Analysis of Human Resource Performance Using the Human Resources Scorecard Method in The Production Department at PT. X

Heri Irawan, Ayu Anggraeni Sibarani[ID], M. Iqmal Maulidist Hasan*

Department of Industrial Engineering, Universitas Jenderal Soedirman, Purbalingga, 53371, Indonesia
*Corresponding Author: iqmalhasan17@gmail.com

ABSTRACT

PT X is a manufacturing company engaged in the sector of herbal medicines, cosmetics, household supplies, and medical equipment. At PT X there are several problems that can lead to a decrease in the performance of human resources in the company's production department, including the production of capsule drugs that do not reach their targets, a lack of employee motivation at work, and a lack of employee discipline. Based on these issues, PT X is required to implement a performance measurement based on the Human Resources Scorecard (HRSC) method and the Analytic Network Process (ANP) method in order to weight its performance indicators. The objective of this study is to measure the human resource performance of the production department of PT X and determine the performance indicators that require the most improvement. The results of measuring human resource performance using the Human Resource Scorecard indicate that the value of human resource performance in employees of PT X is 2,555613 and it can be concluded that the HR performance is in the not good category because the HR performance value of production department of PT X is in the range of 1,8 - 2,6. The perspective that must be prioritized by PT X in improving its HR performance is the financial perspective because it has the lowest perspective value, precisely on the objective strategy of increasing employee effectiveness because it has the greatest priority weight and the KPI achievement score is very low, which is 1.

Keyword: Analytic Network Process, Human Resources Scorecard, Performance Indicators, Performance Measurement, Performance of Human Resources

ABSTRAK

PT X merupakan perusahaan manufaktur yang bergerak di bidang obat-obatan herbal, kosmetik, perlengkapan rumah tangga, dan alat kesehatan. Pada PT X terdapat beberapa permasalahan yang dapat menyebabkan penurunan kinerja sumber daya manusia (SDM) di departemen produksi perusahaan, antara lain produksi obat kapsul yang tidak mencapai target, kurangnya motivasi karyawan dalam bekerja, dan kurangnya kedisiplinan karyawan. Berdasarkan permasalahan tersebut, PT X perlu melakukan kinerja menggunakan metode *Human Resources Scorecard* (HRSC) dan metode *Analytic Network Process* (ANP) sebagai pembobotan terhadap indikator-indikator kinerjanya. Tujuan dari penelitian ini adalah untuk mengukur kinerja sumber daya manusia bagian produksi PT X dan menentukan indikator kinerja yang prioritas untuk dilakukan perbaikan. Hasil pengukuran kinerja sumber daya manusia dengan menggunakan *Human Resource Scorecard* menunjukkan bahwa nilai kinerja sumber daya manusia pada karyawan PT X adalah sebesar 2,555613 dan dapat disimpulkan bahwa kinerja SDM berada pada kategori kurang baik karena nilai kinerja SDM departemen produksi PT X berada pada rentang 1,8 - 2,6. Perspektif yang diprioritaskan untuk dilakukan perbaikan oleh PT X dalam meningkatkan kinerja SDM adalah perspektif keuangan karena memiliki nilai perspektif yang paling rendah, tepatnya pada strategi objektif peningkatan efektivitas karyawan karena memiliki bobot prioritas yang paling besar dan nilai pencapaian KPI yang sangat rendah yaitu 1.

Kata Kunci: Analytic Network Process, Human Resources Scorecard, Indikator Kinerja, Kinerja Sumber Daya Manusia, Pengukuran Kinerja

1. Introduction

The performance level of a company can be gauged by its human resources, which represent a significant factor in the realization of the company's vision and become one of the valuable assets for the company [1]. The company's streamlined production process is designed to align with the capabilities of its human resources, underscoring the importance of effectively managing and optimizing the performance of these resources within the production department [2]. Human resources should be able to become a value for the company so that performance measurements must continue to be carried out in order to support company goals [3]. In order to achieve its vision, mission, and goals, each company must implement a strategy that enables it to compete effectively and utilize resources in the most efficient manner possible [4].

PT X is a company that operates within the sector of herbal medicines, cosmetics, household supplies, and medical equipment supplies. The company's product range includes Mom Uung, Albuforce, Temufit, Cessa, Artrivit, Neolift, and others. Based on interviews conducted with the HRD manager of PT X, several problems affecting the performance of human resources in the company's production department have been identified. These include the production of capsule drugs that do not reach their targets, a lack of employee motivation at work, and a lack of discipline, as evidenced by employees who are late or still negligent in carrying out their duties. Furthermore, performance assessment in this organization is confined to the utilization of key performance indicators (KPI) without any weighting. This is because PT X considers that each KPI has the same level of importance and the company can more easily adjust or add new KPI without the need to change the overall weight. In light of these issues, it is imperative for PT X to implement a performance measurement system that allows for the identification of areas requiring improvement.

One potential approach for measuring human resources performance is the use of the Human Resources Scorecard (HRSC) [5]. This study employs the Human Resources Scorecard (HRSC) as a performance measurement tool to assess the role of human resources (HR) in value creation within the production department of PT X. The HRSC is a method for evaluating the effectiveness of HR practices in a company [6]. The HRSC method allows for the determination of performance assessment indicators across four distinct perspectives: financial, customer, internal business processes, and learning and growth [7]. The Human Resources Scorecard (HRSC) method offers a distinct advantage over other measurement methods. Unlike other methods, the HRSC provides a clear understanding between human resources work results that affect the implementation of organizational strategies (human resources deliverables) and human resources doable. This distinction is crucial as other measurements of HR work results cannot assess the contribution of the human resources section to strategy implementation [8].

In order to obtain a weighted value for a given performance indicator, it is possible to make a pairwise comparison using the HRSC [3]. This weighting is employed to ascertain which indicators exert the most influence on the company's human resource performance. One method for determining indicator weights is the Analytic Network Process (ANP) [9]. In this study, the method employed to obtain the weight of performance indicators is the Analytic Network Process (ANP). ANP is a multicriteria measurement theory that is employed to obtain relative priorities. It allows for interaction and feedback from elements within clusters and between clusters [10]. The advantage of ANP is that it has a network structure that enables feedback from each cluster, which distinguishes it from other methods as a more complex approach [11].

In light of the aforementioned description, it is imperative to conduct a comprehensive examination of the measurement of human resource performance at PT X through the utilization of the Human Resources Scorecard (HRSC) method and weighting through the Analytic Network Process (ANP). With the hope of measuring human resource performance in the production department of PT X and determine the performance indicators that require the most improvement so that it can produce competitive actions in the form of efforts to improve human resource performance in the future.

2. Method

The objective of the research was to evaluate the performance of the human resources in the production department of PT X and identify the performance indicators that require improvement. In regard to the stages of the study, namely the weighting of performance indicators using the Analytic Network Process (ANP) method. The weighting is based on the results of a paired comparison questionnaire completed by respondents. Performing performance measurement, at this juncture the weighted score is calculated based on the multiplication of the score results by the weight of the perspective and strategic objectives. The resulting

perspective-weighted score and the overall weighted score will be obtained. Once the performance of human resources has been evaluated, the subsequent step is to identify the underlying causes of the problem. A fishbone diagram is a diagram used to identify the causes of a problem.

2.1. Human Resources Scorecard

The Human Resources Scorecard (HRSC) is a performance measurement tool that assesses the contribution of human resources to value creation within the organizational context. [6]. In HRSC, the role of HR management becomes a strategic asset and HR's contribution to organizational success, so HRSC can set priorities in terms of capabilities and provide appropriate approaches for managers and staff[12]. The concept of the Human Resource Scorecard is of great importance and strategic value. The work of the entire HR apparatus is essential for the success of any organization. Without the contribution of HR, a company will not have any value [13].

HRSC is structured around four key perspectives: financial, customer, internal business process, and learning and growth [6]. The financial perspective in HRSC delineates the requisite efforts to achieve success in the domain of finance, in addition to the methodology for evaluating the outcomes of financial endeavors [14]. The internal business process perspective delineates the manner in which an organization executes the various stages of activity involved in the production of products or services for its customers [15]. From a learning and growth perspective, the company's human resources are regarded as a significant asset. It is imperative that the company be able to cultivate and nurture its human resources [14].

To calculate this measurement, it is necessary to determine the weight value of the performance indicator and performance score. The overall performance of the human resources can be quantified using Equation 1[16].

Human Resources Performance Score = $\sum$ (performance indicator weight x performance indicator score)   (1)

The assessment score criteria can be seen in Table 1 [17].

Table 1. Performance Criteria

Score	Criteria
≤ 1.8	Not very good
1,8 – 2,6	Not good
2,6 – 3,4	Moderate
3,4 – 4,2	Good
4,2 – 5,0	Very good

2.2. Analytic Network Process

The Analytic Network Process (ANP) represents an advanced methodology within the Analytic Hierarchy Process (AHP) framework. It is designed to address the limitations of traditional AHP approaches by decomposing complex systems into a hierarchy of decision criteria and sub-criteria [18]. The ANP method has the potential to address deficiencies in the AHP, such as the skill of accommodating the relationship between groups and alternatives. In AHP, all existing criteria must be interrelated in a hierarchy. In contrast, ANP allows for the interrelation and disrelation of criteria, with the latter occurring when criteria are not related. In such cases, the criteria are valued [19]. In AHP, all criteria must be interrelated in a hierarchy. In contrast, in ANP, all criteria can be related and unrelated. In the event that any criterion is unrelated, it is nevertheless considered valuable. The advantages of ANP include those of AHP, such as flexibility, the capacity to employ both quantitative and qualitative criteria simultaneously, and the ability to assess the consistency of judgments [20]. The following steps are required to utilise the ANP method:

1. The process of structuring the problem and linkage model elucidates the interrelationship between the sub-criteria (nodes) and the criteria (clusters). This network model will subsequently serve as a reference for the manual calculation of weights using the ANP method.

2. It is necessary to determine the weighting of the criteria and components from the perspective of the respondent. The weighting employs a verbal scale expressed on a numerical scale of 1 to 9 in order to assess the comparative degree of purpose of one element in relation to another.

3. A pairwise comparison matrix is created in this sector, wherein the relative importance of one element in comparison to another is determined. In certain comparisons, a scale of 1 to 9 is employed to quantify the relative importance of one type in comparison to another. The Pairwise Comparison Matrix can be calculated using the following equation [10]:

$$\begin{bmatrix} \frac{W_1}{W_1} & \frac{W_1}{W_2} & \frac{W_1}{W_n} \\ \frac{W_2}{W_1} & \frac{W_2}{W_2} & \frac{W_2}{W_n} \\ \frac{W}{W_1} & \frac{W_n}{W_2} & \frac{W_n}{W_n} \end{bmatrix} = \begin{bmatrix} W_{11} & W_{12} & W_{1n} \\ W_{21} & W_{22} & W_{2n} \\ W_{n1} & W_{n2} & W_{nn} \end{bmatrix} \tag{2}$$

4. The eigenvector of the matrix, which has been created in Stage 1, is the priority weight of the matrix and is subsequently employed in the supermatrix series. The calculation of eigenvectors is performed according to the following equation [10]:

$$\lambda = \frac{\Sigma(\frac{W_{ij}}{\Sigma W_j})}{n} \tag{3}$$

Where: λ represents the Eigenvector, while W_{ij} denotes the column cell values in a row. $\sum W_j$ refers to total number of columns, and n signifies the Number of matrices compared.

5. In order to calculate the Consistency Ratio, it is necessary to determine whether the score is greater than 10%. If this is the case, it is necessary to correct the assessment of the decision data. Conversely, if the consistency ratio is closer to zero, this indicates that the score is better and demonstrates the consistency of the comparison matrix. The Consistency Index can be calculated using the following equation [10]:

$$CI = \frac{\lambda\max - n}{n-1} \tag{4}$$

Where CI is defined as consistency index, λmax represents the largest eigenvalue, and n signifies the number of elements compared.

The equation below can be used to calculate the consistency ratio [10]:

$$CR = \frac{CI}{RI} \tag{5}$$

Where CR is defined as Consistency Ratio, CI is defined as Consistency Index, and RI is defined as Random Index.

6. The Supermatrix is a method of acquiring eigenvectors from multiple comparisons between clusters, criteria, and alternatives. It is comprised of three distinct steps, as outlined below:

a. The unweighted supermatrix is derived by inputting the various eigenvector scores obtained from the pairwise comparison of the sub-criteria matrices.

b. The weighted supermatrix is derived by multiplying each element in the unweighted supermatrix by the cluster matrix.

c. The limiting supermatrix is formed by applying a consistent weighting to the weighted supermatrix until the values in each column in a row are similar.

3. Result and Discussion
3.1. Weighting of Performance Indicators Using the ANP Method

This ANP network model was developed through a collaborative process involving key stakeholders from PT X, including the production manager, HRD manager, production head, production supervisor, and HRD staff. The ANP network model at PT X created using the Super Decision application can be seen in Figure 1.
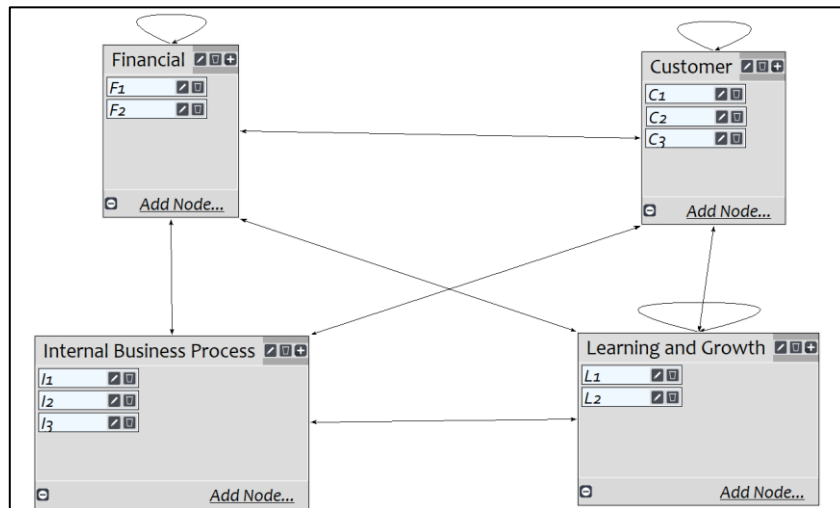
Figure 1. Network Model

The weighting process is initiated with the construction of a linkage model, which elucidates the interrelationship between the sub-criteria (nodes) and the criteria (clusters). The ANP network model for performance indicator weighting is divided into four clusters: financial, customer, internal business process, and learning and growth perspectives. The financial cluster is comprised of two nodes: increasing employee effectiveness (F1) and increasing employee recruitment efficiency (F2). The customer cluster comprises three nodes: increased employee responsibility (C1), increased employee loyalty (C2), and increased employee satisfaction (C3). The internal business process cluster is comprised of three nodes: the provision of bonuses (I1), the enhancement of quality relationships (I2), and the improvement of occupational safety and health (I3). The learning and growth cluster comprises two nodes: increasing employee skills (L1) and increasing employee knowledge (L2).

The node of increasing employee effectiveness is related to nodes C1, I1, L1, and L2. The node of increasing employee recruitment efficiency is linked to nodes F1. The node of increasing employee responsibility is linked to nodes F1, I1, I2, I3, L1, and L2. The node of increasing employee loyalty is related to nodes F1 and F2. The node of increasing employee satisfaction is associated with nodes F1, F2, C1, and C2. The node associated with the provision of bonuses is linked to nodes F1, C1, C2, C3, and L1. The node representing an improvement in quality relationships is associated with nodes F1, C1, C2, and C3. The nodes of improving occupational safety and health have a relationship with nodes F1, C2, and C3. The employee skill improvement node has a relationship with nodes F1, I1, I2, and I3. The node increasing employee knowledge has a relationship with nodes F1, C1, I2, I3, L1.

The indicator weights are obtained from the limiting supermatrix. This supermatrix is formed by lifting the weighted supermatrix consistently until the values in each column in a row are similar. The results of the limiting supermatrix can be seen in Table 2.

Table 2. Limiting Supermatrix

	F1	F2	C1	C2	C3	I1	I2	I3	L1	L2
F1	0,40192	0,40192	0,40192	0,40192	0,40192	0,40192	0,40192	0,40192	0,40192	0,40192
F2	0,00934	0,00934	0,00934	0,00934	0,00934	0,00934	0,00934	0,00934	0,00934	0,00934
C1	0,25050	0,25050	0,25050	0,25050	0,25050	0,25050	0,25050	0,25050	0,25050	0,25050
C2	0,01043	0,01043	0,01043	0,01043	0,01043	0,01043	0,01043	0,01043	0,01043	0,01043
C3	0,01141	0,01141	0,01141	0,01141	0,01141	0,01141	0,01141	0,01141	0,01141	0,01141
I1	0,06684	0,06684	0,06684	0,06684	0,06684	0,06684	0,06684	0,06684	0,06684	0,06684
I2	0,00628	0,00628	0,00628	0,00628	0,00628	0,00628	0,00628	0,00628	0,00628	0,00628
I3	0,03668	0,03668	0,03668	0,03668	0,03668	0,03668	0,03668	0,03668	0,03668	0,03668
L1	0,12592	0,12592	0,12592	0,12592	0,12592	0,12592	0,12592	0,12592	0,12592	0,12592
L2	0,08063	0,08063	0,08063	0,08063	0,08063	0,08063	0,08063	0,08063	0,08063	0,08063

The limiting supermatrix value represents the weight to be assigned to each performance indicator for the purpose of measuring human resource performance. Table 2 illustrates the weight assigned to each performance indicator. The weight of F1 is 0,40192, F2 is 0,00934, C1 is 0,25050, C2 is 0,01043, C3 is

0,01141, I1 is 0,06684, I2 is 0,00628, I3 is 0,03668, L1 is 0,12592, and L2 is 0,08063. The results of this analysis indicate that the performance indicator with the highest weight value is an increase in employee effectiveness, with a weight value of 0,40192. This indicator has the greatest influence on improving HR performance.

3.2. *Human Resources Performance Measurement*
Recapitulation of human resource performance measurement can be seen in Table 3.

Table 3. Recapitulation of Human Resource Performance Measurement

Perspective	Objective Strategy	KPI	Weight	Goal 2023	Real	Score	Weighted Score	Perspective Performance Value
Financial	Increased employee effectiveness (F1)	Percentage of good product output with production target	0,401927	100%	96%	1	0,401927	0,448644
	Improved efficiency of employee recruitment (F2)	Total employee recruitment costs	0,009343	0 rupiah	0 rupiah	5	0,046717	
Customer	Increased employee responsibility (C1)	Percentage of employee tardiness in a year	0,250505	0% delay	5,14% delay	3	0,751514	0,850327
	Increased employee loyalty (C2)	Employee turnover rate	0,010437	0%	4,65%	4	0,041750	
	Improved employee welfare (C3)	Employees who receive coverage	0,011413	All employees	All employees	5	0,057064	
Internal Business Procss	Bonus provision (I1)	Percentage of employees who received bonuses to employees who are eligible to receive bonuses	0,066848	100%	100%	5	0,334241	0,475707
	Improved quality relationship (I2)	Percentage of briefings every shift	0,006280	100%	100%	5	0,031398	
	Improved occupational health and safety (I3)	Number of work accidents	0,036689	0 work accidents	2 work accidents	3	0,110068	
Learning and Growth	Employee skill enhancement (L1)	Percentage of rejected products	0,125927	1%	2,51%	3	0,377781	0,780935
	Increased employee knowledge (L2)	Number of employees who passed basic training	0,080631	all employees	all employees	5	0,403154	
	Human Resource Performance Criteria							2,555613 Not good

Performance measurement using the HRSC method in the production department of PT X resulted in a financial perspective value of 0,448644, a customer perspective value of 0,850327, an internal business process perspective value of 0,475707, and a learning and growth perspective value of 0,780935. Then, the total HR performance value of production employees of PT X is 2,555613 and it can be concluded that the HR performance is in the not good category because the HR performance value of production department of PT X is in the range of $1,8 <$ HR performance value $\leq 2,6$. Therefore, the company must immediately improve the performance of its human resources. The perspective that must be prioritized by PT X in improving its HR

performance is the financial perspective because it has the lowest perspective value, precisely on the objective strategy of increasing employee effectiveness because it has the greatest priority weight and the KPI achievement score is very low, which is 1. This aims to make the performance of human resources in the production department of PT X better in the future.

3.3. Fishbone Diagram

Table 2. indicates that the financial perspective is the most critical for PT X to prioritize in order to enhance its HR performance. This conclusion is based on the fact that the financial perspective has the lowest perspective value, specifically with regard to the objective strategy of increasing employee effectiveness. This is evidenced by the fact that the priority weight assigned to this perspective is the highest, and the KPI achievement score is notably low, at 1. Consequently, the objective strategy that requires the most attention is that of increasing employee effectiveness. The fishbone diagram was constructed based on the findings of interviews conducted with key personnel at PT X, including the production manager, production operator, and mechanical engineer. The resulting fishbone diagram for the low value of employee effectiveness is presented in Figure 2.
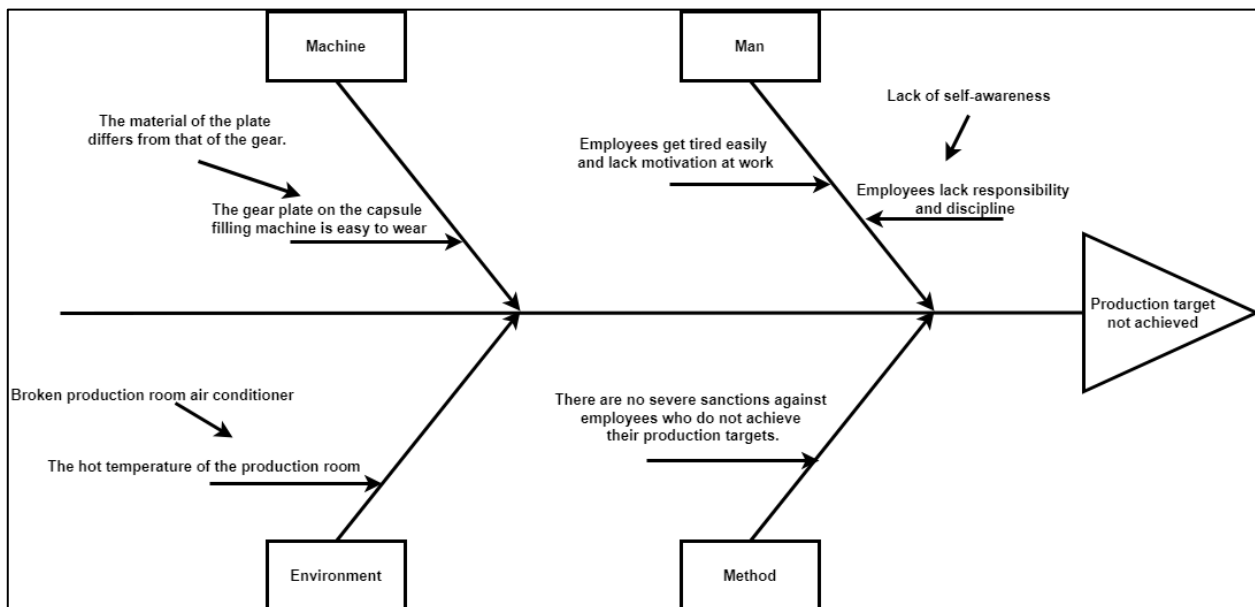

Figure 2. Fishbone Diagram

Fishbone diagram suggests that four key factors may be responsible for the observed production target not achieved of PT X: man, machine, method, and environment. The problem with the man factor is that employees are tired because the workload exceeds their capacity, lack of motivation at work, employees are less responsible and undisciplined due to lack of employee self-awareness. This can cause the production target in 2023 not to be achieved. The problem with the machine factor is that the gear plate on the capsule filling machine wears out easily because the gear plate material is different from the gear. This can cause a breakdown in the capsule filling machine. The problem with the method factor is that there are no severe sanctions for employees who do not achieve their production targets. This causes the guilty may feel emboldened to repeat the same offense. And the problem with the environment factor is that the production room is hot because the air conditioner in the room is broken. This can cause employees to feel uncomfortable, can interfere with employee concentration and focus.

3.4. Proposed Improvements

The proposed enhancements to enhance low employee effectiveness in the production department of PT X are presented in Table 4.

Table 4. Proposed Improvements

Factor	Problem	Proposed Improvements
Man	Employees lack responsibility and discipline	Provide training programs that focus on developing work ethics, discipline, and time management skills.

Factor	Problem	Proposed Improvements
	Employees get tired easily and lack motivation at work	It is recommended that a workload analysis be conducted of production employees to ensure that the workload is commensurate with their capacity, with the objective of avoiding fatigue and stress. Subsequently, it is recommended that appropriate incentives be provided as a means of expressing gratitude for exemplary performance, such as bonuses, salary increases, and promotions.
Machine	The gear plate on the capsule filling machine is easy to wear	The replacement of the plate with a plate of the same material as the gear is a viable solution.
Method	There are no severe sanctions for employees who do not achieve their production targets.	Provide appropriate sanctions for employees who do not achieve their targets.
Environment	The hot temperature of the production room	The production room air conditioner was checked and repaired.

4. Conclusion

The measurement of human resource performance using the Human Resource Scorecard (HRSC) indicates that the value of human resource performance in the production employees of PT X is 2,555613. This value can be classified as indicative of sufficient human resource performance, given that the HR performance value of the production department of PT X is within the range $1,8 <$ HR performance value $\leq 2,6$. Therefore, the company must immediately improve the performance of its human resources. The perspective that must be prioritized by PT X in improving its HR performance is the financial perspective because it has the lowest perspective value, precisely on the objective strategy of increasing employee effectiveness because it has the greatest priority weight and the KPI achievement score is very low, which is 1.

References

[1] A. F. F. Madjri and B. Santoso, "Pengukuran Kinerja Sumber Daya Manusia Dengan Menggunakan Metode Human Resources Scorecard Di Pt. Xyz," *Juminten*, vol. 2, no. 2, pp. 1–12, 2021, doi: 10.33005/juminten.v2i2.227.

[2] S. Phiong and D. Surjasa, "Pengukuran Kinerja Sumber Daya Manusia dengan Pendekatan Human Resources Scorecard dan Alat Ukur OMAX (Objective Matrix) pada Bagian Produksi PT. Fajarindo Faliman Zipper," *J. Tek. Ind.*, vol. 8, no. 3, pp. 213–227, 2018, doi: 10.25105/jti.v8i3.4735.

[3] D. Diniaty, "Pengukuran Kinerja Sumber Daya Manusia Dengan Metode Human Resources Scorecard (Hrsc)," *J. Tek. Ind.*, no. November, pp. 74–92, 2019, [Online]. Available: http://repository.unika.ac.id/id/eprint/20680

[4] M. Ferri and A. Prasetyo, "Analisis Pengukuran Kinerja Sumber Daya Manusia Melalui Metode Human Resources Scorecard (Studi Kasus Badan Penyelenggara Jaminan Produk Halal)," vol. 3, pp. 3400–3410, 2023.

[5] Amelia, P. Nerito, and N. A. Damayanti, "Analysis of Human Resources Performance Measurement by Human Resources Scorecard Method at Hospital in Surabaya," *Indian J. Public Heal. Res. Dev.*, vol. 10, no. 6, pp. 391–397, 2019, doi: 10.5958/0976-5506.2019.01304.4.

[6] B. E. D. Becker, *The HR Scorecard:* Mengaitkan Manusia, Strategi dan Kinerja, Diterjemahkan Dian Rahadyanto Basuki. Erlangga. Jakarta: Esensi, 2009.

[7] J. Hardi *et al.*, "Human Resource Scorecard (HRSC) and Objective Matrix as Performance Measurement and Performance Booster Method to Optimize Production Performance," *Int. J. Multicult. Multireligious Underst.*, vol. 6, no. 6, p. 173, 2019, doi: 10.18415/ijmmu.v6i6.1200.

[8] J. Basalamah, "Keunggulan Penerapan Human Resources Scorecard dalam Pengukuran Kinerja," *J. Tek. Ind.*, vol. 1, no. 2, pp. 1–23, 2019, [Online]. Available: https://www.academia.edu/20382346/Keunggulan_Penerapan_Human_Resources_Scorecard_dalam_Pengukuran_Kinerja

[9] L. E. Quezada, D. E. Aguilera, P. I. Palominos, and A. M. Oddershede, "An ANP Model to Generate Performance Indicators for Manufacturing Firms Under a Balanced Scorecard Approach," *EMJ - Eng. Manag. J.*, vol. 34, no. 1, pp. 70–84, 2022, doi: 10.1080/10429247.2020.1840877.

[10] T. L. Saaty and L. G. Vargas, *Decision Making with the Analytic Network Process*.

[11] M. I. Baskoro, D. Andreswari, and A. Johar, "Sistem Pendukung Keputusan Untuk Menentukan Siswa Berprestasi Menggunakan Metode Analytical Network Process (ANP) Berbasis Web (Studi Kasus SMA Negeri 1 Bengkulu Utara)," *Rekursif J. Inform.*, vol. 9, no. 1, pp. 14–29, 2021, doi: 10.33369/rekursif.v9i1.14984.

[12] N. Abbas, A. Sukmawati, and M. Syamsun, "Rancangan Sistem Pengukuran Kinerja Berbasis Human Resource Scorecard Pada Universitas Muhammadiyah Luwuk," *J. Manaj. dan Organ.*, vol. 10, no. 1, pp. 63–71, 2020, doi: 10.29244/jmo.v10i1.28861.

[13] M. Guix and X. Font, "The Materiality Balanced Scorecard: A framework for stakeholder-led integration of sustainable hospitality management and reporting," *Int. J. Hosp. Manag.*, vol. 91, no. July, p. 102634, 2020, doi: 10.1016/j.ijhm.2020.102634.

[14] Wisnubroto, "Penilaian Kinerja Karyawan dengan Pendekatan Metode Human Resouces Scorecard (HRSC) di CV Jati Barokah Raha Kabupaten Muna," vol. 11, no. Juni, pp. 17–23, 2018.

[15] S.Pratama & and I. Ismail, "Mengukur Kinerja dengan HR Scorecard (Studi Pada PT BPRS Bhakti Sumekar, Sumenep)," *Semin. Nas. dan Call Pap. Sustain. Compet. Advant. 8*, no. September, pp. 1–13, 2018, [Online]. Available: http://jp.feb.unsoed.ac.id/index.php/sca-1/article/view/1227

[16] D. Yulianti, "Perancangan Sistem Manajemen Kinerja Sdm Berbasis Human Resources Scorecard Di Pt Asia Penta Garment," *Sainteks J. Sains dan Tek.*, vol. 1, no. 1, pp. 1–16, 2019, doi: 10.37577/sainteks.v1i1.106.

[17] H. Zaini and A. Suryadi, "Analisis Kinerja Perusahaan Dengan Metode Human Resource Scorecard (Hrsc) Di Cv. Xyz," *Juminten*, vol. 1, no. 1, pp. 151–161, 2020, doi: 10.33005/juminten.v1i1.70.

[18] A. Keyvanfar, A. Shafaghat, N. Ismail, S. Mohamad, and H. Ahmad, "Multifunctional Retention Pond For Stormwater Management: A Decision-Support Model Using Analytical Network Process (ANP) and Global Sensitivity Analysis (GSA)," *Ecol. Indic.*, vol. 124, no. December 2020, p. 107317, 2021, doi: 10.1016/j.ecolind.2020.107317.

[19] Y. E. Windarto, I. P. Windasari, and O. Winarto, "Implementasi Analytic Network Process untuk Penentuan Tempat Pembuangan Akhir," *J. Komput. Terap.*, vol. 6, no. Vol. 6 No. 1 (2020), pp. 47–58, 2020, doi: 10.35143/jkt.v6i1.3480.

[20] S. Kheybari, F. M. Rezaie, and H. Farazmand, "Analytic Network Process: An Overview of Applications," *Appl. Math. Comput.*, vol. 367, p. 124780, 2020, doi: 10.1016/j.amc.2019.124780.