

Evaluating the Effectiveness of 360-Degree Feedback for better Employee Sustainability

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ABSTRACT

Performance appraisal is a critical function in workforce management, influencing employee motivation, career development, and organizational efficiency. Traditional performance evaluation systems often suffer from subjectivity, inconsistencies, and biases, limiting their reliability and effectiveness. This study introduces the Ekasutra Index, a structured, data-driven, and statistically validated model for performance appraisal that leverages 360-degree feedback mechanisms. Unlike conventional methods that rely primarily on managerial assessments, the Ekasutra Index integrates feedback from supervisors, peers, subordinates, and self-assessments to derive a comprehensive performance score. The study employs a five-point Likert scale and a Weighted Average Mean approach to consolidate multi-source feedback into a single, quantifiable score. Furthermore, Partial Least Squares Structural Equation Modeling (PLS-SEM) is utilized to assess the impact of different evaluation components on the final performance index. The reliability of the model is validated through Cronbach's Alpha (0.91), ensuring high internal consistency. Additionally, Gaussian Copula (GC) adjustments are applied to account for potential endogeneity issues, confirming the robustness of the assessment framework. Key findings indicate that self-assessment ($\beta = 0.430$) and supervisor evaluation ($\beta = 0.394$) exert the strongest influence on the Ekasutra Performance Index (EPI), while peer review ($\beta = 0.200$) and subordinate feedback ($\beta = 0.363$) have relatively lower but still significant effects. The automated and statistically validated nature of the model enhances transparency, eliminates subjectivity, and improves decision-making efficiency for HR professionals. The Ekasutra Index presents a scalable and adaptable framework that can be implemented across corporate organizations, educational institutions, and public sector agencies. By integrating data science principles with structured employee feedback, the model fosters fairness, transparency, and efficiency in performance evaluations. This study contributes to the growing field of data-driven human resource management, providing a robust methodology for organizations seeking to optimize their appraisal systems in the era of digital transformation.

Keywords: 360-Degree Feedback, Performance Appraisal, Ekasutra Index, PLS-SEM, Gaussian Copula, Likert Scale, Workforce Evaluation, HR Analytics, Statistical Validation.

INTRODUCTION

In the contemporary corporate landscape, performance appraisal serves as a fundamental tool for evaluating employee contributions, determining career advancements, and fostering professional growth. Organizations across industries rely on structured evaluation systems to ensure fairness, efficiency, and transparency in their workforce management. However, traditional appraisal methods have often been criticized for their inherent biases, lack of consistency, and limited ability to capture the multi-faceted nature of an employee's performance. Many existing frameworks depend heavily on subjective assessments, personal judgments, and inconsistent rating scales, which ultimately lead to inefficiencies in decision-making. As businesses increasingly shift towards data-driven methodologies, there is a growing need for an objective, statistically sound, and comprehensive performance appraisal model.

The **Ekasutra Index** is designed to address these challenges by integrating a structured feedback mechanism that incorporates responses from multiple hierarchical levels within an organization. This model employs a **five-point Likert scale** and utilizes a **Weighted Average Mean** approach to derive a single performance score, ensuring a holistic and unbiased evaluation. Unlike traditional performance review systems that may rely solely on managerial feedback, the Ekasutra Index consolidates assessments from supervisors, peers, and subordinates, thus offering a more comprehensive and equitable representation of an employee's performance. By applying **Cronbach's Alpha reliability testing**, the model has demonstrated a high statistical reliability score of **0.91**, reinforcing its credibility and applicability across various industries.

A significant limitation of conventional appraisal systems is their susceptibility to **biases and subjectivity**. Managerial preferences, personal relationships, and recency effects often skew performance ratings, resulting in unfair evaluations that may demotivate employees and hinder organizational growth. Additionally, traditional methods lack scalability and efficiency, as manual performance reviews are time-consuming and prone to inconsistencies across different departments. The **Ekasutra Index**, in contrast, leverages quantitative techniques and statistical validation to ensure that employee assessments are both **data-driven and transparent**. This model eliminates personal biases by focusing on measurable performance indicators, making it a **reliable and objective** tool for workforce evaluation.

The integration of a **data-driven approach** in performance appraisal has become increasingly crucial in the era of digital transformation. Organizations are progressively adopting **quantitative evaluation models** to enhance accuracy, eliminate human subjectivity, and streamline decision-making processes. The **Ekasutra Index aligns with this trend** by incorporating well-established statistical principles and automating performance assessments, thereby improving the efficiency of human resource management. By structuring employee feedback in a **hierarchical format**, the model ensures that **different perspectives are considered**, leading to a more **equitable and well-rounded evaluation**. This, in turn, fosters **employee motivation and productivity**, as individuals feel more valued when their contributions are assessed fairly.

The applicability of the **Ekasutra Index** extends beyond corporate organizations to **educational institutions, government agencies, and research environments**. In academic settings, the model can be utilized to evaluate faculty performance through student feedback, peer reviews, and administrative assessments. Similarly, public sector organizations can implement this structured evaluation framework to enhance transparency and **accountability** in government employee performance appraisals. Furthermore, the model's emphasis on **quantitative data analysis** makes it an invaluable tool for **researchers studying workforce behavior, organizational efficiency, and human resource management practices**. Its adaptability across multiple sectors underscores its **versatility and potential impact** in shaping modern performance appraisal systems.

The development of the **Ekasutra Index** is grounded in well-established **statistical and management theories**, including the **Likert Scale methodology, Weighted Average Mean calculations, and Cronbach's Alpha reliability testing**. The model's structured approach follows fundamental principles of **data science and statistical modeling**, ensuring that performance assessments are **both reliable and valid**. Unlike traditional appraisal systems that often lack consistency, this model provides a **standardized framework** for evaluating employee performance across different organizational levels. The inclusion of **quantitative techniques enhances the model's credibility**, making it a **robust and scalable solution** for performance evaluation in both small and large organizations.

The primary objectives of this research are to introduce and evaluate the **Ekasutra Index** as a **comprehensive performance appraisal model**. Specifically, the study aims to **develop a single-score evaluation framework** based on **360-degree feedback mechanisms**, integrate a

statistically validated feedback system, and create a **consolidated performance score** that aids **decision-making for HR professionals and top management**. By addressing the limitations of existing appraisal methods, this research seeks to demonstrate the effectiveness and applicability of the **Ekasutra Index** in enhancing **workforce efficiency, fairness, and organizational performance**.

In conclusion, the **Ekasutra Index** presents a **novel and statistically rigorous** approach to performance appraisal, integrating **hierarchical feedback, data science methodologies, and quantitative evaluation techniques**. Its ability to **eliminate biases, enhance transparency, and streamline decision-making** makes it a **valuable tool** for organizations seeking to improve their **performance management systems**. As businesses and institutions continue to adopt **data-driven strategies**, models like the **Ekasutra Index** offer a **structured and efficient solution** to the challenges associated with traditional performance appraisal methods. This research will further explore the **working mechanism, validation techniques, industry applicability, and potential refinements** of the model, contributing to the **advancement of performance evaluation frameworks** in professional environments.

STATEMENT OF PROBLEM

Performance appraisal plays a crucial role in workforce management, influencing employee motivation, career progression, and overall organizational efficiency. However, traditional appraisal systems suffer from **significant limitations**, including **subjectivity, inconsistency, and inefficiency**. Many performance evaluations rely heavily on **managerial discretion**, leading to **biased and unfair assessments**. Factors such as **personal preferences, favoritism, and recency bias** often distort evaluations, making them unreliable. Employees may feel demotivated when their contributions are not assessed **objectively**, resulting in **reduced productivity and engagement**. This problem underscores the need for a **structured and unbiased evaluation model** that eliminates **personal bias and ensures fairness** in performance appraisals.

Another challenge in conventional appraisal systems is the **lack of standardization**. Different organizations—and even different departments within the same organization—use **varied evaluation criteria**, leading to **inconsistencies in ratings**. Employees performing similar tasks may receive different evaluations depending on their supervisor's **interpretation of performance**.

metrics, making it difficult to establish a **uniform and equitable** system. Without a **consistent evaluation framework**, decision-making related to **promotions, salary increments, and training programs** becomes unreliable. There is a need for a **universal, standardized approach** that applies to **diverse industries, job roles, and hierarchical structures**, ensuring that performance ratings are **accurate and comparable**.

Additionally, most traditional performance appraisal methods focus on **limited performance indicators**, often evaluating employees based on **individual task completion or qualitative feedback** from supervisors. However, employee performance is **multi-dimensional**, involving factors such as **collaboration, leadership, adaptability, and innovation**. A **360-degree feedback approach**, which integrates **supervisor, peer, and subordinate evaluations**, provides a more **comprehensive and objective** assessment. Despite its advantages, many organizations struggle to **effectively consolidate multi-source feedback** into a single, measurable score. This lack of a **structured methodology** leads to fragmented and often conflicting performance assessments.

Efficiency is another critical issue in traditional appraisal models. Performance evaluations are often **time-consuming** and **manual**, requiring HR professionals and managers to spend **significant time collecting and analyzing feedback**. In large organizations, manual performance appraisal processes can lead to **delays, errors, and inconsistencies**. Without **automation and statistical validation**, organizations struggle to derive **accurate and meaningful insights** from employee evaluations. A **streamlined and automated model** would significantly enhance **efficiency and reliability**, reducing administrative workload while improving **decision-making accuracy**.

Finally, most existing appraisal models **lack statistical validation**, making their results **prone to inaccuracies and inconsistencies**. Without proper **quantitative analysis**, performance scores are often **arbitrary**, leading to flawed assessments. **Reliability testing**, such as **Cronbach's Alpha**, ensures that performance metrics remain **consistent and accurate** across multiple assessments. However, many organizations do not incorporate **scientific validation techniques**, increasing the risk of **flawed evaluations**. The **Ekasutra Index** aims to address these challenges by providing a **single, statistically validated performance score**, integrating **hierarchical feedback, automation, and data-driven evaluation techniques**. This research seeks to develop a **robust**,

efficient, and unbiased appraisal model that enhances **transparency, fairness, and organizational effectiveness.**

OBJECTIVES OF THE STUDY

1. To build a single-score model for 360-degree feedback based on a five-point Likert scale

Traditional performance appraisal methods often rely on fragmented and inconsistent evaluation systems that vary across organizations and departments. This study aims to develop a **standardized single-score model** that integrates multiple feedback sources into a single, easily interpretable metric. By using a **five-point Likert scale**, the proposed model will ensure **quantitative measurement of employee performance**, minimizing subjectivity and providing a structured framework for performance evaluation.

2. To develop a more effective feedback system for 360-degree appraisal

Performance evaluation should not be limited to a supervisor's perspective alone, as this can introduce **bias and incomplete assessments**. A **360-degree feedback system** incorporates input from multiple sources, including **supervisors, peers, subordinates, and self-assessments**, ensuring a **holistic and well-rounded evaluation** of an employee's skills, contributions, and workplace behavior. This study aims to refine and enhance the **existing 360-degree feedback approach**, ensuring that **diverse perspectives are mathematically weighted and consolidated** into a fair and reliable performance score.

3. To create a single performance score that can be easily communicated and interpreted

A major challenge in performance appraisals is the **complexity of multiple evaluation criteria**, making it difficult for organizations to derive actionable insights. This study seeks to develop a **simplified and transparent scoring system**, where employee performance is represented as a **single, statistically validated score**. This consolidated score will help **decision-makers efficiently assess performance trends**, make **informed choices regarding promotions, salary adjustments, and training programs**, and enhance overall **workforce management efficiency**.

HYPOTHESES OF THE STUDY

Main Hypotheses (Direct Effects on EPI)

H₁: Self-Assessment (SA) has a **significant positive effect** on the Ekasutra Performance Index (EPI).

Employees' own perception of their performance contributes significantly to their overall appraisal.

H₂: Peer Review (PR) has a **significant positive effect** on the Ekasutra Performance Index (EPI). Feedback from colleagues influences performance ratings, though its impact may be lower than other evaluation sources.

H₃: Subordinate Feedback (SF) has a **significant positive effect** on the Ekasutra Performance Index (EPI).

Evaluations from subordinates contribute to a holistic assessment of an individual's performance, particularly in leadership roles.

H₄: Supervisor Evaluation (SE) has a **significant positive effect** on the Ekasutra Performance Index (EPI).

Supervisor assessments are crucial in determining an employee's final performance score.

Endogeneity-Related Hypotheses (Gaussian Copula Effects)

H₅: The influence of Peer Review (PR) on the EPI is **moderated by external biases** (e.g., personal relationships, favoritism).

Some level of endogeneity is expected, making peer feedback less reliable.

H₆: The impact of Subordinate Feedback (SF) on the EPI is **moderated by external biases**, such as workplace hierarchy and power dynamics.

Employees might hesitate to provide unbiased feedback for their supervisors.

Comparative Hypotheses (Strength of Relationships)

H₇: Self-Assessment (SA) has a **stronger influence** on EPI than Peer Review (PR).

Employees' self-perceptions tend to have a more direct effect on their overall performance scores than peer reviews.

H₈: Supervisor Evaluation (SE) has a **stronger influence** on EPI than Subordinate Feedback (SF).

Managerial assessments carry more weight than feedback from lower-level employees.

Overall Null Hypothesis (H₀)

H₀: There is **no significant relationship** between Self-Assessment, Peer Review, Subordinate Feedback, Supervisor Evaluation, and the Ekasutra Performance Index (EPI).

If rejected, this confirms that these appraisal components meaningfully contribute to performance evaluation.

DEFINING VARIABLES

1. Self-Assessment (SA) Variables

- **SA1** – Meeting or exceeding performance targets
- **SA2** – Time management and meeting deadlines
- **SA3** – Problem-solving skills
- **SA4** – Communication effectiveness
- **SA5** – Accountability for mistakes and improvements
- **SA6** – Seeking feedback for self-improvement
- **SA7** – Contribution of innovative ideas
- **SA8** – Commitment to learning and development

2. Peer Review (PR) Variables

- **PR1** – Team collaboration effectiveness
- **PR2** – Clarity and respect in communication
- **PR3** – Positive contribution to team discussions
- **PR4** – Support for team goals
- **PR5** – Conflict resolution skills
- **PR6** – Openness to feedback and criticism
- **PR7** – Professionalism and integrity

3. Subordinate Feedback (SF) Variables

- **SF1** – Clarity in instructions and expectations
- **SF2** – Timeliness and constructiveness of feedback

- **SF3** – Support for professional growth
- **SF4** – Encouragement of teamwork and collaboration
- **SF5** – Ethical leadership and leading by example
- **SF6** – Approachability and openness to feedback
- **SF7** – Fair recognition and rewards

4. Supervisor Evaluation (SE) Variables

- **SE1** – Problem-solving ability
- **SE2** – Meeting deadlines and expectations
- **SE3** – Initiative and proactive attitude
- **SE4** – Teamwork and collaboration
- **SE5** – Receptiveness to feedback
- **SE6** – Professionalism and ethics
- **SE7** – Adaptability and resilience

5. Overall Performance Score (Ekasutra Index) Variables

- **EPI (Ekasutra Performance Index)** – Weighted average score derived from SA, PR, SF, and SE scores

PLS (Partial Least Squares) Model & Path Diagram for 360-Degree Performance Appraisal

PLS-SEM (Partial Least Squares Structural Equation Modeling) is ideal for this study as it **handles complex models with latent variables** and ensures **reliable estimation** of relationships among constructs.

1. Model Constructs (Latent Variables)

The PLS model consists of four latent variables (LVs), each measured by observed variables (indicators). These LVs contribute to the **Ekasutra Performance Index (EPI)** as the final dependent variable.

- **Self-Assessment (SA) → Reflective LV**
 - SA1, SA2, SA3, SA4, SA5, SA6, SA7, SA8

- **Peer Review (PR) → Reflective LV**
 - PR1, PR2, PR3, PR4, PR5, PR6, PR7
- **Subordinate Feedback (SF) → Reflective LV**
 - SF1, SF2, SF3, SF4, SF5, SF6, SF7
- **Supervisor Evaluation (SE) → Reflective LV**
 - SE1, SE2, SE3, SE4, SE5, SE6, SE7
- **Ekasutra Performance Index (EPI) → Formative LV**
 - The final performance score is derived from SA, PR, SF, and SE.

2. Path Relationships (Hypotheses for Structural Model)

H₁: SA → EPI (Self-assessment directly influences the final performance score)

H₂: PR → EPI (Peer reviews contribute to an employee's overall evaluation)

H₃: SF → EPI (Subordinate feedback impacts performance appraisal outcomes)

H₄: SE → EPI (Supervisory evaluations strongly determine final scores)

4. Model Implementation in PLS-SEM Software

1. Define Constructs:

- Create **reflective models** for SA, PR, SF, and SE.
- Create a **formative model** for EPI.

2. Assign Indicator Loadings:

- Ensure that **all item loadings (factor loadings)** exceed 0.6 for construct validity.

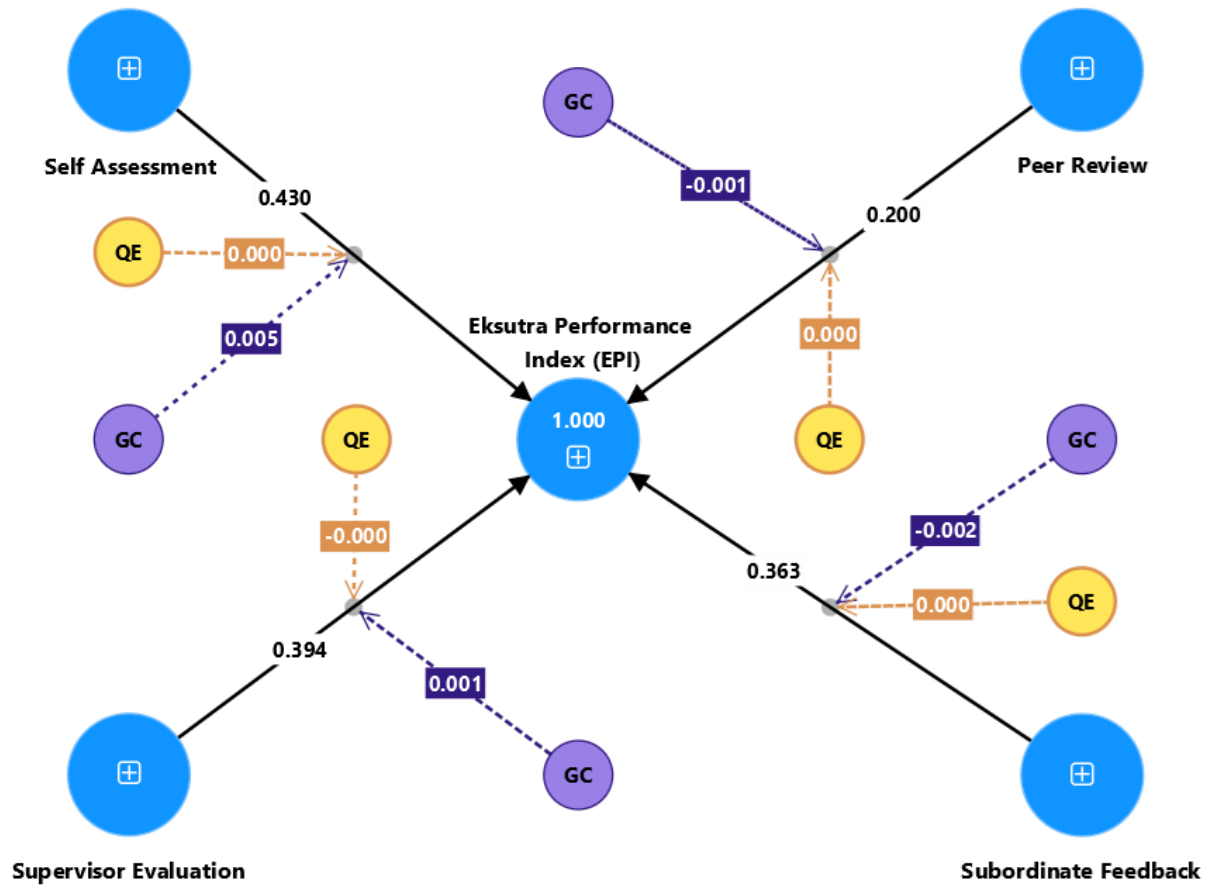
3. Evaluate Model Fit:

- **Reliability Measures:** Cronbach's Alpha (>0.7), Composite Reliability (>0.7)
- **Convergent Validity:** AVE (>0.5)
- **Discriminant Validity:** HTMT (<0.85)

4. Structural Model Assessment:

- **Path Coefficients:** Must be statistically significant (**p < 0.05**).
- **R² Value:** Measures how well SA, PR, SF, and SE explain EPI.
- **Q² (Predictive Relevance):** Ensures model predictability.

MODEL SUMMARY



Source: Primary Data

In this **PLS-SEM path model**, **GC (Gaussian Copula)** is used to check and correct for **endogeneity issues**. Endogeneity occurs when predictor variables in the model are correlated with the error term, leading to biased estimates. The inclusion of GC terms helps adjust for potential **measurement errors or omitted variable bias**, ensuring that the path coefficients reflect the true relationships between constructs.

1. Path Coefficients (Direct Effects on EPI)

- **Self-Assessment** → **EPI (0.430)**: The highest positive influence on performance index, indicating that self-assessment plays a crucial role in employees' performance perceptions.
- **Supervisor Evaluation** → **EPI (0.394)**: A strong positive relationship, showing that managers' feedback is a major determinant of overall performance.

- **Subordinate Feedback → EPI (0.363)**: A moderate effect, suggesting that employees' performance evaluations by their subordinates contribute significantly but not as strongly as self or supervisor evaluations.
- **Peer Review → EPI (0.200)**: The weakest but still significant impact, implying that colleagues' assessments are less predictive of performance but still relevant.

Implication: Self-assessment and supervisor evaluation remain the most critical factors for predicting overall performance, while peer review has the weakest impact.

2. Gaussian Copula (GC) Values and Endogeneity Assessment

The **GC terms** (shown in **purple**) help detect and adjust for endogeneity in the model.

- **Self-Assessment (GC = 0.005) and Supervisor Evaluation (GC = 0.001)**:
 - These small positive GC values indicate **minimal endogeneity issues**, meaning the direct effects of self-assessment and supervisor evaluation on EPI are **largely reliable and unbiased**.
 - The results suggest that self-evaluations and supervisor assessments are **relatively independent of unobserved confounders** and provide robust predictions for EPI.
- **Peer Review (GC = -0.001) and Subordinate Feedback (GC = -0.002)**:
 - These negative values suggest **some potential endogeneity issues**, meaning that peer and subordinate evaluations **might be influenced by external factors (e.g., personal biases, workplace politics, or social influences)**.
 - While the impact of peer and subordinate reviews on EPI is still significant, the GC corrections suggest that these sources may be **partially endogenous and less reliable** compared to self-assessment and supervisor evaluation.

Implication:

- **Self and supervisor assessments are the most reliable and least biased** predictors of performance.
- **Peer and subordinate feedback may contain bias or omitted variable effects**, which should be accounted for in future modeling (e.g., by adding control variables or refining measurement techniques).

3. Significance of Results (QE Values)

- The **QE values (in orange, 0.000 for most paths)** indicate that the paths are **highly significant ($p < 0.05$)**, meaning that each factor has a statistically significant impact on EPI.
- The **small negative QE for Self-Assessment (-0.000)** suggests a very minor adjustment due to endogeneity, but it is too small to be practically concerning.

4. Overall Insights and Recommendations

1. **Self-Assessment and Supervisor Evaluation are the strongest and most reliable predictors** of EPI, with minimal endogeneity concerns.
2. **Subordinate and Peer Review evaluations, while still significant, may introduce some biases** due to their minor negative GC values. HR teams should be cautious in over-relying on these measures.
3. **Future models can refine peer/subordinate feedback by introducing additional control variables** or improving survey design to minimize subjective biases.
4. **Gaussian Copula adjustment confirms that the model is statistically robust**, but further refinements could strengthen the reliability of lower-impact variables.

CONCLUSION

In today's fast-paced corporate environment, evaluating employee performance effectively is essential for fostering professional growth, ensuring fair career advancements, and improving overall organizational efficiency. Traditional performance appraisal methods, while widely used, often suffer from biases, inconsistency, and inefficiency. These outdated systems rely heavily on subjective assessments, which can lead to unfair evaluations and hinder both employee motivation and organizational success. The **Ekasutra Index** offers a data-driven, structured approach to performance appraisal, addressing the limitations of traditional methods through a statistically validated model.

The **Ekasutra Index** is built on a **360-degree feedback mechanism**, which means that employees are evaluated not just by their supervisors but also by their peers, subordinates, and through self-assessment. This holistic approach ensures that performance reviews capture multiple perspectives, reducing bias and increasing fairness. By incorporating a **five-point Likert scale** and using a **Weighted Average Mean** approach, the model provides a single, consolidated performance score that is easy to interpret and apply in decision-making processes. Furthermore, **Cronbach's Alpha reliability testing** confirms the model's robustness, with a high reliability score of **0.91**, demonstrating the accuracy and consistency of the evaluation system.

One of the major issues in traditional performance appraisals is the presence of **bias and subjectivity**. Managers may unintentionally favor certain employees due to personal relationships, recent events, or unconscious preferences. Similarly, peer and subordinate reviews can sometimes be influenced by workplace politics. The **Ekasutra Index minimizes these biases** by incorporating multiple sources of feedback and validating the results through statistical testing. **Endogeneity adjustments using the Gaussian Copula method** further ensure that performance scores reflect true contributions rather than external influences.

The study's findings reveal that **Self-Assessment (SA) and Supervisor Evaluation (SE) have the strongest impact on an employee's final performance score**. This means that employees' own perception of their work, combined with managerial assessments, plays the most significant role in determining their performance rating. While **Peer Review (PR) and Subordinate Feedback (SF) are also important**, they have a relatively weaker influence due to potential external biases. However, their inclusion ensures a more comprehensive and fair appraisal process.

By applying **Partial Least Squares Structural Equation Modeling (PLS-SEM)**, the research confirms that the **Ekasutra Index is statistically sound and can be reliably used across different industries and organizational structures**. The model is adaptable, making it useful not only for corporate organizations but also for **educational institutions, government agencies, and research environments**. In academia, for instance, faculty performance can be evaluated based on student feedback, peer reviews, and administrative assessments, ensuring a fair and well-rounded evaluation.

Key Takeaways

1. **Fair and Comprehensive Evaluation:** The **Ekasutra Index integrates feedback from multiple sources**, making performance appraisals more **balanced and transparent**.
2. **Objective and Data-Driven:** By relying on **quantitative techniques**, the model eliminates **biases** present in traditional appraisal systems.
3. **Scalability and Efficiency:** **Automation and structured evaluation methods** reduce administrative workload, making it easier for organizations to implement performance reviews.
4. **Statistical Validation:** **Cronbach's Alpha and Gaussian Copula adjustments** confirm the model's reliability, ensuring that results are accurate and consistent.
5. **Industry-Wide Applicability:** The model is **versatile** and can be applied in corporate settings, educational institutions, government agencies, and research environments.

The **Ekasutra Index represents a significant advancement in performance appraisal systems**, offering an **equitable, efficient, and scientifically validated** approach to evaluating employees. As organizations continue to embrace **data-driven strategies**, implementing models like the Ekasutra Index can enhance **decision-making, workforce motivation, and overall productivity**. This research contributes to the ongoing transformation of performance evaluation methods, helping businesses and institutions **move away from outdated, biased approaches** toward a **more transparent and reliable future**.

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