

Six Sigma Performance Measurement System

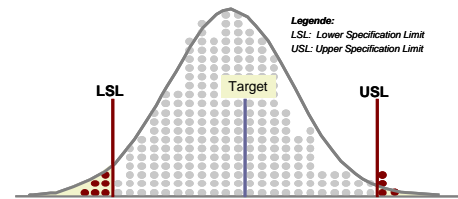
proXcel White Paper

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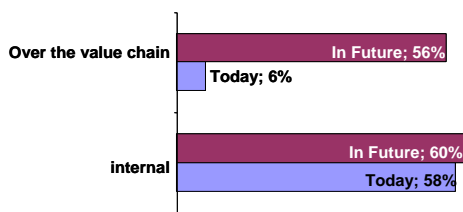
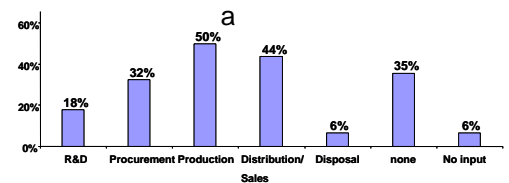
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Due to increasing dynamics of today's markets the long-term and sustainable business success depends on the company's ability to adapt continuously to changed basic conditions and challenges by correct selection of strategies and thus projects. Especially in cost-oriented sectors is a sufficient saving potential through improved quality. Approximately 90% of quality or rather failure costs because of quality defects are disguised and rarely investigated, even they make 30% of the revenue in industrial as well as in service sectors. Furthermore the generation of new solutions in order to satisfy customer needs is a decisive competitive advantage. There is a deficit on methods enabling the evaluation and optimisation of process effectiveness and efficiency in fields perceived by the customer. This is important for a strong and sustainable competitive position. For a sustainable successful development of a company the maintenance and enhancement of company value are the basis and motivation of each entrepreneurial act. This will only be possible if a company is in a custom-tailored position and by this means more cost-effective, better and faster than its competitors. A concept enabling the development and analysis of key performance measurement system for holistic evaluation of the process organisation structure efficiency from customer view as well as customer-oriented process improvements over the whole value chain can help companies to attain and to upkeep business success. In this manner deficits of traditional procedures could be abolished.

Six Sigma as a modern quality management method is a promising strategy combining Porter's generic competitive strategies cost leadership and differentiation and making the targets attainable by adopting the DMAIC-cycle on every single process of each process level. In this context the main target of the Six Sigma Strategy is the customer-oriented improvement. In this connection Sigma Level is a reasonable concept that compares process data with the specification level given by the customer. It is a customer-oriented process capability indicator that can be calculated for continuous as well as for attributive processes. Furthermore, it predicates how the company accomplishes internal/ external customer as well as entrepreneurial requirements. Complex process chains can be described with the Sigma Level. Additively, the method integrates user preferences and practical methods for process evaluation and transfers it to the new concept.



For this manner empirical studies¹ show also the need for such Performance Measurement System. Nearly 60% of the companies don't have a PM-System. Many companies don't have also an overview about their process performance in different process chains; even the importance of process improvements is well-known and accepted in each sector. That's why companies have serious troubles in defining targets (67%), data investigation



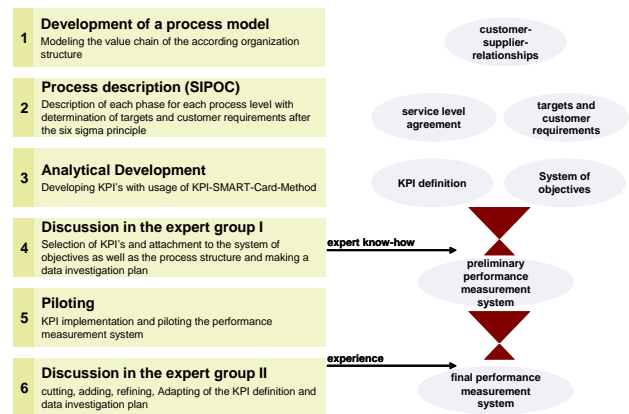
because of complexity and scope (56%) and quantifying the project potentials (40%). Furthermore in the near future the meaning and usage of process controlling, PM-System as well as customer-oriented process improvement will increase

¹ Source: Tavasli, S. (2005) „Trends and strategies: Process controlling as an instrument of a modern business management”: The principal object was to determine trends and strategies in process controlling and the requirements of managers in order develop to customer-tailored concepts for the practise.

in each sector. This situation leads to an increasing dissatisfaction between the managers.

Therefore the concept of KPI-SMART-Card (KPI = Key Performance Indicator, SMART = Specific, Measurable, Agreed to, Realistic, Timeline) can support to fulfil these requirements and to develop a PM-System on the base of the Six Sigma philosophy. Companies don't have only the advantages because of the structured generation of a PM-System, but also because of preliminary examination with the processes as well as fortification through process consciousness. Six Sigma has a two-sided focus combining external with internal needs in kind of a counter current process. That means it connects the voice of the customer with the voice of the company in order to center processes and minimize variations in projects. That's why the KPI-SMART-Card Approach uses deductive and inductive procedures for developing adequate and suitable KPI which is process-, customer- as well as target-oriented.

In the first step the selected process organisation structure of a company must be modelled to determine the continuous customer-supplier relationships. For this purpose the determination of the system boundary (in accordance to the customer) as well as of the process owner are important steps. Therefore different kinds of process models are useful like value chain diagram and event-driven process chain to understand the logic of the process which is important for the evaluation and aggregation systematic. After setting measure points in the process model each process element with measure points is described with the enhanced SIPOC-Diagram (Supplier-Input-Process-Output-Customer) which allows a holistic consideration and documentation of the process structure.



	People	Sales/Logistics	Method	Supplier	Technical Equipment	Environment
time		<ul style="list-style-type: none"> Time difference between the planning cycles Reliability of delivery date Order cycle time 	<ul style="list-style-type: none"> Complaint level 	<ul style="list-style-type: none"> Reliability of delivery date 		
cost	<ul style="list-style-type: none"> Employee costs 	<ul style="list-style-type: none"> range of inventory Amount of customer orders/ time 	<ul style="list-style-type: none"> seasonal fluctuation effects 	<ul style="list-style-type: none"> Delaying costs 	<ul style="list-style-type: none"> old Equipments effects 	
quality	<ul style="list-style-type: none"> flexibility degree in the working time system Ausbildungsgrad 	<ul style="list-style-type: none"> projection quality Reliability of delivery quantity Service performance 	<ul style="list-style-type: none"> Amount of small orders Amount of missing orders on hand 	<ul style="list-style-type: none"> Amount of delayed goods Reliability of supplier 	<ul style="list-style-type: none"> Failure rate Complaint level 	<ul style="list-style-type: none"> Amount of strikes Adaptation flexibility on changing market needs

analytical way with the input of the main results of the preliminary step “: determined targets and customer requirement”. Within this phase different advanced Six Sigma tools can be used. A company wants to become faster, better and more cost-effective to keep and to acquire more customers. That's why an indicator comprises the dimensions time, quality and costs. Furthermore the




development of KPI's are based on the 7M-Method of Ishikawa which regards all causes groups and the approach enables with the CTQ-driver tree a multicausal and multidimensional evaluation of the process structure. The tools are linked in a KPI-pattern.

The KPI's must be selected and defined with the support of Six Sigma tools like Kano-Model and with the participation and contribution of the process owners in according to the service level agreement, process targets, specification limits. It is very useful to use and document KPI's in standardized KPI data sheets given by

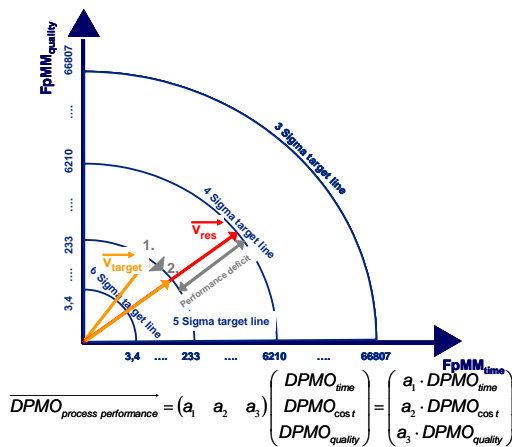
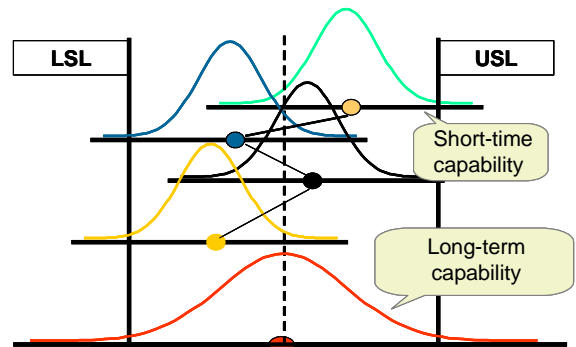
Number of the KPI	Name of the KPI	Target
		(UCL, LCL) Responsibility
Formula:		Data type/ scale level:
purpose:		
description:		
Data sources and measurement data:		
Calculation guideline:		
data handling/ information creation		
Display format of the KPI		

the German VDI 4400 guidelines. In this step experts and process owners determine also failure definition, specification limit as well as the exact targets. What a failure is often matter of definition of standards, effort or rather added value as well as customer requirements.

In conclusion the selected and defined KPI's are attached to the chosen and suitable type of PM-System (calculating system, classification system and target system). Each type of PM-System has advantages and disadvantages. A Six Sigma PM-System must be target-, process- and customer-oriented as well as simple for all users. That's why a combination of all is useful to use the advantages and eliminate the disadvantages. Additively it should allow the tracking and tracing over the value chain and real-time-monitoring. But firstly the PM-System should be applied in a division to avoid the overstraining of the process organisation structure. After the first run and piloting KPI's can be added, refined or adapted to have the final PM-System. In next step it can be amplified in other divisions.

Types of PM-System	Examples	Pro	Contra
Calculating system	DuPont-PM-System 	High operability with mathematical relationship between the KPI's	limited application area
Classification system	RL-PM-System 	Systematic and complete description of object of investigation	Because of many KPI difficult to manage
Target system	Heinen-PM-System 	Goal-oriented KPI application	Constricted Operability

The KPI-SMART-card approach offers also different types of evaluation: Fractal, fractal-causal and causal analysis. The fractal analysis is evaluation of a single KPI from different point of views. Therefore local parameter (mean, median and modus), variation parameter (range, standard deviation, skew ness and kurtosis) as well as six sigma metrics are used. The chosen process indicator depends on data type (attributive/ continuous) and time period (short-term or long-term data).



sub processes explain the top processes.

After that companies can detect weak points and generate improvement projects in order to optimise

A process have a couple of KPI's regarding the dimensions time, cost and quality. The fractal-causal analysis delivers the concept for a holistic evaluation of a process structure using vector systematic. A process can be described as a vector in a three-dimensional coordinate system. Priorities can be set down with weighting factors. The magnitude of the vector is the process performance. This concept also enables a selection of a whole target for the process structure broken down into the sub-dimensions with the new type of Iso lines. The causal analysis makes possible that

the value chain with its Six Sigma Agents to enhance the customer satisfaction and thus the business success. For it Six Sigma uses a structured and systematic approach (DMAIC-cycle) to solve process problems from each area with statistical and non-statistical methods in a traceable and sustainable way. Moreover the system has an early-warning characteristic. In the long-term, a company will improve its market position and also its business relationships. The concept represents a new stage of development of the Six Sigma Strategy and thus Business Process Management.