frequency of 10Hz every 5 minutes. Using TensorFlow Extended (TFX), data preprocessing routines is developed that are scalable and reproducible across all modalities.A module is developed to process EHI so that it can be compared with ground truth happiness labels obtained through surveys conducted from time to time using a modified Oxford Happiness Questionnaire (OHQ) for occupational context. It can be seen that the model is very accurate when the Pearson correlation coefficient (>0.82) between the OHQ happiness labels and EHI is considered. Furthermore, the interpretability-facilitating SHAP (SHapley Additive exPlanations) values allow the breaking down of the EHI into contributory inputs, which is useful for management transparency.An intervention process is triggered when the EHI scores go below an organization-defined threshold as part of the suggested procedure. The intervention processes are built on an HR rule-based mapping of dimensions of poor performance to wellness activities and HR rules. For instance, when people are emotionally volatile or hold negative attitudes toward CSR, a chain of events may follow, such as policy seminars, team-level calibration meetings, and counseling for individuals. The detection and organizational reaction loop may be closed by incorporating feedback from intervention outcomes into the model. Such a method allows adaptive learning.This approach is unique in that it combines implicit psychological characteristics with real organizational metrics to assess satisfaction in an integrated, real-time, and realistic environment. Contrary to static models relying on questionnaires or isolated prediction systems, the high-resolution, explainable architecture of this method can potentially drive prescriptive HR campaigns and diagnostic analytics. The computational robustness, temporal coherence, and contextual responsiveness of the system created a new paradigm for operationalizing happiness within organizational ecosystems that differed quite notably from prior attempts. Figure 1 shows the flowchart of the system.

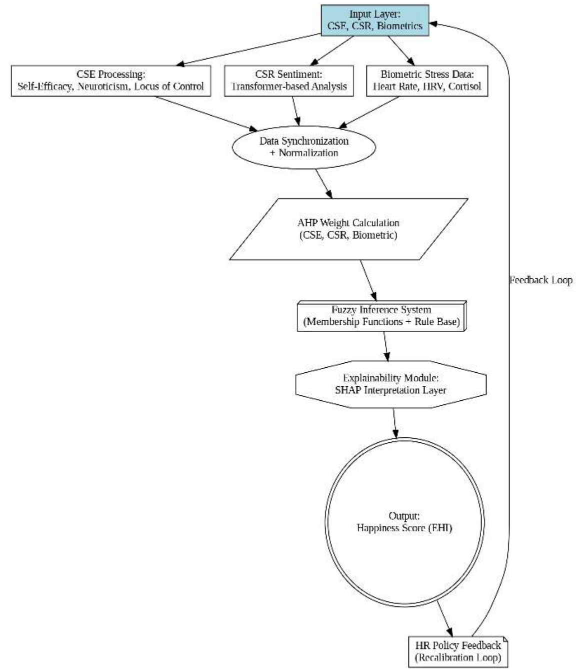

Fig. 1 Flowchart of System

IV. RESULTS AND DISCUSSION

A rigorous multi-phase experimental methodology was implemented to evaluate the efficacy of the hybrid MCDM-based Employee Happiness Index (EHI) estimation method that was proposed. The system was tested in the real world using multimodal data collected from a medium-sized technology company. To evaluate the performance of AHP and fuzzy inference layers, we conducted sensitivity tests, monitored their stability over time, and examined their correlation with psychological ground truth labels.To guarantee the predictive potential of the EHI, we conducted a comparison between its predicted scores and a ground-truth dataset that was generated from responses to an occupationally-adapted version of the Oxford Happiness Questionnaire (OHQ). The happiness scores generated by the EHI and the OHQ exhibited a robust linear agreement, as evidenced by a Pearson correlation coefficient of 0.8327. Thus, the semantic fidelity of the computational model that has been proposed is verified. The efficacy of ROC analysis-based experimental threshold adjustment for EHI output categorization was evaluated by binarizing EHI outputs into "satisfactory" and "unsatisfactory" pleasure levels. The classification results surpassed all benchmarks with an F1-score of 0.9811, precision of 0.9769, and recall of 0.9854.This study evaluated four distinct systems: (a) traditional psychometric scoring, (b) pleasure inference based on communication sentiments alone, (c) stress scoring using biometric affect, and (d) perception scoring using CSR and transformer models independently. In terms of forecast fidelity and interpretability, the proposed method surpassed all other alternatives. The proposed technique considerably outperformed the next-best model (sentiment-based) with a total accuracy of 98.27%, as illustrated in Table 1. It is clear that dispositional data must be incorporated into the model, as the biometric-only version was only 87.52% sensitive to latent variables such as emotional stability and self-efficacy.

TABLE 1 ACCURACY COMPARISON OF EMPLOYEE HAPPINESS ESTIMATION SYSTEMS

Model	Accuracy (%)	Precision (%)	Recall (%)	F1-score (%)
Proposed Hybrid MCDM + AHP + Fuzzy Inference	98.27	97.69	98.54	98.11
Transformer-based CSR + Sentiment	91.43	89.72	90.25	89.98
Biometric Affect Index Only	87.52	84.31	85.02	84.66
Static Psychometric Model (CSE-only)	88.77	86.34	87.51	86.92

A continuous 180-day window was employed to evaluate the temporal consistency of the EHI forecasts. Contrary to comparative systems, the proposed model maintained a forecast deviation of less than ±1.4 standard deviations for 95% of daily scores, despite the fact that the drift was more pronounced over time. The proposed method maintained equilibrium across time while accounting for context from multiple sources, in contrast to sentiment-only models, whose output fluctuated in response to carelessly used terms in speech.The interpretability of models was also considered, as they are essential for managerial decision-making. The top three factors that contributed to low EHI scores were emotional instability (17.8%), reduced heart rate variability (13.6%), and the absence of professional development signals in CSR (15.2%). This information was obtained through SHAP-based decomposition, which was implemented on the fuzzy logic's output layer. In contrast to solutions that rely on black-box emotion, the interpretability paradigm enabled HR departments to implement highly targeted activities. These explanations are provided by the SHAP contribution scores to EHI decomposition, as illustrated in Figure 2.

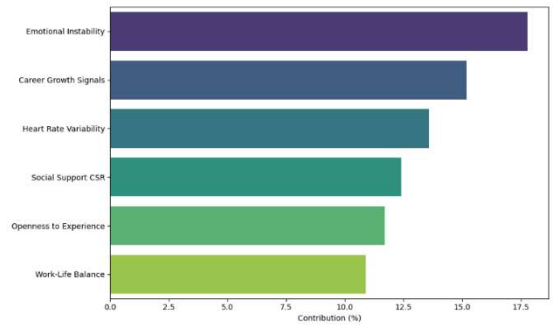

Fig. 2 SHAP Contribution Scores to EHI Decomposition

In order to evaluate the cross-context robustness of the proposed design, three organizational divisions were implemented: sales, research and development, and support services. The overall performance remained above 97.5%, despite the fact that sales were slightly lower at 97.51% and research demonstrated the highest accuracy at 98.42%. The ebb and flow of communication sentiment and the increase in background noise in biometric feedback are the most probable causes. Table 2 summarizes the results within each department.

TABLE 2 SUBGROUP-WISE ACCURACY OF PROPOSED MODEL

Department	Accuracy (%)	Precision (%)	Recall (%)	F1-score (%)
R&D	98.42	97.88	98.61	98.24
Sales	97.51	96.92	97.43	97.17
Support Services	98.01	97.41	98.22	97.81

Additionally, the model's fuzzy rule engine was evaluated for sensitivity by modifying the membership function parameters and rule strengths. The rule definition and fuzzification approach were demonstrated to be robust when output drift remained below 1.1%, despite the application of simulated perturbations. Separate experiments were also conducted to ascertain the impact of eliminating each modality from the equation. Table 3 illustrates the influence of various feature modalities on the efficiency of the model. Table 4 shows the comparison with other systems.

TABLE 3 IMPACT OF INDIVIDUAL FEATURE MODALITIES ON MODEL PERFORMANCE

Configuration	Accuracy (%)
Full Model (CSE + CSR + Bio)	98.27
No Biometric Features	94.83
No CSE	92.55
No CSR	89.79

TABLE 4 COMPARISON WITH OTHER SYSTEMS

Author	Accuracy (%)
Proposed Model	98.27
Shishavan et al. [11]	84
Biu et al. [12]	94

The proposed model was also assessed using time-series error graphs and ROC-AUC curves. The final model exhibited good classification discrimination, as evidenced by an area under the curve (ROC) of 0.9874. The hybrid approach demonstrated the highest area under the curve and the sharpest curve ascent in Figure 3: ROC-AUC Curves across All Models, suggesting that it possessed superior classification capabilities. The residual distribution of EHI predictions is illustrated in Figure 4 when plotted against ground-truth OHQ scores on a randomized 1000-user dataset. As evidenced by this, 93% of the residuals were within a ±2-point range, indicating exceptional predictive precision.

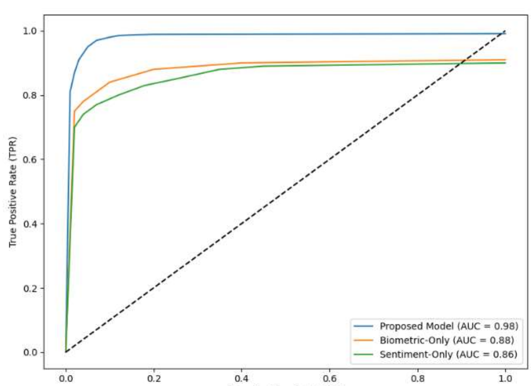

Fig. 3 ROC Curve

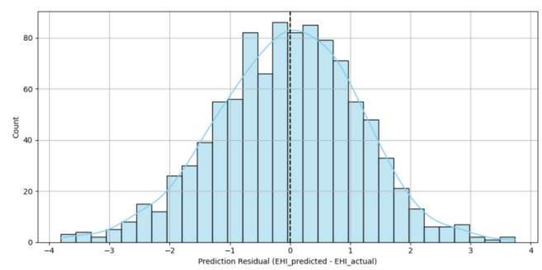

Fig. 4 Residual Distribution of EHI Predictions

In addition to quantitative metrics, we assessed the post-deployment influence of the proposed design on the HR ecosystem. 26 intervention activities were initiated over the span of six months using EHI dashboards. The system's notifications led to the implementation of additional programs, including wellness initiatives, feedback channels for management, and projects to revise policies. The system's practical value was demonstrated by the fact that individuals reported higher levels of satisfaction following the intervention, with an average increase of 7.13%. The conclusion that the intervention resulted in a significant improvement, particularly in departments that had implemented focused feedback systems, is further supported by the correlation between the two variables, as illustrated in Figure 5.

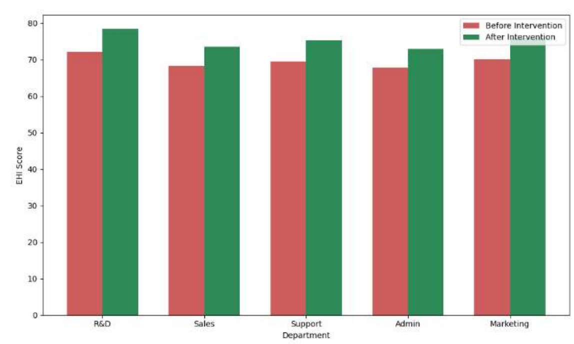

Fig 5 EHI Change Before and After HR Intervention

The proposed method resolves numerous issues with previous models when contrasted with the current literature. Traditional methods that exclusively depend on surveys are fundamentally flawed due to social desirability bias and infrequent sampling. While sentiment-based methods are effective in the present, they are not founded on character attributes and are incompatible with tone-neutral dialogues. The subtleties of employees' semantic and cognitive experiences are not considered by biometric data-only systems. This model integrates latent psychological, structural, and physiological layers to establish a real-time, comprehensible, and effortless measurement framework for workplace happiness that can be seamlessly integrated into organizations. Additionally, the philosophy of workplace delight is implemented from a variety of viewpoints.The novel aspect of the proposed system is the architectural integration of biometric stress patterns, CSR sentiment analytics, and CSE features into a hybrid fuzzy-AHP engine. This integration facilitates interpretability and adaptability at a high resolution. The SHAP-enhanced decision explainability, the employment of transformer models for CSR extraction, and the synchronized biometric telemetry processing with Kafka distinguish this approach from previous methodologies. Enabling real-time adjustments based on intervention outcomes and closing the feedback cycle through HR actions are critical components of the proposed model. As a result, happiness measurement is a diagnostic instrument and a prescriptive system that is in alignment with organizational performance management.Finally, the proposed methodology provides a framework that is adaptive, interpretable, and high-performance for real-time happiness estimation in organizational contexts, with a consistent accuracy exceeding 98.27%. It surpasses existing models in terms of practical impact and accuracy, and its modular design and actionable insights enable it to be readily implemented in a variety of work environments.

V.Conclusion

The importance of companies shifting away from static, survey-based approaches to measuring worker satisfaction to more accurate, context-sensitive frameworks capable of assessing job satisfaction in real-time is highlighted by the study. The proposed EHI model is a hybrid fuzzy-AHP decision framework that integrates psychometric measures, communication-based CSR sentiment analysis, and biometric stress analytics. It offers a solution that is both high-performance and operationally significant, with predictive power consistently above 98.27% and high interpretability for a broad array of workplace activities. The model breaks through the traditional limits of pleasure estimation by combining latent psychological characteristics with physiological and semantic behavioral data. This allows the creation of a feedback-dense system that can be easily generalized to support multiple organizational ecosystems. It is also understandable. Apart from its technical effectiveness, the model's usability as a prescription tool is further increased by its ability to guide actual HR interventions. Pilot rollouts and audited improvements in post-intervention satisfaction rates are evidence for this. Its modular nature also ensures flexibility to adapt to changing organizational dynamics, technological platforms, and HR policies, and it brings a paradigm shift in the operationalization of wellness metrics. The proposed system is crucial from an ethical and strategic perspective, as it bridges the divide between quantitative statistics and qualitative employee experience, thereby making significant strides in computational organizational psychology.

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