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Towards consistent performance management systems

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1. Introduction

The success and continuity of an organisation depend on its performance, which may be defined as ‘the way the organisation carries its objectives into effect’. This requires that ‘all noses are pointing in the same direction’, as every person in the organisation contributes to the company objectives via his or her activities. A good manager keeps track of the performance of the system he or she is responsible for by means of performance measurement (PM). His (her) staff carrying responsibility for certain activities within the system, need PM to see how well they are performing their tasks. This also holds for the employees actually executing the various process steps. So performance indicators (Pis) are important for everyone inside an organisation, as they tell what has to be measured and what is considered to be satisfying.

Clearly there should exist relationships between the Pis used by the different functions in an organisation and the target values (or ranges of values) set for these indicators. However, when looking around in organisations it becomes clear that often (too many) Pis are created on an ad hoc base where no or hardly any attention is paid to the relations between Pis. The above practice may among others result in sub-optimisation. Also in literature not much attention is paid to the relations between Pis, except for some general considerations, see e.g. Wisner & Fawcett [1] and Doumeingts, Clave & Ducq [2].

The purpose of this paper is to present a systematic method for designing a consistent performance management system (PMS) to be used in practice where explicitly attention is paid to the relations between Pis. By a consistent PMS we mean a system that covers all aspects of performance that are relevant for the existence of an organisation as a whole. Such a system should offer management quickly insight into how well the organisation is performing its tasks and to what extent the organisational objectives are reached. The method consists of three main steps: Defining Pis (Step 1),
Defining relations between PIs (Step 2) and Setting target values or ranges of values for PIs (Step 3). Within this context a new classification scheme for PIs is presented, which is based on three ‘intrinsic dimensions’ of every PI namely: (1) the type of decision that is supported by the PI, (2) the aggregation level of the decision, and (3) the type of measurement unit in which the PI is expressed. Also attention is paid to how to maintain and redesign a consistent PMS.

2. A new classification scheme for PIs

Many different PIs are used in practice. Hereafter an overview of PIs which are mentioned in literature is given, subdivided according to some of the most well known existing classifications for PIs:

**Financial versus Non-Financial** -- There is a general awareness that the traditional financial PIs alone no longer suffice to determine the company’s health, and that other types of indicators are needed as well. See e.g. Andersson, Aronsson & Storhagen [3]; Kaplan [4], Kaydos [5], Keegan, Eiler & Jones [6], McNair, Lynch & Cross [7].

**Global versus Local** -- Very restricted definitions of global and local are used: global PIs are for top management, and local PIs for managers at lower levels. See e.g. Edson [8]; Fry & Cox [9]; Maskell [10].

**Internal versus External** -- Internal PIs are being used to monitor the performance of an organisation on aspects that are relevant for its internal functioning, whereas external PIs are introduced to evaluate the performance of the organisation as experienced by customers or to evaluate the performance of suppliers, where ‘customer’ and ‘supplier’ can also refer to different parts of the same organisation. Also the related sub-division into input (supplier), process (internal) and output (customer) can be found in literature. See e.g. Azzone, Masella & Bertelè [11], Fortuin [12], Kaplan [4], Keegan, Eiler & Jones [6].

**Organisational hierarchy** -- The vertical relations between PIs are often based on the organizational structure of a company. The hierarchy functions in a natural way to aggregate PIs at a certain level into a smaller number of indicators at the next higher level (a bottom-up approach). See e.g.: Keegan, Eiler & Jones [6]; Son & Park [13].

**Area of Application** -- This classification is department oriented: R&D, Operations, Sales & marketing. The idea behind this classification is that each department requires its own PIs. See e.g. Azzone, Masella & Bertelè [11]; Edson [8]; Fortuin [12]; Kaydos [5].

Note that the first classification of PIs primarily focuses on what is or may be measured, whereas the other classifications primarily focus on where what is or may be measured or used. Although the above overviews may be very useful as sources for potential PIs, most of them do not help much to get insight into and to establish relations between PIs, however. That is because the overviews do not tell much about the PIs themselves, i.e. about their ‘intrinsic dimensions’ which do not depend on where and by
whom the PIs are used. Hereafter a new classification of PIs is introduced, involving three 'intrinsic dimensions', see Figure 1.

![Figure 1 -- Three intrinsic dimensions for classifying PIs.](image)

1. **Decision type: strategic/tactical/operational**
   Here we focus on the kind of decision the PI is meant to support. If a PI is related to a decision having effect on issues with a time scale of several years, such as position in the market, we are dealing with a *strategic* PI. On the other side of the spectrum, there are decisions that control daily activities; these are monitored with *operational* PIs. In between we have *tactical* PIs for looking at performance with a time scale of weeks or months. It will be clear that a strategic PI without related tactical and operational PIs is at the least very strange. The same applies with respect to operational PIs without any relation with tactical or strategic PIs. So stating explicitly which type of decision a given PI is related to helps to establish a consistent set of PIs for a given organisation.
2. Level of aggregation: overall/partial

If we are interested in the performance of a system as a whole, dealing with the system as a black box, we define overall PIs. If the black box has to be opened in order to look at the system in more detail, we move from overall to partial PIs. Partial PIs will often be used for tracing the causes for a significant good or bad performance. Examples of overall and partial PIs can be found all over organisations. For example for a Board of Management responsible for the functioning of a company as a whole, returns on investment for the company is an overall PI, whereas the returns on investment for part of the company is a partial PI for the Board as a whole, but may be an overall PI for one of the members of the Board responsible for the performance of that part. Another example concerns the availability of a production line as a whole for which an overall PI may be defined by the manager responsible for the functioning of the line, whereas the same manager may introduce partial PIs in order to get insight into the availability of individual machines in this line during a given period of time. From the above examples it will have become clear that overall and partial are relative concepts. Also this dimension helps to get insight into both horizontal and vertical relations between PIs, although in a way different from the foregoing dimension.

3. Measurement unit: monetary/physical/dimensionless

Essentially, there are three types of units in which all quantities can be expressed. There are indicators that express performance in terms of monetary units: the monetary PIs. In production and inventory management, but also in systems like banks and hospitals, insight into performance requires also PIs such as number of products or customers per unit of time and throughput times; these are physical PIs, with dimensions such as units/hour, m³, or kg/m². More abstract PIs, often obtained by calculating a percentage or a ratio, are dimensionless. We label them as dimensionless PIs. Service level defined as the probability that no shortages occur during the lead time of a replenishment order is an example of such a PI. Which measurement unit is used does not only depend on the activities that have to be controlled but also on the people who are made responsible for the PI. For example, a financial manager may be interested in the scrap of a production department in monetary units, whereas a production manager may use the total number of scrapped products. Clearly the financial target expressed in a monetary unit should correspond with the dimensionless target set by the production manager. The above type of relation between PIs is not revealed by the two other intrinsic dimensions discussed above. For this reason we included type of measurement unit as the third intrinsic dimension to reveal relations between PIs.

Before dealing with the development of a consistent PMS in detail, some remarks concerning the above classification have to be made. The classification of PIs here
presented is not meant to replace the classifications given up to now in literature. That is because they play different roles in setting up a consistent PMS, as will become clear hereafter. It may be that for a given organisation there are no PIs corresponding to some of the blocks in the cube presented in Figure 1. This does not necessarily mean that the set of PIs that is used by the organisation is not complete. This depends on how and by whom things are controlled within a given organisation. (Remember the scrap example given above.) Nevertheless all persons in the organisation responsible for PIs should critically analyse their set of PIs when there are no PIs used that relate to one or more blocks of the cube.

3. The development of a consistent PMS

The method we propose for designing a consistent PMS consists of three main steps:

Step 1: Defining PIs
Step 2: Defining relations between these PIs (thereby using the classification scheme given in the foregoing section), and
Step 3: Setting target values for PIs.

Next, these steps will be dealt with in more detail.

Step 1. Defining PIs

From a bottom-up point of view the tasks that have to be executed within an organisation are the starting point for defining PIs, whereas from a top-down point of view starting point for defining PIs are the functions in an organisation that are responsible for the executing of these tasks. Within the context of each function the following three types of PIs can be distinguished:

1. PIs used by others to judge your performance from their points of view.
2. PIs used by yourself to judge your performance with respect to activities you are executing yourself.
3. PIs used by you to judge the performance of others executing activities for you.

Note that the above classification of PIs corresponds with the classifications of PIs denoted under the sub-heading Internal versus External in the foregoing section of this paper.

We believe that those who are responsible for executing a given task or controlling a certain activity, are able to define a list of candidate PIs for evaluating their performance with respect to this. Thereby it is not necessary to think about relations with other PIs or the company’s objectives; these will be dealt with in step 2. Nevertheless often a top-down approach, where all PIs are deducted from higher hierarchical PIs or organisational objectives, will be used because people will start with defining the PIs that are used to evaluate their performance by higher hierarchical levels in the organisation.

In literature several strategies for obtaining PIs are globally described, see
e.g. Fortuin [12], Wisner & Fawcett [1], Kaplan & Norton [14, 15, 16]. Most of them involve brainstorming as a starting point:

Sub-step 1: Brainstorming -- Uncensored and unstructured generation of candidate PIs. Each participant should write his or her suggestions on cards, one per card, after which the cards should be pinned on a board. Notably in case PIs are defined for the first time or when an existing system of PIs is reconsidered, overviews of PIs given in literature (such as the ones mentioned in the foregoing section of this paper) may be helpful. After all people executing a given function have defined their sets of PIs, one common set of PIs for this function should be defined out of all the sets, involving:

Sub-step 2: Clustering -- Collective removal of doubles. Giving names to potential PIs.

Sub-step 3: Priority setting -- Discussion about the relative importance of the candidate PIs, followed by ranking.

Sub-step 4: Selection -- The number of PIs should be reduced as much as possible, so that attention can be focused. See e.g. Keegan et al. [6].

Sub-step 5: Definition -- For each of the remaining PIs its meaning should be carefully written down, and a formula for its calculation should be determined.

Sub-step 6: Measurement -- From the definitions and formulae a list of required data is derived. Answers have to be given with respect to "Which data do we have already?", "If not, where are they to be found?", "How can we measure the missing quantities and where can such measurement take place best?".

Step 2. Defining relations between PIs

During this step relations between the various PIs are checked or defined. In general two types of relations can be distinguished: relations between the PIs used within the context of one function ("internal" relationships), and the relations between the sets of PIs defined for different functions ("external" relationships). As far as "internal" relations are concerned, these are usually implicitly defined during Step 1. So during this step notably attention will be paid to the relations between the sets of PIs defined for different functions.

In order to assist people, the new classification of PIs as well as the classification of PIs mentioned in the context of Step 1 are very helpful. For each PI people using the PI should explicitly state its values for each of the three intrinsic dimensions as well as the type of the PI according to the classification of Step 1, whereas for PIs of Type 1 and Type 3 it also should be stated for whom it is a PI.
Again a top-down/bottom-up approach is used. For showing the relations between different PIs, the structure in Figure 2 can be used, where Performance Indicator 1 is called the "parent" PI, and Performance Indicators 2a and 2b are the "children" of PI 1. (Note that there can be more than two children per parent and that each child may be the parent of a number of children.)

It should be possible to link PIs without a parent PI to the company goals. If a vertical relationship is missing, then either this relationship should be put in, or the PI has to be deleted from the list.

The final part of this step is to check whether there are blocks of the cube of Figure 1 for which no PIs have been defined. For each empty block one should check if there should be a PI in it. Again, we want to emphasize that is not necessary to have all the blocks filled with one or more PIs.

**Step 3. Setting target values for PIs**

A PMS is not only characterised by its set of PIs but also by the ranges of values triggering different actions. Clearly the latter have to be realistic. Starting from a (range of) value(s) set for a parent-PI, targets are set for the corresponding child-PIs. If targets set for one or more of the child-PIs turn out to be unattainable, the targets set for the other child-PIs belonging to the same parent, or the target set for the parent-PI itself, may have to be changed. So target value setting is a negotiation process, requiring a top-down/bottom-up approach, involving both "employers" and "employees", "suppliers" and "customers".
**The final responsibility for arriving at a consistent set of Pis for a given function lies with the manager responsible for the performance of the people executing the function. Here ends the detailed description of our strategy for designing a consistent set of Pis for a given organisation. In the next section some attention will be paid to the maintenance and redesign of PMSs.**

4. PMS maintenance and redesign

Once having defined and implemented a PMS, we have to take care that the PMS remains relevant for a company. For all kinds of reasons a PMS may have to be changed. These changes may not only concern the target values that are set for the different Pis, but also the ordered set of Pis itself. In general two types of changes can be distinguished: external changes, caused by changes in the external environment of an organisation, and internal changes due to changes in the internal environment of an organisation. Examples of external changes are shorter delivery times and cheaper sales prices realised by competitors. Examples of internal changes are the arrival of a new machine, and an internal reorganisation of activities. Internal changes are often, but not always, triggered by changes in the external environment.

Due to external or internal changes, a PMS may have to be changed in three ways. In case a new PI is required, the method described under PMS Design can be used. Whenever a PI is considered to be deleted, the corresponding PI parent-child clusters should be checked to examine which other Pis may have to be deleted as well. Finally, in case the target value(s) for a PI are planned to be changed, the parent-child relationships should be checked on target value consistency.

5. Comments and conclusions

In this paper a concrete, operational framework for (re)designing an effective, consistent performance measurement system has been outlined. The framework has successfully been used to design a performance measurement system for a chocolate producing company (Fortuin [17]). Further implementations are required to examine the general validity of the framework. In order to have a consistent performance management system more is required than a consistent performance measurement system. In this paper the functions in the organisation and the tasks for which they are held responsible have been assumed to be given. In practice the above does not apply for new companies or new tasks. In that case decisions have to be taken with respect to which responsibilities to assign to which functions. Also with respect to these aspects further research is required.
6. References


