

A PROPOSED DESIGN OF INTEGRATED PERFORMANCE MANAGEMENT SYSTEM IN PHARMACEUTICAL SUPPLY CHAIN

Allan Aditya Prakosa Dewo^a & Dermawan Wibisono^b

^{ab}Institut Teknologi Bandung, Bandung, Indonesia.

Corresponding email: allan_aditya@sbm-itb.ac.id

Abstract

In the post pandemic supply chain pharmaceutical companies face an increasingly uncertain future where resilience is critical. The environmental changes itself can cause new measurements for performance management systems in the pharmaceutical supply chain. Integrated Performance Management System (IPMS) and COBIT Framework approach can help organizations to mitigate changes in organization and business process. This research focuses on the design of performance management systems by identifying critical variables and indicators as well as which critical organization function is involved by analyzing existing performance variables and indicators of current organization, performance linkage, and performance variable assessment. As finding, 20 variables and 45 indicators over multiple organizations is formulated into 3 perspectives and 10 aspects using the IPMS framework including which organization function is contributed most in organization. Additionally, this research is limited to performance variables and indicators in the design stage of IPMS to determine KPI and Cascade KPI, target, weight, and organization function by involving 3 business value streams in the pharmaceutical industry with multiple industries, they are manufacturer, distributor, and retailer. However, the implementation plan requires a 12 months implementation from alignment of the new performance management system across the organization until it is implemented using an end-to-end application (vertical and horizontal in organization) and dashboard for real time monitoring.

Keywords: Supply Chain, Integrated Performance Management System (IPMS), COBIT Framework.

1. Introduction

Three years into the “new normal,” supply chain companies face an increasingly uncertain future where resilience is critical. Furthermore, no one would deny that the COVID-19 pandemic has caused major disruptions to global supply chains. Nothing like this has happened in decades, and many operators rely on strategies that only partially solve their challenges. Recent disruptions and bottlenecks have disrupted just-in-time manufacturing, resulting in delayed deliveries, higher prices and less diversity in sourcing. In pharmaceutical companies, emergency shipments became prevalent during the COVID-19 pandemic. Pharmaceutical companies involve manufacturers, distributors, and retailers to distribute pharmaceutical products. In fact, they'll be overtaken withinside a long time through slower transferring however greater everlasting results on delivery chains taking place under the surface. However,

preparing digitalization and performance management systems for long-term uncertainty and possible upheaval may encourage companies to build resilience in their supply chains.

As pharmaceutical company, resilience is critical to future success, but building it can be costly, and many companies are tightening their belts (McKinsey & Company, 2022). As the frequency and magnitude of outages increase, it becomes more difficult to apply ad-hoc measures to restore the predictability of systems optimized based on increasing costs. To restore the required resilience, supply chain operators may need to consider a number of options, including optimal performance management systems. Moreover, environmental changes drive new measurements of performance management systems. Therefore, defining a well-designed performance management system across multiple business value streams (manufacturer, distributor, and retailer) and organizations is important by defining its critical variables and indicators.

2. Literature Review

2.1 Performance Management system

A performance management system (PMS) is a tool for measuring and evaluating a company's performance in achieving its goals including its vision and mission. There are several PMS that can be conducted to organization, first, a Balanced Scorecard (BSC) that comes from the idea of looking at strategic measures in addition to traditional financial measures to get a more "balanced" view of performance with 4 main perspectives. Second is PRISM that Prism takes a stakeholder-centric view of performance measurements. This reflects the need to measure not only stakeholder satisfaction but also stakeholder contribution to the wants and needs of the organization. And finally Knowledge-Based Performance Management System or used to be called Integrated Performance Management System (IPMS), according to Wibisono & Khan (2010), designing or creating a performance management system (PMS) is an integral part of a management control system. It's called "knowledge-based" for a number of reasons because the implementation of a PMS involves many performance variables, and then there are complex linkages between them. Then, prioritizing a large number of performance variables requires a supporting tool to enable effective decision-making, and also there is a benchmarking process to compare and improve the competitiveness of companies. The comparison is shown in table 1 below (Dermawan Wibisono, 2021).

Table 1. Comparison of Performance Management System

Aspect	BSC	PRISM	IPMS
PMS Design Process	Described clearly	General description	Described clearly
Formulation of Performance Variable	General description supported by detail formulation at selected implemented variable	Detail formulation at each variable	Detail formulation at each variable which have intercorrelation
Quantity of Performance Variable	Grouped in 4 perspective, each may contain several variable, depends on the organization/ company	More than individual performance variables	Grouped in 3 perspective which have intercorrelation
Reason of Selecting Variable	Described clearly in each perspective	Described clearly in each perspective	Described clearly in each perspective
Consideration of Existing Performance	No	No	Yes

Correlation of Each Variable	Described at the variable perspective	Differentiated clearly	Described specifically according to intercorrelation of variables
Final Output	Financial aspect	Stakeholder satisfaction	Integration of financial and non-financial aspect of stakeholder satisfaction

To solve the business issue above, the performance management system should be aligned with the vision and mission as well as corporate strategy. Moreover, the performance management system has to be linked to one another corporation or organization. Therefore, Knowledge-Based Performance Management System or Integrated Performance Management System (IPMS) will be used in this research for theoretical foundation as the following framework especially in stage design to identify performance variables for business results, internal processes, and resource capabilities, determining lineage and weight, and internal benchmark.

2.2 COBIT Framework

COBIT is an IT governance framework for organizations looking to implement, monitor, and improve IT management best practices, and is an acronym for Control Objectives for Information and Related Technologies (ISACA, 2022). IT Maturity variable and indicator can be

determined using COBIT Framework. Aligned with KBPMS framework, COBIT Framework also need alignment from organization goal through vision and mission to deliver good performance in technology adoption and adaptation. This framework focus on measurement of maturity process and control in organization especially how organizations optimize its capabilities and process.

3. Research Methodology

This research will focus on designing an integrated performance management system for end-to-end pharmaceutical supply chains starting from manufacturing to retailer value chain. The performance variable and indicator contained in the design stage and proposed implementation in Knowledge-Based Performance Management System (KB-PMS) Framework by Dermawan Wibisono or known as Integrated Performance Management System (IPMS). It has variables that consist of three perspectives. There are organizational output, internal business processes, and resources availability (Dermawan Wibisono, 2012). First organizational output consist of financial and non-financial aspect. Second, internal business process consist of innovation, operation process, marketing, and after sales service aspect. And finally, resource capabilities consist of human resources, technology, and organization aspect.

KPI from current organization and COBIT parameter concerns would be mapped into KBPMS perspective. The main concern is resources and processes aligned with the business vision and mission as strategic to technical level alignment in business digitalization using COBIT Framework (ISACA, 2022), the variables that should be aligned to the indicators are (as top 3 of corporate's concern) Organization's vision and mission awareness, Technology implementation that has impact to the business, and Feedback from customer for technology implementation.

3.1 Organizational Output Perspective

Organizational output perspective consists of financial and non financial aspects. In Organization, the financial aspect would be dominant for organization position, funding process, and other financial variables. As same as for non-financial aspects which are affecting social responsibility in state owned enterprises.

3.2 Internal Business Process Perspective

Internal business process perspective consist of innovation, operation process, marketing, and after sales service as following explanation:

1. Innovation aspect is the ability of an organization to see opportunities and implement research management processes by focusing on new product development and its technology.
2. Operation Process is related to the activities carried out by the organization to make sure the business process can operate well from manufacturer to retailer.
3. Marketing is related to promotion, advertising, forecasting, and competitor analysis, it is focusing on market share and activation of global strategic partnership in both the private and public sector.
4. After sales service aspect is suitable for manufacturing companies, it is focusing on total active customers including their engagement into the organization's products and services.

3.3 Organization Capabilities Perspective

Resource Capabilities perspective consists of human resources, technology, and organization aspects as following explanation:

1. Human resources aspect is availability of resources based on specific criteria on subject matter experts (SME) of each value chain as organization needs.
2. Technology aspect is important to enable, drive, and also optimize business operation, having an end-to-end integrated system would be an advantage to drive business growth.
3. Organization aspect consists of culture, leadership, and talent capabilities. IT is focusing on alignment, vision and mission across multi organizations and how effective training programs are.

3.4 Cascading of KPI

Cascading of KPI of value chain in supply chain would be mapped to organizational function in supply chain area, they are parent organization, manufacturer, distributor, and retailer as illustrated in figure 1. Decomposition tree of cascading KPI depending on business value stream below.

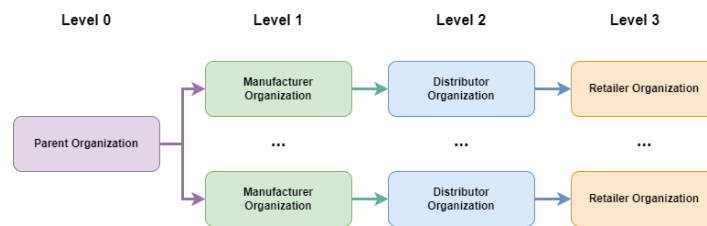


Figure 1. Decomposition Tree of KPI Cascading

According to the picture above, each cascading KPI from one level to another level has a consolidation score for each parent activity as 80% weight and child activity as 20% weight to be consolidated to 100% of corporate performance. It also works for consolidating each KPI and its linkage. Also, each score will be represented on indicator level using color and specific criteria of the KPI target as shown in table 2 below. Indicator level is based on normal distribution of internal benchmark in organization with lower limit 70% and upper limit 110%.

Table 2. Indicator level using color and specific criteria

Indicator Level	Color	Actual Score (%)
K20	Grey	Actual \leq 70
K40	Red	70 < actual \leq 85
K60	Yellow	85 < actual \leq 95
K80	Light Green	95 < actual \leq 105
K100	Dark Green	105 < actual \leq 110

4. Business solution

4.1 Analysis

Identifying variables and indicators using the IPMS framework and primary data of the company from KPI that has been determined by organization. As actual data obtained and discussion with management, lower limit, lower quartile, median, upper quartile, and upper limit score from 70% to 110% in indicator level can represent as KPI target as actual score to be achieved in corporate performance based on perspective and aspect in research design. Median or default score from each indicator level is 70% for K20, 80% for K40, 90% for K60, 100% for K80, and 110% for K100. Additionally, according to assessment and adjusted target in variable and indicator to determine KPI, cascade KPI, and target. The result of the analysis is shown on table 3. In terms of cascading KPI to organization, it consists of manufacturer (M), distributor (D), and retailer (R). Moreover, to identify which organization is most critical, it can be identified the biggest contribution through cascade KPI.

Second analysis is required to identify which organization involved most to contribute in performance management system. The organization functions involved are Finance and Accounting Function (1), Supply Chain Management Function (2), Sales and Marketing Function (3), Procurement Function (4), Manufacturing Function (5), Distribution Function (6), Retail Function (7), Human Capital Function (8), and Digital & TI Function (9).

After doing interviews and assessments with management and subject matter expert (SME), it found that 20 variables and 45 indicators are required to design a performance management system for multiple entities in pharmaceutical supply chain including manufacturing, distribution, and retail. Additionally, the top 5 organization function that should concern each cascade KPI is the Manufacturing Function (42 indicators), Distribution Function as (37 indicators), Retail Function (37 indicators), Sales and Marketing Function (34 indicators), Supply Chain Management Function (30 indicators). The design of performance management systems can be implemented in multi corporations with relevant business value streams in the pharmaceutical supply chain. However, having a linkage KPI is very important to identify which variable and indicator relate to each aspect, based on the assessment as well, the linkage of KPI is determined by each aspect in perspective as illustrated in Figure 2.

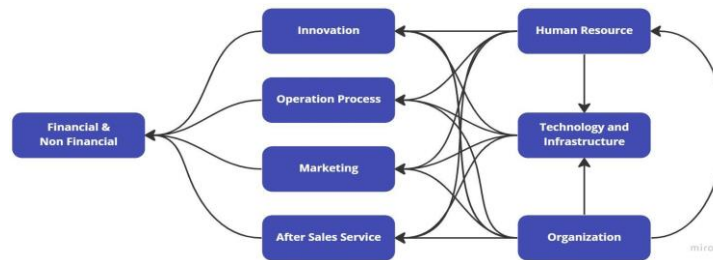


Figure 2. Linkage of Each KPI From All Aspects

4.2 Solution And Implementation Plan

According to the analysis in 4.1, variables and indicators can be used to design an integrated performance management system for the supply chain of pharmaceuticals using the KBPMS framework. Business Solution as design of performance management system is implemented on Google Spreadsheet using internal benchmark score assessment from organization as following (table 3). Based on every assessment to determine variable, indicator, KPI, cascade KPI, target, organization function and its weight, this weight of KPI is important to categorize which KPI should be prioritized in organization.

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Table 3. Design Implementation of PMS (source: modified by author)

Perspective, Aspects, and KPI	Weighted Score (%)	Weight (%)
Organizational Output	23.93%	25
- Financial	14.31%	15
EBITDA	4.91%	5
Cash conversion cycle	2.72%	3
ROIC	1.97%	2
Interest bearing debt	2.95%	3
Increased Revenue	1.81%	2
- Non-Financial	9.83%	10
Component of material TKDN	9.83%	10
Internal Business Process	37.03%	40
- Innovation	9.41%	10
New technology for product development	3.61%	4
New product development	5.88%	6
- Operation Process	13.74%	15



Perspective, Aspects, and KPI	Weighted Score (%)	Weight (%)
Capacity utilization	4.13%	5
Inventory level	1.88%	2
Delivery performance	2.71%	3
Quality product & service	4.90%	5
- Marketing	9.61%	10
Marketshare	5.71%	6
New global strategic partnership	3.92%	4
- After Sales Service	4.52%	5
Total active customer	4.52%	5
Resource Capabilities	32.21%	35
- Human Resources	14.36%	15
Talent availability	9.51%	10
Employee satisfaction	4.88%	5
- Technology	8.91%	10
End-to-end system integration across organization	8.91%	10
- Organization	9.00%	10
Training management effectiveness	4.50%	5
Organization management effectiveness	4.50%	5
Final Score	93.17%	100

However, to make it seamless during monitoring of PMS, every aspect of KPI can be monitored from a spider diagram dashboard to get more understanding for a holistic view from all perspectives to KPI is illustrated as Figure 3. Based on analysis of assessment, lower score (based on indicator level under K100) means immediate action is required.

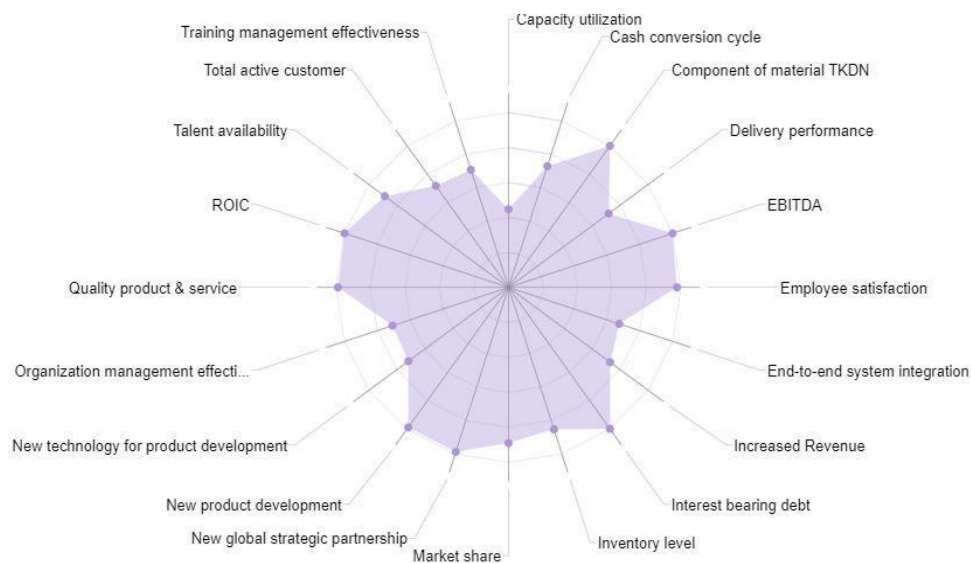


Figure 3. KPI Dashboard of All Perspective in PMS

To implement a performance management system requires an implementation plan as a guideline and milestone that can be done by the organization, it requires activity and timeline divided on a monthly basis. Moreover, it also requires key people to lead implementation and execution team champions in each organization. As Estimated, the end-of-year implementation of PMS can be realized. Moreover, to make sure implementation is well-running, organizations should conduct monitoring and evaluation of PMS implementation and give recommendations if any issue occurs to be resolved soon. Milestones to be considered are:

1. Alignment PMS with top management is an initial activity with management to propose a new integrated performance management system, it is critical to obtain trust and support.
2. Socialization of PMS with stakeholders among organizations is required to align the strategy implementation across companies and organizations through corporate strategy and performance, its goal is to choose key people in the implementation phase.
3. Defining implementation team members is crucial, this team consists of a business process owner, a subject matter expert, and digital & information technology team.
4. System development for PMS is a phase for developing applications by integrating 2 systems that already exist to perform integrated performance management systems as proposed.
5. Socialization of PMS to organizations and subsidiaries is required after system development is done. In this case for all employees in the organization as guidance during the implementation phase including training and consultation.
6. Defining execution team champions in each organization has a task to make sure change management is performed well and escalate issues once it occurs to be resolved and consulted to the implementation team.
7. Implementation of PMS is a long journey. Therefore, it requires good communication and coordination across organizations through implementation team as committee and the execution team champion as executor in each organization.
8. Monitoring and evaluation of PMS implementation are crucial during first time implementation to manage the expectations of all employees including management to gain benefit from PMS implementation.
9. Recommendation for system improvement from every issue recorded during monitoring and evaluation that occurs highly should be put to item for PMS improvement.

5. Conclusion And Recommendations

Based on this research and from various references including shareholder aspirations, there are 20 variables and 45 indicators with an assessment score 93.17% for Corporate KPI from internal benchmark. Additionally, critical KPIs in red and yellow color on table 3 to be concerned for KPI improvement in organization. Moreover, according to assessment and analysis, simulation of integrated performance management systems from manufacturing to retail business value stream using 80% weight from parent and 20% weight from child including its KPI linkage can perform well to calculate score consolidation of whole KPI in each aspect as illustrated on table 3 and figure 2. To implement a performance management system widely end-to-end in the horizontal and vertical organization there are top 5 critical organization functions involved, are Manufacturing Function (42 indicators), Distribution Function (37 indicators), Retail Function

(37 indicators), Sales and Marketing Function (34 indicators), and Supply Chain Management Function (30 indicators). Finally, the implementation plan and solution of the proposed design performance management system requires good communication and well-orchestrated coordination by selecting the implementation team and execution team champion is also crucial for implementing PMS across organization of multi entities.

This research is focused on the performance variable and indicator in the design stage of IPMS to determine KPI and Cascade KPI, target, weight, and organization function involved. as the limitation of this research, variables, and indicators integrated performance management system by integrating COBIT framework as selected IT maturity obtained from current pharmaceutical organization assessment. Further, performance management systems at the operational level for each corporation in the value stream of the pharmaceutical supply chain can be explored as well as implementing new COBIT 5 framework to determine which indicator can lead a company to survive in digitalization.

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