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PROPOSED PERFORMANCE MANAGEMENT SYSTEM IN FMCG REGIONAL DISTRIBUTION CENTRE USING KNOWLEDGE-BASED PERFORMANCE MANAGEMENT SYSTEM AND SUPPLY CHAIN OPERATION REFERENCES (SCOR) 12 METHOD

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Abstract

Some Fast-Moving Consumer Goods (FMCG) companies in Indonesia cooperate with Local Distributors to distribute their products in a certain area instead of using their subsidiaries. Therefore, they usually assigned the Regional Sales Team representing Regional Supply Chain Team to the local distributors. The result from internal data in one company showed that the company could lose up to billions of Rupiah in additional distributions cost and potential sales loss, due to the poor practice of supply chain operations in the Regional Distribution Centre. These problems were caused by the insufficient performance monitoring of the indicators which are related to the Distribution Centers' operations. Supply Chain Operation Reference Model (SCOR) 12 was used as the method to assess the supply chain activities and performances of the Regional Distribution Centre. SCOR 12 in RDC operations measured 21 different performance metrics and utilized De Boer normalization to equalize each metric parameter. It is found that 10 performance metrics were categorized as not good. Knowledge-based Performance Management System was then implemented to be the framework for constructing a Performance Management System that covers the RDC operation, which is related to Sales Team.

Keywords: De Boer normalization, distribution Centers, Indicators, Performance Management System, SCOR.

1. Introduction And Purpose

At this time, competition in the industrial sector is considered quite tight in line with its rapid development. Performance improvement strategies cannot be well formulated if there has never been a performance measurement itself before. Performance measurement has immense significance because it can bind complex value-creation systems into one, give direction to the formulation of the company's strategy, and play an essential role in monitoring and implementing the strategies (Suliantoro & Nugrahani, 2015). Supply Chain Management issues' relevance and importance especially in mature industries have grown over the years. The supply chain itself is defined by Lindner (2009) as a set of entities that plays its role in product and service design, raw materials procurement, semi-finished and finished product production, and delivery to end customers. Olson (2012) put forth that the core processes of the supply chain are the development of products, procurement, production, physical distribution, management of customer relationships, and measurement of performance. The evolving complexity and uncertainty of the business environment propel companies, especially those in the retail industry, to react by optimizing their supply chain management practices.

PT. XYZ, a disguised name, has been operated in Indonesia for over 50 years. As a multinational beverages FMCG company, PT. XYZ has multiple product portfolios sold to Indonesian households. Due to the complexity of Indonesia relief, PT. XYZ, under its Sales Division, has to divide its operations into every region and area all over Indonesia. Instead of using its

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subsidiaries to reach the market, PT. XYZ assigns a local partner to become the local distributor. PT. XYZ also has 8 regional distribution centers in Indonesia and has planned to have an additional RDC on Kalimantan in 2023. By adding RDC, PT. XYZ could decrease the transporting lead time and increase stock availability to all local distributors which consequently would reduce the potential sales loss and increase the service level to the customers.

PT.XYZ utilize Vendor Managed Inventory as an instrument to supply its goods to the local distributor. This means that the responsibility for the process of inventory planning and the scheduling of the replenishments is given to PT.XYZ. The calculation of VMI is based on the sales forecast done by PT.XYZ based on the previous 3 months and the upcoming 3 months. Each local distributors then have different Stock Cover Days (SCD) based on their location. For example, Local distributors in Papua has bigger SCD than Java due to the longer Transport Lead Time they experienced. The supplier is the manager of the inventory. Local distributors and PT.XYZ had contractual agreements regarding the service level conditions and desired inventory levels. Distributors VMI Specialist (DCS) has a role in delivering VMI calculations to the local distributors, and local distributors have the right to ask for adjustments regarding the requested order attached to VMI calculations. Local distributor teams will consult with the Head of the Area regarding the adjustment request on VMI.

These factors show that in PT. XYZ, the collaboration and coordination from inter-division are highly required to reach successful Supply Chain Management (SCM). In this case, the flow of goods to local distributors is highly influenced by the Area Sales Supervisor who was included in the Regional Sales Division. The Area Sales Supervisor also became the main PT.XYZ representative for the local distributors, so all forms of Supply Chains-related activities such as unloading schedules in local distributors' warehouses, VMI adjustments, payment collection, and returned goods would be directly under the Area Sales Supervisor's acknowledgment.

2. Problem Formulation

PT.XYZ's internal source mentioned that they could lose up to billions of Rupiah in additional distributions cost and potential sales loss, due to the poor practice of supply chain operations in the Regional Distribution Centre. These problems were mainly caused by two different factors, postponement of shipment unloading into local distributors' warehouses and the late shipment delivery from RDC to local distributors due to the cost saving. Unloading postponement could cost PT. XYZ more dwelling fees to be paid to the Third-party transportation partner. RDC often couldn't deliver the shipment quickly due to the routing shipment. Sometimes, the VMI generated does not fulfill the RDC minimum goods required to be transported. Therefore, RDC would wait for another issue of shipment so they could reach the minimum requirement. This research wanted to propose a performance management system combined with SCOR assessment to solve this issue

3. Literature Review

There have been several methods developed to asses and measure a company's supply chain performance. Supply Chain Operations Reference or SCOR, is a model or method of approach initiated by the Association for Supply Chain Management (APICS) in 1996. This SCOR Model framework can be used to diagnose the company's supply chain performance and can benchmark it with another company in a similar industry which was included in the SCOR database. SCOR Model also keeps being updated in the variable and attributes to adjust with the development of the industry and technology. The SCOR Model includes the business processes of a company that consists of 6 types of processes which are mentioned below.

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Table 1. Process in SCOR and its definitions

Process	Practices
Plan	Planning of production, procurement, scheduling, distribution, and marketing plan
Source	Procuring required materials and raw materials from the suppliers
Make	The production process, work-in-process until becomes semi-finished or finished goods
Deliver	Delivering and transporting products and/or services to the targeted customers
Return	Receiving product's return from the customer's product due to unfit market demand
Enable	Ability to utilize assets efficiently. The matrix includes usage and utilization inventory capacity.

These 6 processes in SCOR are measured into 5 categories of performance attributes, and these attributes are included in the measurement of SCOR metrics. Below are the definitions of each performance attribute in SCOR 12.0.

Table 2. Performance attribute in SCOR 12.0 and its definitions

Attribute	Definition
Reliability	Common metrics for the focus attribute include the exact right time, quantity, and quality.
Responsiveness	The speed at which tasks could be done and products delivered to the customers.
Agility	Firm's ability on facing external changes to earn advantages.
Costs	The operating costs consist of labor costs, raw materials costs, as well as management, and transportation costs.
Asset Management Efficiency	Firm's ability to take advantage of its asset efficiently

Asset Management Efficiency and Cost are categorized as internal-focused attributes and Agility, Reliability, and Responsiveness are categorized as customer-focused attributes. Each performance metric is grouped into one performance attribute. Each Performance Attribute can be cascaded to 3 levels of metrics and included in several processes. The company can utilize the calculation of those level-1 metrics to assess how successful it is in achieving its desired performance within the competitive marketspaces (APICS, 2017).

There are various performance measurement frameworks to date. This research wants to implement a Knowledge-Based Performance Management System (KBPMS) due to its simplicity and its fitness to the Indonesian company culture. KBPMS was developed by Wibisono (2006) which is considered by Maddinsyah et al (2020) as the refinement of BSC and Performance Prism. KBPMS was constructed by combining BSC's simple design with Performance Prism's stakeholder consideration. Compared to BSC and Performance Prism, KBPMS provides an

advantage where it is more simplified and accessible by only using three perspectives: organizational outcome, internal process, and resource capabilities. The completeness of KBPMS is that it lays the following information on the performance management system (PMS) design process: PMS foundation, business environment analysis methods, PMS and strategy alignment how-tos, performance management system which includes performance variable, correlation, and benchmarking.

Knowledge-Based Performance Management System, therefore, provides advantages such that it provides a successful PMS strategy with foundation alignment, a broad selection of metrics, supply chain standards, and better management control procedures. SCOR as a performance measurement system aims to describe supply chain processes comprehensively. It aims to provide a description, analysis, and evaluation of information, financial, and physical flows of a supply chain. The comprehensiveness of SCOR is that it considers the performance of all entities in the whole chain, compared to another PMS that measures a single entity in the chain. However, SCOR has its weaknesses: high abstraction, not covering the whole processes, tricky performance metrics monitoring and measurement below the third level, rigid measures, high implementation workload, and constant actualization of the model provide uncertainty. This will be best combined with KBPMS which complements SCOR's descriptive and abstract nature to cohesion and concrete steps that KBPMS provides.

4. Research Methodology

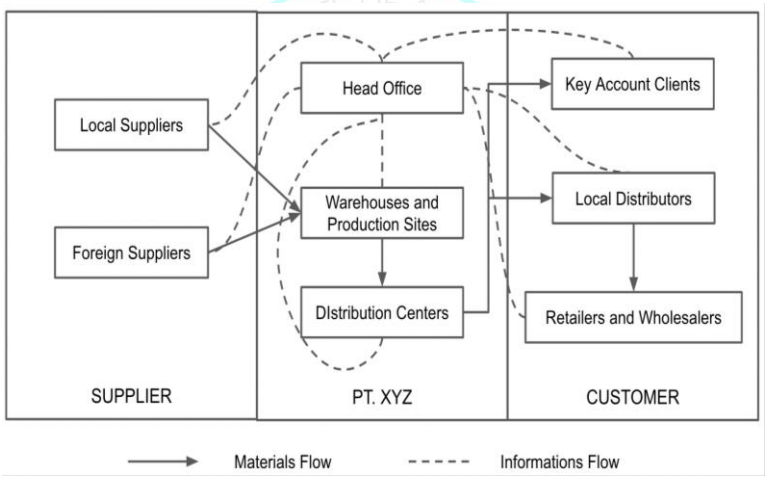

Figure 1. PT. XYZ General Business Scope Diagram

The business scope diagram shows the general business activities done by PT. XYZ starts by procuring raw materials from local and foreign suppliers, producing, and storing goods in warehouses and RDC, until the products are delivered to the key account clients and local distributors which will distribute them to the retailers and wholesalers. The information flow is centered on PT. XYZ's head office shows that the company is in control of all its business processes. For example, the Head office can access the data of Retailers' and Wholesalers' current stock and sales achievement with its technological capabilities. These retailers and wholesalers also could be connected to the Head Office virtually or by the Regional Sales Team.

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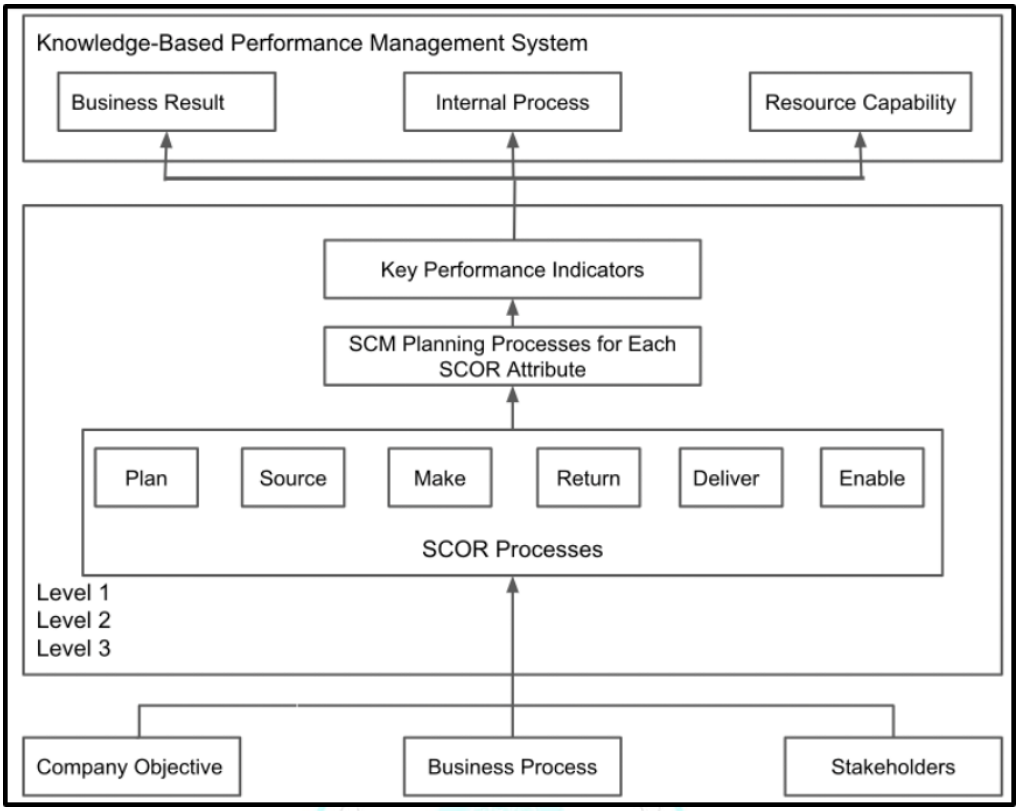

Figure 2. The Framework of Utilizing Integrated SCOR-KBPMS Model

This research started by collecting the company vision and strategic objective, the role of related stakeholders in the Regional Distribution Centers operation, and the business process that is fit the research purpose. Assessing the strategic objective, business process, and related stakeholders was vital to determining the context and condition of the operations. It is important to decompose the SCOR process from level 1 to level 3 in order to assess which activities are crucial to be assessed. After decomposing the process, the next stage was choosing the process's performance metrics representing the operations condition. The targeted values of performance metrics were obtained from PT. XYZ Supply Chain Division and similar industry standards. Since this research was focused on the Regional Distribution Center operation and Sales Team, most of the metrics used were dominated by Deliver and Plan level-1 process. After determining performance metrics, the current metrics' results could be computed and compared to the desired state.

Below are attached the methods used in this research to analyze the issue and compute each related Performance Indicator in PT. XYZ regional distribution center, which is also related to the Regional Sales team.

1. Interview

Firstly, the condition in the field is assessed by interviewing employees who were involved in the supply chain process of the regional distribution center. These employees include the RDC manager and a Third-party transporter specialist and were meant to gain some insights and problems they faced in RDC especially related to the sales team.

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2. De Boer Normalization

Each indicator has different measurement parameters. Therefore, the normalization method is utilized to equalize these parameters. The normalization process was done by using the snorm de Boer formula according to Trienekens & Hvolby (2000) as follows:

For Indicators that become better on larger values:

$$Snorm\ (Score)\ =\ (SI - Smin)/(Smax\ -\ Smin)\ x\ 100\% \quad (1)$$

For Indicators that become better on smaller values:

$$Snorm\ (Score)\ =\ (Smax - SI)/(Smax\ -\ Smin)\ x\ 100\% \quad (2)$$

By using De Boer Normalization, every indicator score can be converted into the range of 0 (lowest score) until 100 (highest score). Therefore, each indicator is obtained in the same parameter and can be judged by using the value in the table below (Ardhanaputra et al., 2018).

Table 3. De Boer Normalization Indicator Value and Its Definition

Indicators Value	Definition
Less than 40	Poor Performance
40- 50	Marginal Performance
50- 70	Average Performance
70- 90	Good Performance
More than 90	Excellent Performance

5. Analysis and Discussion

The SCOR 12 attribute and matrix calculation was based on the internal historical data gained from PT. XYZ supply chain division. The data has different types of actual value parameters and were normalized by using De Boer normalization. The minimum and maximum value of the performance metrics are based on the company's lowest and highest standards in the company operation The next step is to determine which performance metrics and its attribute underperformed in the PT. XYZ RDC Performance Metrics Calculations in table 4. and how Performance Management System can be utilized by PT. XYZ to improve these performance metrics which occurred in PT. XYZ Regional Distribution Centers.

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Table 4. PT.XYZ RDC Performance Metrics Calculations

No.	Attribute	Metrics	Min	Max	Actual Value	De Boer Score
1	Asset Management Efficiency	Inventory Days of Supply	40 days	63 days	46.29 days	79.57
2	Asset Management Efficiency	% Defective Inventory	0	3%	69.67%	69.67
3	Asset Management Efficiency	% Excess Inventory	20%	30%	0.0945	52.75
4	Agility	Upside Deliver Adaptability	10%	30%	28%	90.00
5	Agility	Additional Delivery volume	3000 cu dam	5000 cu dam	4800 cu dam	96.00
6	Cost	Cost to Verify Product	10 IDR	20 IDR	11.1 IDR	86.00
7	Cost	Indirect Delivery Cost	300 IDR	500 IDR	372.3 IDR	63.85
8	Cost	Order Management Costs	50 IDR	80 IDR	57.9 IDR	73.67
9	Cost	Order Delivery Costs	4000 IDR	6000 IDR	5249 IDR	57.55
10	Reliability	% of Orders Delivered In Full	70.00%	100.00%	87%	56.67
11	Reliability	Delivery Performance to Customer Commit Date	70.00%	100.00%	92%	73.33
12	Reliability	Orders Received with Correct Shipping Documents	90.00%	100.00%	98%	82.00
13	Reliability	Product Transferred without Transaction Errors	90.00%	100.00%	98%	81.40
14	Reliability	Delivery Item Accuracy	90.00%	100.00%	99%	92.00
15	Reliability	Delivery Location Accuracy	90.00%	100.00%	99%	95.00
16	Reliability	Delivery Quantity Accuracy	90.00%	100.00%	99%	93.00
17	Reliability	Forecast Accuracy	70.00%	100.00%	86%	53.33
18	Responsiveness	Route Shipments Cycle Time	1 day	3 days	1.73 days	63.50
19	Responsiveness	Ship Product Cycle Time	5 days	9 days	6.13 days	71.75
20	Responsiveness	Consolidate Orders Cycle Time	12 hours	36 hours	21.89 hours	58.79
21	Responsiveness	Establish Delivery Plans Cycle Time	12 hours	36 hours	21.89 hours	58.79

Based on the calculation above, it is shown that 10 out of 21 SCOR performance metrics whose De Boer score was under 79 could be categorized as not having a good performance. All of each Responsiveness and Asset Management Efficiency attribute metrics scores were under 71 and 80 respectively. There was also much to improve in the cost attribute especially in Indirect Cost to Delivery and Order Delivery Cost. These figures showed in which attributes and metrics RDC underperformed and could be used as one of the main considerations for PT. XYZ to build its strategy map and performance management system in the Regional Distribution Center.

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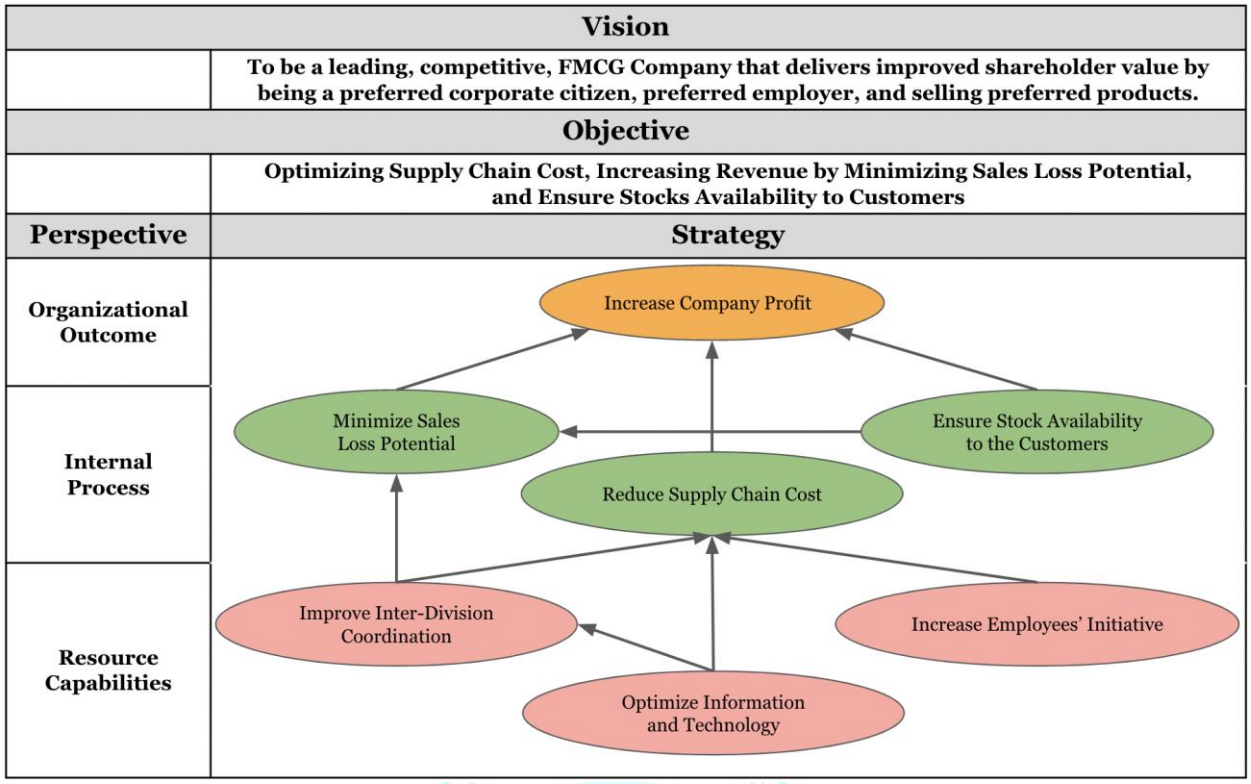

Figure 3. PT.XYZ Regional Distribution Center Strategy Map

At the bottom of the diagram, resource capabilities have 3 different strategies which improved inter-division coordination, optimize information and technology, and increase employee initiative. Optimizing Information and technology also could help another Resource capabilities strategy which was improving inter-division coordination All of these strategies also aimed to support another three strategies in the internal process. In the middle of the diagram, the internal process consisted of three different strategies which were minimizing sales loss potential, reducing supply chain cost, and ensuring stock availability to the customers.

After calculating the performance metrics in each indicator and deciding which strategies can be employed during each perspective. The researcher can construct Key Performance Indicators in the Knowledge-Based Performance Management System and supplement by its aspect, perspective, strategic objective, variables, formulation, Data Period, Data sources, Target, and status which was attached in Appendix A.

7. Conclusions

Based on SCOR 12. assessment complemented by De Boer normalization, 10 of 22 performance metrics in the Regional Distribution Center were categorized as not good. Responsiveness and Asset Management Efficiency were deemed as the underperformed attributes and Agility and Reliability as the best-performing attribute. The combination of SCOR and KBPMS is reliable to be used in Indonesia's Supply chain operations because each framework can fulfill the other's disadvantages. SCOR could give a comprehensive description of the whole supply chain process starting from sourcing from suppliers, delivering products, and receiving returns. But, KBPMS's simplicity and practicality could compensate for the complexity and abstractiveness of SCOR.

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Appendix A

Table A. PT.XYZ RDC Knowledge-Based Performance Management System Working variable

Perspective	Aspect	Strategy	Variable	Indicator	Formulation	Data Source	Period	Target	Status
Business Outcome	Financial	Increase Company Profit	Profitability	Net Profit Margin increased by double-digit as targeted by management	Net Profit Margin	Finance Division	Annually	>10%	○
Business Outcome	Financial	Increase Company Profit	Sales	Net Sales Revenue annually grew by double-digit as targeted by management	Net Sales Revenue	Sales Division	Annually	>10%	○
Internal Process	Operations	Ensure Stock Availability to the Customers	Stock Cover Days	Local distributors' Annual Stock Cover Day follows PT.XYZ standard	Distributors' Annual SCD which follows PT. XYZ Standard	Supply Chain Division	Monthly	85%	○
Internal Process	Operations	Ensure Stock Availability to the Customers	Cycle Time	Route Shipments Cycle Time	Route Shipments Cycle Time	Supply Chain Division	Monthly	1 day	○
Internal Process	Operations	Minimize Sales Loss Potential	Cycle Time	Ship Product Cycle Time	Ship Product Cycle Time	Supply Chain Division	Monthly	5 days	○

Each indicator can be converted by using De Boer Normalization into usual parameters. Then, these parameters can be visualized by Trafic Light assessment to show the status of each indicator.

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Indicators Value	Definition	Traffic Light Status
Less than 40	Poor Performance	●
40- 50	Marginal Performance	☐
50- 70	Average Performance	☐
70- 90	Good Performance	◒
More than 90	Excellent Performance	☐