

1. INTRODUCTION

1.1 Background

PT. XYZ is the first and largest Industrial Gas Company in Indonesia with the most extensive distribution network strategically located across various regions in the country. The company offers a wide range of Industrial gases in both gaseous and liquid form serving numerous industries, including healthcare, infrastructure, manufacturing, and others. With an estimated 4100 employees spread across different directorates, backgrounds, and job positions, the majority of its employees are 86% male. To maintain this prominent role in Indonesia, PT. XYZ is required to innovate and evolve while prioritizing its people continuously. Attracting and retaining talented employees is critical to maintaining this competitive edge (Dibble, 1999). As a core strategy for sustainable business transformation, PT. XYZ emphasizes more towards the development of human resource competencies.

In a highly competitive and globalized environment, PT. XYZ must ensure both high-quality and efficient human resource management. To this end, statistical analysis is a vital tool for identifying employees worth retaining, which is critical given the high cost of employee turnover, ranging from half to 200% of an employee's annual salary (Hebenstreit, 2008). Successful employee retention directly contributes to an organization's stability, growth, and revenue (Cloutier et al., 2015). Retaining top-performing employees through competitive compensation is essential; however, there is limited research on using statistical methods to identify high performers and allocate better compensation. Performance evaluations at PT. XYZ is typically based on supervisors' perspectives, which can introduce subjectivity, leading to employee demotivation and strained relationships between supervisors and subordinates (Van Rinsum & Verbeeten, 2012). These issues often result in higher employee turnover rates. Although the experience of these supervisors is essential and truly valuable, the accuracy of their evaluations tends to decline as team size grows and the number of factors to consider increases.

This process could lead to a negative impact on decision making regarding employee retention, increasing recruitment cost and training costs, compensating wrong employees and limiting opportunities for growth and expansion of PT. XYZ. Therefore PT. XYZ needs more advanced information tools to help them analyze which employees deserve additional compensation compared to the others.

A key evaluation tool at PT. XYZ is the Key Performance Indicator (KPI) score of individual employees. However, large organizations often face challenges in ensuring fair and accurate compensation due to the diversity of the KPI Systems in use. Different teams might have different KPI Parameters, and even within the same team, individual employees might be evaluated using different metrics, which results in incomparable performance. For instance, employees with higher KPI scores may contribute less significantly compared with the ones who demonstrate lower scores but have a higher contribution to the company. As a result, relying simply on the KPI Scores to determine compensation can lead to inaccurate and unfair decisions and bias towards certain job standards.

With this objective, in this article, a method is proposed to perform a statistical compensation framework obtained from the employee performance in each directorate by the use of Shapley Value (Hart, S., 1989). The main idea of the compensation framework is to compare each of the employee contributions with the supervisor's performance, which in this case would be the representative of the team KPIs. The main assumption of this framework is that managers and directors share accountability for staff performance through performance-linked incentives, encouraging strategic planning and active engagement with KPIs. Hence, the performance of a manager/director is also a reflection of his/her team members (not just an individual performance).

The Shapley Value is a solution in a cooperative game theory, which takes into account each participant's collaboration with others and calculates their marginal contribution to the total value created by the cooperation or the group. It then allocates the cooperative gain based on the average marginal contribution of each participant across all coalitions ensuring a fair distribution (Zhao et al., 2024). This participant's collaboration is obtained by analyzing interactions effect between each individual contribution and possibility of individual collaboration relative to the supervisor's KPI. To model the relative importance of each individual in a team, a Shapley Value Regression is used (Liang, 2021).

However the employee KPI available at PT. XYZ varied in terms of the scale, generally speaking, there are 4 different types of KPIs available at PT. XYZ (see Table 1.1).

Table 1.1

Types of KPIs Available at PT. XYZ

KPI Type	Description	Logic
Type 1	Proportional Without Capping	% Accomplishment = Realization / Target
Type 2	Proportional With Capping (100%)	% Accomplishment = Realization / Target if % Accomplishment > 1
Type 3	+/- based on weight	If Target Achieved 1 Else -1
Type 4	0 or based on weight	If Target Achieved 1 Else 0

Simple arithmetic operations on the above KPIs may result in a negative value or positive values above 100%, which leads to invalid comparisons between each employee. So to standardize this value between 0 to 1, this paper utilizes the preference function available from the promethee function (Brans & Mareschal, 2006).

1.2 Problem Formulation

Based on the background described above, the problem formulation is:

1. PT. XYZ, Indonesia's largest industrial gas company, faces challenges in retaining top-performing employees in a competitive and globalized environment.
2. Performance evaluations are primarily subjective, relying on supervisors' perspectives, which are prone to bias, especially as team sizes grow and complexity increases.
3. Bias in evaluations may demotivate employees, strain workplace relationships, and result in unfair compensation decisions, negatively impacting retention and organizational growth.
4. PT. XYZ employs a diverse range of KPI systems (four types) across teams, leading to inconsistent and incomparable performance assessments.
5. KPI values can be on different scales, with simple arithmetic comparisons yielding inaccurate and misleading results (e.g., values below 0 or above 1).
6. Reliance on subjective evaluations or raw KPI scores for compensation decisions risks over-rewarding less impactful employees while under-rewarding high contributors.

1.3 Research Objectives

Based on the formulation of the problem above, the aim of this research is:

1. Create a robust, data-driven framework to evaluate employee contributions across diverse roles and teams, ensuring equitable compensation that aligns with individual performance.
2. Introduce statistical methods to reduce reliance on supervisor-based assessments, thereby minimizing biases and enhancing the accuracy and transparency of evaluations.
3. Establish methods to identify high-performing employees objectively based on their marginal contributions, ensuring they are appropriately compensated to improve retention and motivation.

1.4 Research Benefits

This research is expected to be useful for:

1. For PT. XYZ (Organizational level) this research could help PT. XYZ to retain top talent, lowering turnover rates and any associated costs. This research also helps to motivate the employees to contribute more to the organizational efficiency and success, reducing recruitment, onboarding, and training expenses by retaining high-performing employees and fostering long-term organizational stability and competitive advantage.
2. For employees of PT. XYZ, employees benefit from reduced subjectivity in performance evaluation, and high-performing employees are accurately identified and rewarded based on the contributions made.
3. For the human resources and leadership teams, this research helps the HR Teams gain access to advanced tools for identifying and rewarding top contributors and addressing the underperformers. The insights obtained could also support the HR Team in aligning the workforce capabilities with the organizational goals.
4. For the researchers, this provides a novel application of the Shapley Value in Human Resource Management, and researchers/practitioners can adapt the findings for use in similar organizational contexts.