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Proposal for a Method of Deriving Performance Indicators Towards Alignment with External Factors to Organization

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Abstract

Organizations formulate and implement strategies and evaluate their performance based on an analysis of their internal and external environment in order to solve problems and achieve their objectives. The promotion of globalisation and the development of information technology have made the external environment more influential on organizational performance. Organizations are therefore engaged in dynamic management of their strategies to respond to the impact of the external environment. However, performance indicators cannot be aligned with changes in the external environment and strategy, making timely assessment difficult. This study aims to support the design of performance indicators for the timely assessment of organizational performance. A methodology was designed to derive performance indicators that consider the impact of interventions from the external environment in addition to internal strategic interventions. The designed performance indicator derivation method was applied to a medium-sized organization to evaluate the effect of the added external factors perspective. As a result, performance indicators were derived to assess the impact of external factors on the organization, in addition to performance indicators to assess the effectiveness of strategic initiatives. It was also suggested that the process of deriving performance indicators facilitates direct reflection on risks related to the achievement of the organization's objectives, which were traditionally reflected via strategies.

Keywords: performance measurement, performance indicator, strategy, external environment.

1 Introduction

Performance measurement is conducted to evaluate the appropriateness and effectiveness of strategies in the organization, to report to stakeholders and to promote improvements in the business[1][2][3][4][5]. Strategies are developed and implemented based on an analysis of the external and internal environment to solve problems and achieve targets. Performance measurement monitors the implementation and effectiveness of the strategy and supports decision-making on changes to the strategy. An organization's strategy needs to be continuously reviewed in response to changes in the environment in which it operates. In recent years, the promotion of globalisation and the development of information communication technologies have made organizations more connected to the outside world. As a result, the environment surrounding organizations is becoming increasingly volatile, uncertain, complex, and ambiguous (hereinafter 'VUCA'). Organizations are required to manage their strategies more dynamically in order to respond to changes in the environment [6]. On the other hand, it has been reported that performance indicators fail to correspond to changes in strategy, creating gaps [7]. It has been suggested that where there is a gap between strategy and performance indicators, this can in turn have a negative impact on

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performance [8]. Even when performance indicators and strategies can be aligned, challenges arise in terms of timely alignment, as the external environment and performance indicators are aligned via the strategy [9][10]. Therefore, there is a need for methods to design performance indicators that maintain alignment with the external environment and strategy of the organization [11][12].

Miura et al. propose a Strategic Performance Indicator Derivation Framework (SPIDF) to design performance indicators in line with organizational goals and strategies [13]. In this method, the derivation of performance indicators is based on the analysis of the transition status of the organization's objective states and the enablers and strategic intervention measures in each state. This method enables timely performance evaluation corresponding to the organization's status and strategy. However, a challenge has been identified in the SPID framework, which is the failure to reflect the impact of the external environment. The reasons for this challenge can be explained as follows. Organizational performance is influenced not only by voluntary interventions through strategic initiatives, but also by the external environment, including stakeholders in the supply chain. In the SPID framework, on the other hand, only the effects of interventions by the company itself were subject to performance measurement. The impact of external factors is to be reflected through strategy updates and therefore does not include a perspective for reflecting the impact of the external environment in performance indicators. Performance is not only influenced by voluntary interventions such as strategic initiatives, but also by stakeholders and the external environment. In recent years, organizations have increased their collaboration with external parties and are no longer able to assess the overall performance of their business on their own. In addition, changes in the external environment make it increasingly difficult to explain changes in performance from an internal perspective alone. Hence, there is an increasing need to monitor changes in external environmental risks in the face of increasing uncertainty. Until now, the impact of the external environment has been analysed during strategy formulation and reflected in strategic initiatives. Performance indicators could then be adapted to changes in the external environment through strategy updates. However, the external environment changes quickly and its impact needs to be monitored directly. In light of the above, it is necessary to reflect the impact of the external environment more directly when deriving performance indicators.

Therefore, this study aims to support the derivation of performance indicators that can take into account the impact of the external environment on performance. We decided to use an additional perspective to support the SPID framework. Namely, we added an external perspective to the intervention viewpoint in the organization in order to consider the influence of the external environment. The SPID framework can be used to identify targets for performance evaluation based on strategic interventions by the company as well as external interventions. If performance is affected by the external environment, it is possible to evaluate the impact through performance indicators. The method for deriving performance indicators with the added perspective of external factors was evaluated from the following perspectives.

RQ1: What performance indicators can be derived from the addition of the external factors perspective?

RQ2: How does the addition of an external factors perspective contribute to the derivation of performance indicators?

Next, the novelty of this study is explained. Traditional performance measurement often uses the balanced scorecard of Kaplan et al [14]. The balanced scorecard provides a set of perspectives

that correspond to an organization's strategy, but it has been noted that there are challenges in its alignment with external factors [15]. Performance Prism, which incorporates stakeholder perspectives, has been reported as a method for deriving performance indicators by adding perspectives external to the organization [16]. In Performance Prism, perspectives on stakeholders are used in addition to strategy, processes and resources. The study was not limited to stakeholders. This study differs from previous studies in that it is not limited to stakeholders, but adds an external environment perspective. Therefore, the novelty of this study is that it provides a more flexible perspective by focusing on the correspondence between organizational goals and internal and external interventions of the organization, unlike conventional performance evaluation approaches that provide a perspective on internal and stakeholders. In this study, it is possible to include causal relationships of interventions from the external environment. These two research questions were evaluated using the derivation of performance indicators in the quality management system of a pharmaceutical company as a case study. Using this method, performance indicators were derived to monitor the impact of external factors. It was also suggested that the process of deriving performance indicators facilitates direct consideration of external factor risk to the organization. This report consists of seven sections. Section 2 summarises relevant research. Section 3 describes the framework proposed in this study. Sections 4 and 5 report on the evaluation methodology and the results from the case studies. Section 6 describes the evaluation results of the proposed methodology. Sections 7 and 8 present the challenges and future research questions and conclusions.

2 Related Research

Performance Measurement

Performance evaluation plays an important role in concretising strategies, communicating them to stakeholders, and evaluating and improving their effectiveness [17]. As a method for organizations to comprehensively assess their business performance, a systematic method of using evaluation indicators in combination with leading indicators, in addition to traditional financial indicators, has been proposed and used. The most used balanced scorecard provides four perspectives for overarching measurement: financial, customer, process, and learning and growth [14]. However, a disconnect has emerged between the organization's strategy and the management of performance indicators [7][8]. In recent years, in response to the increasing volatility, uncertainty, complexity and ambiguity of the environment in which organizations operate, they are changing their strategies more dynamically to achieve their objectives. However, it is sometimes difficult to align performance measurement with changes in strategy, resulting in inconsistencies, and methods are required to manage performance measurement appropriately and dynamically [18].

Another approach to systematically evaluating performance is program evaluation [19]. Program evaluation is a methodology for systematically evaluating performance according to objectives, such as summative evaluation to demonstrate accountability or formative evaluation to improve business. Program evaluation involves an assessment of needs and an assessment of program theory with regard to program evaluation. In addition to the results of that assessment, the logic model will clarify the hypotheses for the process, output, and outcome impact to be evaluated and identify key evaluation points.

A common perspective of performance measurement and program evaluation is that it consists of processes that collect, select, analyse and provide strategy-relevant information to support

strategic decision-making [17]. Two points are of particular importance: 1) Evaluating performance from an overarching perspective, 2) Be able to explain cause and effect relationships in performance. The Balanced Scorecard has four perspectives consisting of Financial, Customer, Process, and Learning and Growth for overarching measurement. These can be divided into two types in terms of time. That is, the financial perspective as a lagging indicator corresponds to the non-financial perspective (customer, process, learning and growth) as a leading indicator [14]. However, challenges have been identified in the causal relationships between these indicators. The following section describes the design of performance measures to assess strategy effectiveness.

Strategic Performance Indicator Derivation (SPID) Framework

Performance measurement plays an important role in concretising strategies, communicating them to stakeholders and monitoring their effectiveness. In recent years, the increasing volatility, uncertainty, complexity, and ambiguity of the environment in which organizations operate has led them to be more dynamic in their strategies to achieve their objectives. However, the challenge is to align performance measurement with changes in strategy and to obtain measurement results when needed. Informed decision-making is therefore an issue and an approach to designing performance measurement appropriately is needed. Against this background, Miura et al. propose the SPID framework for deriving performance measures based on the linkage between the analysis of an organization's goal state and its enablers, and the results of the analysis of strategic initiatives [13]. The framework has a perspective of analysing known information and identifying unknowns that should be measured to support decision-making. The SPID framework for deriving performance indicators consists of four steps: 1. estimate the transition state of the organization, 2. analyze the enablers of each state of the organization, 3. functional analysis of strategic interventions, 4. derive performance indicators from the analysis of organizational enablers and strategic interventions. This study proposes an additional perspective used in the SPID framework to align performance indicators with the external environment and strategy.

3 Proposed Derivation Method.

The purpose of this study is to assist strategic managers in deriving performance indicators that are consistent with the external environment and strategic measures. Performance indicators need to be aligned with the external environment and strategy in order to support the organization in solving its problems and achieving its objectives. For this purpose, two requirements were considered

1) Mapping performance measures to the organization's objective state

This alignment is because strategies are formulated to achieve the organization's objectives and therefore the achievement of objectives needs to be measured.

2) Derive performance indicators based on the correspondence between organizational status, strategic interventions, and external factors

This correspondence is due to the need to explain the causal relationship between interventions and organizational performance changes in order to explain the impact of strategic and external interventions. Using the SPID framework, performance measurement items can be derived by analyzing the organization's objective state, internal and external interventions, and their linkages.

The SPID framework allows for the derivation of performance measurement items. In this study, a model is first proposed to reflect internal and external interventions in the performance measures. By exploring causal relationships between interventions from inside and outside, it is possible to find elements that should be subject to performance evaluation. The examination of causal relationships involves hypotheses, which can be described to support the verification of effects based on measurement results.

Strategy and Performance Alignment Model (SPA Model)

Table 1 presents three perspectives that the SPID framework should have. The perspectives are the organizational state perspective, the intervention perspective, and the performance indicator perspective. The organizational state perspective indicates the capacity of the organization and has three sub-perspectives. The organizational state perspective includes the initial state of the organization, as well as the long-term goal state and the short-term intermediate state. The organizational enabler perspective includes the functions, processes, and resources of the organization as necessary elements for the realisation of each state, while the third sub-perspective is the relational perspective, which examines causal relationships with regard to organizational change. Intervention perspectives include the internal and external perspectives. The internal perspective deals with the strategic measures taken by the organization. The external perspective covers the stakeholders and external environment that affect the performance of the organization. Performance indicators are perspectives for assessing the performance of an organization.

Table 1: Three perspectives on the correspondence between the external environment, strategies, and performance indicators

Organization	State	Organization's capability Current state, Goal state, Transition state
	Enabler	Enable to achieve the target state Function, Process, Management Resource
	Relation	Causal Relationship in organization
Intervention	Internal	Initiative to implement strategy Solution, Project, System
	External	Affective factor to organization Environment, Stakeholder
Performance Measurement		Items for performance measurement

The relationship between the perspectives is illustrated in Figure 1. An organization consists of organizational states and enablers that support those states. The strategic manager describes the organizational state based on the goal state, the current state, and intermediate states in between. Depending on the uncertainty, intermediate states can be described by analysing the gap between the two states, either by a top-down approach from the goal state or a bottom-up approach from the status quo. Each state is supported by an enabler. The organization plans strategic interventions and considers the functions required for those interventions to realise the strategy.2nd layer Context indicates that in addition to internal intervention measures, the impact of external factors is considered. These interventions may have a positive or negative impact on organizational enablers. The performance indicators then support a summative assessment of the achievement of the objective state and a formative evaluation of strategic measures and external factors. The newly introduced external factors perspective helps to relate strategies and performance indicators to the external environment by describing the impact of the external environment on the organization.

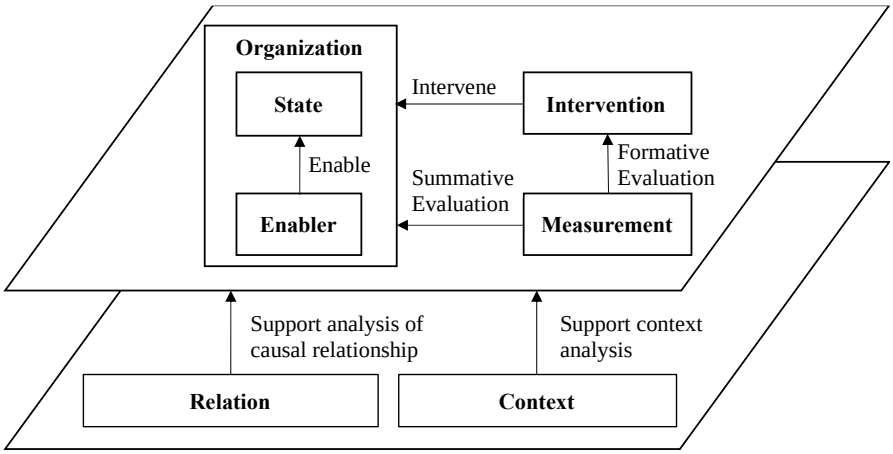
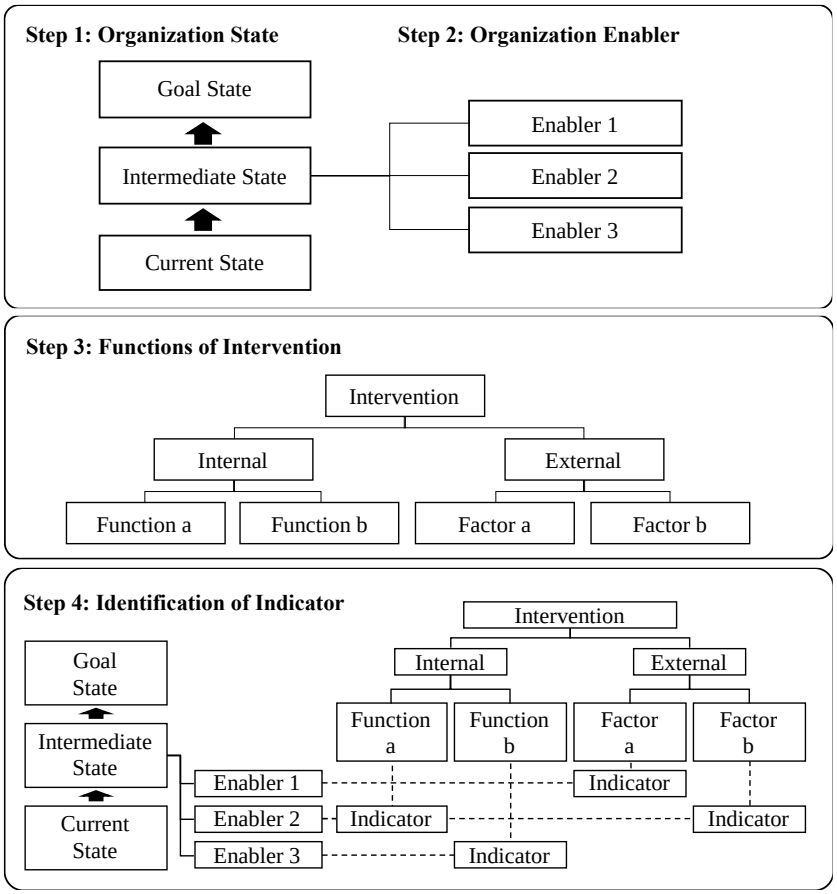


Figure 1: relationship-aware SPA model

Strategic Performance Indicator Derivation (SPID) Framework

The performance indicator derivation (SPID) framework is shown in Figure 2. The SPID framework was designed based on the SPA model (Figure 1). Each step has an objective, output, and method. Each step is performed in sequence, but is intended to be repeated as required.



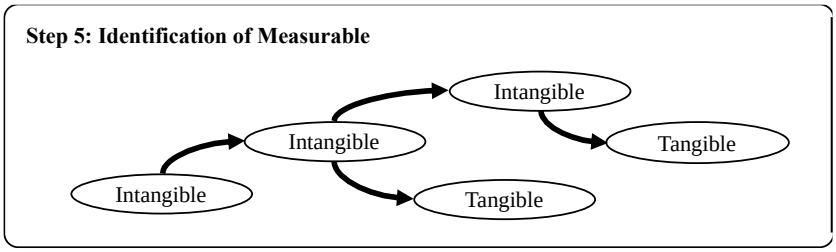


Figure 2: SPID framework Step 1 to Step 5

Step 1: Analyzing the state of the organization.

The objective of step 1 is to estimate the intermediate state of the organization. The outputs are the intended goal state and the transitional intermediate state. If it takes time to reach the goal state, several intermediate states need to be considered in order to assess the transition state in a timely manner. Gap analysis is one useful method for estimating and describing transition states [14]. Forward or backcasting approaches can then be selected, depending on the degree of uncertainty in the organization's state [18].

Step 2: Analyzing organizational enablers.

Step 2 aims to describe the enablers required to achieve the desired intermediate state of the organization. The output is a list of enablers in the intermediate state. One method for analysing enablers is the Enabler Framework [20].

Step 3: Analyzing the functioning of interventions inside and outside the organization.

The objective of step 3 is to identify the impact of strategic interventions and external factors. Methods for describing the functioning of interventions include Functional Flow Block Diagram (FFBD) and Work Breakdown Structure (WBS) [21][22]. Methods to medicalise external factors include risk analysis methods and the PESTLE framework.

Step 4: Derivation of performance indicators.

Step 4 aims to derive performance indicators, such that a set of performance indicators is the output. The performance indicators are derived by creating a matrix based on the list of organizational enablers and interventions. In the initial situation of strategy development, a formative evaluation can be carried out to assess the status of the interventions, and the performance targets can be revised to a summative evaluation as the situation evolves.

Step 5: Explore measurable indicators.

Step 5 aims to explore measurable performance indicators, such that a set of measurable indicators becomes an output. The transformation into measurable indicators is done by value chain analysis or causal analysis, based on the context of the organization. Methods can include Customer Value Chain Analysis (CVCA) and causal analysis methods [23][24].

4 Evaluation Plan

The SPID framework was applied to assess the effectiveness of quality management systems in pharmaceutical companies. In pharmaceutical companies, companies are accountable for the quality of the products they provide and are required to establish a quality management system to comply with regulatory and user requirements [25]. Quality management systems require performance evaluation to demonstrate their effectiveness, relevance, and adequacy [26]. Performance indicators are monitored through the collection of external feedback information and process information, and are required to be analysed and reviewed to ensure that standards are met during the process of change in the quality management system [27][28]. In the pharmaceutical supply chain, outsourcing to external contractors has increased, making it difficult to assess performance only for in-house activities. In this study, we asked strategists to derive performance indicators using the SPID framework in order to evaluate the research questions. In addition to evaluating how the perspective of external factors was reflected in the derived performance indicators, the strategists were interviewed about the impact of using the derivation method on the review process.

5 Evaluation Results

Examples of the status and results of enabler analysis in steps 1 and 2 are shown in Figure 3.

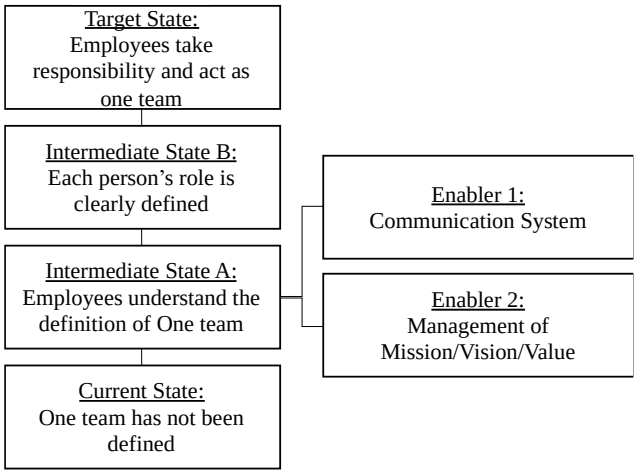


Figure 3: Examples of tissue states and enablers

An example of the results of the functional analysis of strategic interventions in Step 3 is shown in Figure 4. In this case, the policy change by headquarters is considered as a factor outside the sector.

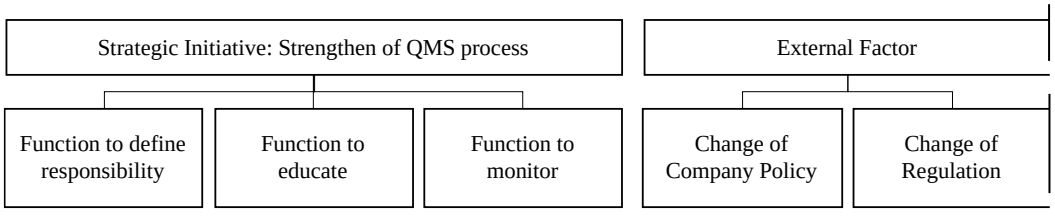


Figure 4: Examples of internal and external interventions

Figure 5 shows an example of a measurement indicator derived from the results of steps 1-3.

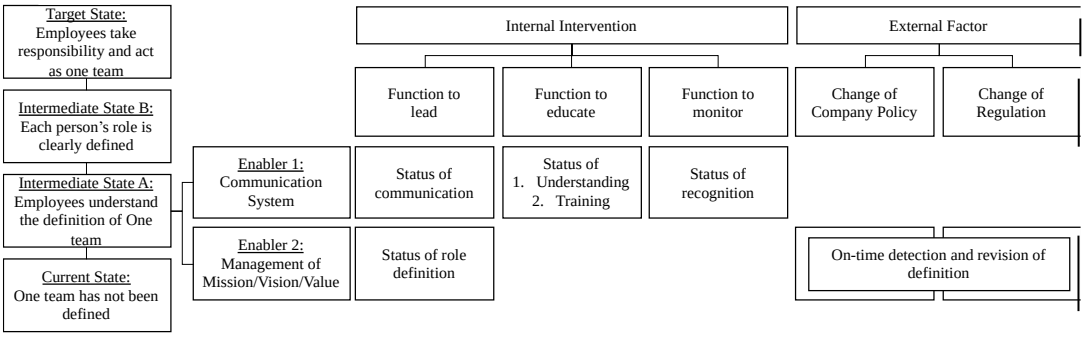


Figure 5: example of identified indicators

6 Discussion

The addition of the perspective of analysing external factors allowed a direct correspondence between performance indicators and external factors, suggesting its effectiveness as a framework for deriving performance indicators that are aligned with the organization's objectives, strategy, and external factors. Specifically, the analysis of the organization's desired intermediate states led to intermediate state A (where employees understand One team) and intermediate state B (where their roles are clearly defined). For intermediate state A, two enablers (communication system and management of MVV) were identified as necessary to achieve it (Figure 3). The internal and external intervention analysis identified three key functions (leading, educating and monitoring) (Figure 4). In addition, policy made by the head quarter and regulatory changes were identified as external factors. Step 4, based on the enablers in intermediate state A, resulted in the derivation of performance indicators for the four measures, as well as performance based on external factors (Figure 5). It was suggested that when performance indicators were selected by considering external factors, they can be considered at risk in achieving the objectives and are effective in explaining performance indicators. Specifically, the indicators were selected based on the consideration of the need to respond to external changes.

7 Challenges and Future Research

In this study, the SPID framework was applied to assess the effectiveness of quality management systems in pharmaceutical companies. The framework enabled the derivation of performance indicators that take into account the influence of external factors. On the other hand, as the number of perspectives to be considered has increased, it is also necessary to assess whether strategic managers can always derive indicators efficiently using this framework. Furthermore, it is necessary to assess what support is needed to derive the indicators.

8 Conclusion

The purpose of this study was to assist in deriving performance indicators that are consistent with organizational objectives, external factors, and strategies in order to assess the impact of changes in the external environment on performance in a timely manner. To design the performance indicators, we designed the SPID framework with an additional external factors perspective. The

results of applying the framework in a pharmaceutical company suggest that it can derive indicators corresponding to external factors based on the analysis of external factors and supports the consideration of risks that affect the achievement of objectives in the derivation process. It is suggested that by applying this method, it is possible to derive indicators to evaluate the impact of the external environment on performance, in addition to evaluating the effects of strategic interventions. A limitation of this study is that it is a single case study within a medium-sized sector, which limits the scope of the study. Future studies are expected to evaluate quantitative methods.

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