

KPI Analysis and Application

James C. Chen

Department of Industrial Engineering and Engineering Management
National Tsing Hua University
Hsinchu, Taiwan, R.O.C
james@ie.nthu.edu.tw

Tzu-Li Chen

Department of Industrial Engineering and Management
National Taipei University of Technology
Taipei, Taiwan, R.O.C
chentzuli@mail.ntut.edu.tw

Meng-Gung Li

New Kinpo Group
New Taipei City, Taiwan, ROC
kyo@kinpo.com.tw

Kung-Chin Koo

Department of Industrial Engineering and Engineering Management
National Tsing Hua University
Hsinchu, Taiwan, R.O.C
tpekingkoo@gmail.com

Abstract

Key performance indicators (KPIs) are the mainstream performance measurement methods for enterprises nowadays. The results measured by KPIs provide a key point for enterprises to improve strategically and operationally as well as highlight an analytical basis for decision-making. By quantifying the key parameters defined by the enterprise itself within a certain period of time, the indicators that are able to reflect the current state and performance can be obtained. This study aims to provide a tree-like KPI structure with a clear definition and hierarchical relationship for enterprises to identify and analyze performance. Through a comprehensive literature review, a multi-level KPI structure that combined a group of 34 KPIs that was introduced in ISO22400 and other important indicators in related literature is proposed. Besides, the supporting elements used for calculating KPIs are also defined in this study for investigating the relationships and connections between different KPIs. Such a study can also enable enterprises to implement a hierarchical intelligent dashboard to visualize a real-time situation based on the proposed KPI structure.

Keywords

Key Performance Indicator (KPI), ISO22400, Formula, Manufacturing Systems

Biographies

James C. Chen is Professor in the Department of Industrial Engineering and Engineering Management at National Tsing-Hua University (NTHU), Taiwan. Prior to his current position, he was Chair Professor in the Department of Industrial Management at National Taiwan University of Science and Technology, Professor in the Department of Industrial and Systems Engineering at Chung Yuan Christian University, and a researcher at Industrial Technology Research Institute, Taiwan. He received a B.S. in Industrial Engineering from NTHU, Taiwan, an M.S. in Manufacturing Systems Engineering, and a Ph.D. in Industrial Engineering, both from the University of Wisconsin-Madison. His current research interests include advanced planning and scheduling, lean production, supply chain

management, business process reengineering, and project management. Dr. Chen was awarded IBM Manufacturing Research Graduate Fellowship 1991-92 and Distinguished Industrial Engineer Award from Chinese Institute of Industrial Engineers in 2011.

Tzu-Li Chen is an Associate Professor in the Department of Industrial Engineering and Management at National Taipei University of Technology (NTUT), Taiwan. Dr. Chen received his B.S., M.S., and Ph.D. degrees in Industrial Engineering and Engineering Management at National Tsing-Hua University (NTHU). His research interests include production and logistics management, smart manufacturing, healthcare/medical management, system simulation, decision making under uncertainties, machine learning, and reinforcement learning.

Meng-Gung Li is Senior Manager of Product R&D in Department of Industry 4.0 at New Kinpo Group (NKG), Taiwan. Mr. Li received his M.S. degrees in Institute of Communications Engineering at National Tsing-Hua University (NTHU). With experience in Cloud/Data engineering and Internet fields, he is committed to the industrial Internet of Things (IIoT) architecture. Through the data platform and machine parameters, production efficiency/equipment alarm/maintenance/prevention and management indicators, to achieve the development goals of Industry 4.0 smart manufacturing.

Kung-Chin Koo is a master student in Industrial Engineering and Engineering Management at National Tsing-Hua University (NTHU), Taiwan. He received a BS. degree in Industrial Engineering and Management at National Taipei University of Technology (NTUT). His current research interests include Lean Management, Lean Production, and Key performance indicators.