

Title: AN APPROACH FOR THE IMPLEMENTATION OF A GLOBAL QUALITY MANAGEMENT SYSTEM ASSURING BOTH ROBUST GLOBAL PROCESSES AND LOCAL FLEXIBILITY

Authors:

Felix Meentken: Fraunhofer Institute for Production Systems and Design Technology IPK, Berlin, Germany; e-mail: felix.meentken@ipk.fraunhofer.de

Prof. Dr.-Ing. Roland Jochem: Berlin Institute of Technology (TU Berlin), Germany; e-mail: roland.jochem@tu-berlin.de

Keywords: *Global quality management, quality management system, standardization, flexibility, process management*

Conference theme: *Adaptability*

Abstract

The requirements for global enterprises have changed dramatically in recent years. Increasing customer demands, shorter product life cycles, increasing transport costs and more complex products and processes are just some of the current challenges in the global economy. These challenges reveal that thinking in closed systems is not up-to-date. Globally distributed business activities and value creation networks require a high systemic, integrative thinking, which points out global synergies and ensures an effective and efficient global cooperation. Thus, the importance of cross-site coordination considering different cultural, political and economic conditions becomes increasingly important. In this focus, an essential task of the management is to create a suitable organizational base to optimally integrate the enterprise in the turbulent environment, to facilitate continuous improvement, to be able to quickly react to changing demands and to define the structure for a successful global cooperation.

The basis for a global quality management system is a process oriented organization with defined business processes as the core of the enterprise. Therefore, globally standardized processes are considered to be a key success factor for outsourcing of business activities with a consistent high quality level. Globally valid processes with common terms, key performance indicators (KPI), objectives, responsibilities etc. enhance the enterprise-wide communication and cooperation. Furthermore, global standards concerning different areas such as quality, environmental protection and occupational health and safety can be established in the global organization. A major challenge in the heterogeneity of the global value chain is the definition of an appropriate level of detail where global standards (processes, documents, etc.) are mandatory and at which level local adaptations are allowed to ensure local flexibility and improvement. Thus, the objective of the developed approach is not a globally uniform standardization in every detail, but to grant the local sites sufficient flexibility to adapt to their specific local requirements.

The implementation is based on a combined approach of top-down and bottom-up. Thus, in the first phases the top-management is in charge and must define the strategic objectives and create a suitable conceptual framework for the global quality management system. In the following phases, a defined core project team and the employees are in charge to realize the operational implementation of the management system. Thus, primarily the necessary processes must be designed and implemented. Here it is important to create a global applicable standard and to identify local specific requirements in an interdisciplinary and international team. This is necessary to create global acceptance, which is inevitable for a successful and vibrant management system.

In close cooperation with an industry partner an approach for the implementation of a global quality management system was developed. It is based on a process oriented global organization that assures the standardization of core business principles, processes and values

on the one hand, and respects differences of the local sites concerning culture, laws, norms etc. on the other hand. Furthermore, this approach fulfills both the internal requirements of the employees and the management as well as the external requirements of norms, laws and customers.

1. Introduction & problem statement

Within the last few decades it can be observed that particularly the production processes of individual products and their components have changed towards globally distributed production activities (Seghezzi *et al.*, 2013, p. 281). Globally distributed business activities and value creation networks require a high systemic, integrative thinking, which points out global synergies and ensures an effective and efficient global cooperation (Conti, 2013, pp. 645; Feo and Thompson, 2010, p. 282). Therefore, the importance of cross-site coordination considering the different cultural, political and economic conditions becomes increasingly important (Juran, 2010, p. 52). So the challenges of global enterprises have increased in recent years. Higher customer demands, shorter product life cycles, increasing transport costs and more complex products and processes are just some of these challenges (Spath, 2009, p. 7; Becker and Kahn, 2005, p. 3).

Quality management systems (QMS), which take into account the various aspects and constraints of a global enterprise, are considered a suitable instrument to make the increased complexity manageable. Such systems require and support a high degree of conformity, standardization and improvement across the organization (Schreiber, 2007, pp. 207). In this focus, an essential task of the management is to create a suitable organizational base to optimally integrate the enterprise in the turbulent environment, to facilitate continuous improvement, to be able to quickly react to changing demands and to define the structure for a successful global cooperation (Conti, 2013, pp. 652). Through, *inter alia*, mergers and acquisitions many enterprises have grown significantly in recent years. It has turned out that old structures and organizational forms are commonly no longer suitable for enterprises with a certain size and globalization of its business activities.

Therefore, the current challenge is not only to minimize the coordination effort between different business areas and departments but to manage globally distributed value creation activities and networks. Often several sites, suppliers, customers, laws, standards etc. need to be considered. Thus, various aspects such as different cultures, infrastructures, ways of thinking, qualification level, quality standards concur at a global enterprise, which must be coordinated and optimized holistically (Mehra and Agrawal, pp. 1014). In this focus, a special challenge is to manage the conflicting priorities of standardization and flexibility. Robust, globally valid processes are considered an important multiplier for the enterprise-internal knowledge. This supports the familiarization of different sites with the standards of the home base. A big challenge is, however, that these global valid processes need a suitable level of detail for standardization, so that also a determined scope for local adaptations is ensured.

2. State of the art

Standardized QMS e.g. according to ISO 9001:2008 and Total Quality Management (TQM) as a holistic management approach have proved effective to make the complexity of enterprises manageable and to establish a high quality standard (Wagner, 2007, pp. 173; Malorny, 2007, p. 995). However, the problem is that existing management systems are usually not matched to the challenges of global enterprises and do not offer appropriate solutions to these challenges (Seghezzi *et al.*, 2013, p. 282). So it is proven that quality problems occurring in the cooperation with international sites continue to remain high (Kinkel and Maloca, 2009; Kinkel *et al.*, 2009; Zanker *et al.*, 2013).

The importance of a global QMS for a global enterprise becomes apparent when the effect chain of quality and business success is considered (s. figure 1). According to the effect chain

the system quality is the basis for business success. Common objectives, values and standards are set in the QMS. By using a holistic approach the enterprise can be controlled and optimized to meet the global challenges. A holistic approach that differs from the technological, economic or humanistic perspective by regarding the enterprise as a complex, multi-dimensional system in a complex environment, is here considered most suitable to meet the current challenges (Friedli *et al.*, 2013, p. 9). The main task of the management in a holistic approach is to integrate the global enterprise into a harmonious whole and to ensure an optimal adaptation to the environment (Ulrich, 2001, p. 95). Thus, through the globalization a big discontinuity has emerged that requires a systemic, holistic approach (Conti, 2013, p. 649).



Figure 1: Effect chain of quality and business success (Gembrys and Herrmann, 2007, p. 8)

Process quality is the next element in the effect chain. Processes must be based on the corporate strategy and the management system, and thus establish global quality standards, improve communication and support the global knowledge transfer through standardization. Defined and standardized processes are therefore an essential step on the way to a process-oriented management system (Jochem, 2010, p. 102). It has been shown that standardized processes have a great value especially for global enterprises. The specialized knowledge of the employees of the home base has gained over many years and does generally not exist at new sites and acquired companies. Enterprises often try to qualify new sites by on-site presence of experienced staff and to ensure thereby a know-how transfer. This is basically a recommended step, but should be supported by globally valid processes. Such processes involve a substantial part of the know-how of the enterprise and thus serve as a knowledge multiplier across the enterprise. Thereby a common basis and a common understanding of all employees are generally facilitated. The on-site presence of experienced staff, however, remains certainly in the long term useful to further promote the implementation of the defined processes and also to make informal knowledge available at external sites. Therefore, globally valid processes are a vital part of a global QMS.

Process quality significantly affects the quality of the products offered. Thus, products can only be offered at a consistently high quality level, if the processes in the enterprise are well defined and controlled. The processes can therefore be considered as the core of the management system and particular attention on the planning, definition and implementation of these processes is necessary. The best starting points for cutting costs, reducing time,

increasing volume flexibility and improving quality can usually be found in the processes (Seghezzi *et al.*, 2013, pp. 50).

According to the effect chain high quality products lead to a corresponding market success of the enterprise, the customer requirements are continuously fulfilled and thus a certain price level can be justified to the customer. Ultimately, the business success can be improved. The customer assesses whether the product fulfills his requirements and whether the price is reasonable. So it is important that the management realizes the relationships between product, process and system quality in order to offer the customers an optimal product and thus to maximize the business success (Seghezzi *et al.*, 2013, pp. 7).

Some of the most relevant concepts in the area of quality management are currently the ISO 9000 family (DIN EN ISO 9001, 2008), Total Quality Management (TQM) (Rothlauf, 2010), the EFQM-model (Zink, 2004) and Six Sigma (Gundlach and Jochem, 2008). It should be noted that there is a lack of approaches, which conceptually address global quality management and show suitable, systematic models to adapt the quality management of a global enterprise to the current challenges (Seghezzi *et al.*, 2013, pp. 281). It remains an open question, how global quality management can be implemented holistically, i.e. next to a global QMS with defined processes also the worldwide operational and strategic applicability can be ensured by an appropriate IT-support, a global corporate strategy and organizational structure. Thus, it should be noted that since the introduction of the Excellence models in in the 1990s little progress in the area of quality management have been made for global enterprises, and, however, this issue is urgent to work on both in science and in practice (Seghezzi *et al.*, 2013, pp. 641).

3. Global quality management concept

It has become evident that quality management urgently needs to adapt to the challenges of globalization. Thus, globalization is regarded as the crucial issue of the 21st Century (Conti, 2013, pp. 641; Feo and Thompson, 2010, p. 282).



Figure 2: Global quality management concept

The global quality management concept comprises five elements (s. figure 2):

- Global corporate strategy: In the focus of globalization, enterprises require a global strategic alignment and clearly communicate this global strategy. Thereby, inter alia, the following questions should be answered: What is the overall objective of the enterprise? Which products and/or services should the enterprise produce to meet

global market requirements? What is the global quality strategy? The defined global strategy is the basis for the global organizational structure and processes.

- Robust, global processes: Globally defined and documented processes assure a global standard. Furthermore, the processes serve as a knowledge base and multiplier between different sites. Besides global standardization these processes shall also ensure local adaptations and flexibility. So there is always an enterprise-specific trade-off between the extent to which global standardization of processes is useful and to which extend local differentiation and flexibility is necessary. This must be clearly worked out and defined in an enterprise-wide process modelling standard.
- Global organizational structure: Besides global processes, a suitable global organizational structure of quality management is essential. Clear responsibilities and tasks between the various central and local QM departments must be defined. Hence, global enterprises typically show both divisional and regional structures, which result in a high complexity and must be considered by an appropriate global organizational structure.
- Global IT-applications: A suitable IT-application (e.g. Computer-Aided-Quality (CAQ)) is important to support the defined processes and the operational work. It serves as a global communication platform and provides the employees at any time with appropriate, high-quality data.
- People: The core of the concept is represented by people respectively the employees. They are characterized by their individual knowledge and in a global enterprise they have different backgrounds regarding culture, qualifications, quality perceptions and values, which affect the other four elements of the concept.

This concept has to be implemented and operationalized in a suitable global QMS, which is described below.

4. Approach for the implementation of a global QMS

As demonstrated above, the management is currently faced with new challenges, which require a global governance of the enterprise on the one hand, and local, operational improvements and flexibility without losing the general overview on the other hand. For this purpose, a global QMS can be used which realizes the global quality management concept.

The implementation is based on a combined approach of top-down and bottom-up. Thus, in the first phases the top-management is in charge and must define the strategic objectives and create a suitable framework for the global QMS. In the following phases, a defined core project team and employees are in charge to realize the operational implementation of the management system. Thus, primarily the necessary processes must be designed and implemented. Here it is important to create a global applicable standard and to identify local specific requirements in an interdisciplinary and international team. This is necessary to create global acceptance, which is inevitable for a successful and vibrant management system.

In the following a generic approach is presented which shows how an enterprise can establish, implement and use a global QMS (s. figure 3). The basic content of respective phases is described step by step.

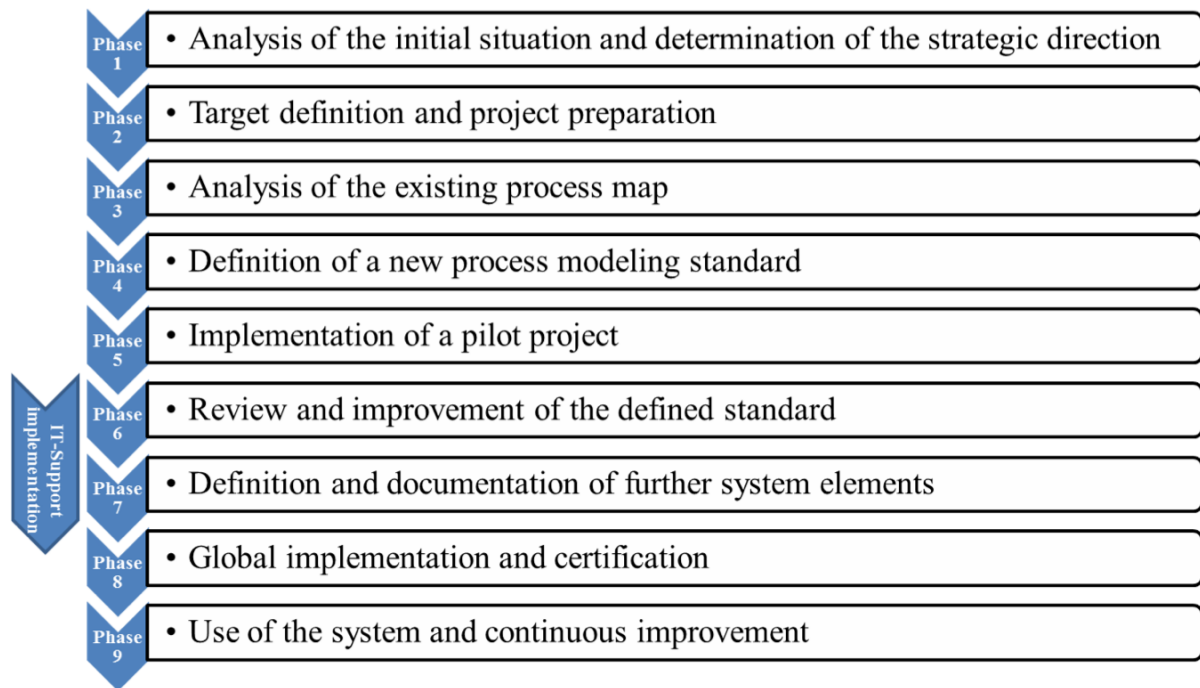


Figure 3: Steps for the implementation of a global QMS

Phase 1: Analysis of the initial situation and determination of the strategic direction

First, the general strategic direction of the enterprise must be analyzed. Top management analyzes the enterprise's current strategy and, if necessary, makes adjustments. Based on the enterprise's strategy and vision, globally valid principles, policies, KPI's etc. are determined for the relevant scope. According to the global quality management concept (s. figure 2), the global corporate strategy needs to be defined and the above mentioned questions should be answered.

Thus, at the end of this phase the main objectives of the enterprise are clearly defined. The strategic direction of the enterprise is communicated and is comprehensible and transparent for all employees. Thereby, the management commits to act in accordance with those principles and to ensure that all employees have the necessary resources available to implement the corporate strategy in their daily work. Thereby the strategic basis for a global QMS is made.

Phase 2: Target definition and project preparation

Top management sets the specific targets, which should be supported and implemented by the global QMS. Furthermore, top management must make a clear commitment for the implementation of the global QMS and provide all necessary material and immaterial resources for the implementation of the management system. Therefore, inter alia, the quality management representative must be determined, who is in charge of driving forward the implementation of the global QMS and acts as a permanent contact person for this project in the complete enterprise.

Afterwards, a suitable core project team must be defined, which works out the concept in detail, specifies the requirements of the management system and pushes the project permanently. From this point on it is advisable to involve external consultants to use the know-how and experience of experts in the implementation of such management systems. Additionally, the neutral point of view of consultants can be helpful to encourage internal communication and to reduce conflict potential.

In a rough project organization additional teams should be already taken into account, which are necessary for specific work packages during subsequent project stages. Furthermore, all

relevant stakeholders with respective requirements for the management system should be considered. Here it is important to consider also local specific requirements. For example, in addition to the ISO 9001:2008 in China the local norm GBT 19001:2008 defines requirements for a QMS.

Phase 3: Analysis of the existing process map

An analysis of the actual state must be conducted in order to demonstrate the concrete need for change. For this purpose, the previously defined requirements for the management system can be used. Improvement potential can be derived by an assessment of the degree of fulfillment of the requirements. The improvement potential must be clearly quantified and must be illustrated by showing the target state (e. g. with "best practice" solutions). Only this way the investment in a global, holistic management system can be justified.

Thus, at the end of this phase the actual state has been analyzed and improvement potential has been systematically derived. Furthermore, the target state was illustrated and a rough project plan should be created.

Phase 4: Definition of a new process modelling standard

Based on the analysis of the actual state and the identified improvement potential, a new process modeling standard should be defined, which describes in detail how process management will be deployed in the entire organization. This standard is designed in such a way that the processes meet both the internal requirements of the employees and management as well as the external requirements of norms, laws and customers.

Furthermore, a workshop on the topic "global / local" must be conducted. With process experts, quality managers, etc. an enterprise-specific differentiation between global standardization and local differentiation and flexibility needs to be worked out. Basically, in particular the strategic direction of the enterprise and the management system is crucial here. If the focus is put on global integration and standardization, the granted scope for local adaptations will be lower. If, however, a greater focus is put on local diversification and differentiation usually a greater freedom for local adaptations is granted. A reasonable solution for this issue can be seen, for instance, in a process concept, which defines and standardizes business processes in an international project team in a detail that a global acceptable standard is created. Necessary local adaptations are not designed in the process itself but can be realized by other applicable documents and procedures which are linked to the process.

Phase 5: Implementation of a pilot project

Initially the project core team must analyze which business process is suitable for the implementation of a pilot project. The selection should be strategically well devised as the pilot subsequently serves as a new best practice solution in the enterprise, which should cause a high degree of attention and persuasion.

After identifying a suitable business process, an interdisciplinary project team is formed that defines and documents the process by using the new process modeling standard. The project team should consist of employees from different departments and international sites who apply the process in their daily work. Furthermore, it is recommended to also include other experts and external consultants to the project team who provide detailed knowledge and best practice solutions in this area. This ensures that not only the current state of the process is designed but also already certain optimizations can be identified, discussed and implemented. Due to the pilot project the business risk can be kept very low and changes to the concept can be quickly and relatively easily made.

Through an optimal implementation of the pilot project, the benefits of the new management system can be demonstrated to all employees with a concrete, practical example. Furthermore, the changes of the new system are easily visible and transparent. This can be very effective to

motivate employees for other projects to design further business processes according to the new standard.

Phase 6: Review and improvement of the defined standard

On the basis of the experiences gained in the pilot project, new findings and improvements are integrated into the process modelling standard. Furthermore, a comprehensive check of the newly designed process is carried out in terms of content and concept. For this purpose, experts from international sites must be invited for a workshop. Hence, if not earlier, at this point it must be analyzed whether the practicability of the process is ensured on the documented level for all sites. An internal audit, for example, can provide the necessary conceptual framework for a further assessment, which can analyze at the same time the fulfillment of norm requirements. In addition, certain changes in the process can be carried out so that an overall optimum is created, which is beneficial for all sites. Local specific requirements should be added through other applicable documents.

The responsibility for the local process is handed over to the local process owner. The process owner and process experts are qualified and trained to enable them to implement and improve the processes on-site, to make their staff familiar with the standards and to create an awareness of a shift in values regarding a new quality perception.

If the first processes are defined and the pilot project has successfully approved the concept, the selection and implementation of an appropriate IT-application (e.g. CAQ) can be started in parallel to support the designed processes. Furthermore, a suitable global organizational structure must be defined. Therefore, it has to be clarified what task and responsibilities of the different central, divisional and regional QM departments are. For instance, it must be defined who is responsible for the management system, who plans and conducts audits, who defines and assesses KPI's, etc.

Phase 7: Definition and documentation of further system elements

Due to the increased acceptance and attention of the global management system further processes will be gradually added to the process portal and thereby designed and documented according to the new process modelling standard. Various cross-departmental, international process teams are formed, which gradually design the further processes according to the new process modelling standard.

It is useful to create a global roll-out plan that prioritizes the designing of individual processes and brings them in a schedule. Thus, the internal resources can be better planned and a transparent target can be demonstrated. All other business processes should be implemented and the management system should have matured to a complete global management system which is valid for all hierarchical levels, departments and sites. Furthermore, the implementation of the IT-application and the global organizational structure are parallel continued and elaborated.

Phase 8: Global implementation and certification

A basic distinction is whether the management system should be introduced gradually or not until it is fully completed. There are various advantages and disadvantages, while a gradual introduction seems reasonable in industrial practice. Thus, the gradual introduction can be already used as a test of the functionality in the daily work and improvement suggestions of the users can be taken into account at an early stage. Furthermore, the introduction is very complex and usually requires some organizational changes that require a certain period of time and trigger resistance in the organization, which must be overcome only by a clear commitment of top management.

According to a global certification roadmap, it is also started to integrate various sites into a multi-site certification and to globally coordinate the related audits.

Phase 9: Use of the system and continuous improvement

A management system must be a vibrant system. That is, it has to evolve continuously and must adapt to a changing business environment. Only in this way the management system remains globally applicable and represents a competitive advantage.

At the corresponding sites a locally effective quality management team must be set up, which supports the global management system, anchors it in the organization and ensures the implementation and use in the daily work. Through the guidance of central quality management improvements are coordinated and implemented worldwide. Finally, global processes (by central QM) and local processes (by regional and divisional QM) are applied and continuously improved under consistent global synchronization and coordination.

5. Conclusion

Nowadays global enterprises are faced with an enormous complexity that needs to be reduced and to be made manageable with the help of appropriate management systems which are based on a global concept. Therefore, especially the management requires holistic and integrative management systems that allow keeping the general overview of the enterprise and identifying and managing the dependencies and relationships between business processes as well as between involved sites, divisions and departments. Thereby, the differentiation between global standardization and local flexibility of the sites is a key point in the conceptual design and implementation of a global QMS.

The introduced approach for the implementation of a global QMS fulfills these requirements through a holistic perspective. A combined approach of top-down and bottom-up has proven a suitable procedure. Thus, a rough framework and a generic approach have been described how quality management can better focus on coping with global challenges. Thus, an important step towards a conceptualization of global quality management was shown. However, global quality management is generally a young research area, so that there is a need to further develop and elaborate this concept and approach.

6. List of references

- Becker, J. and Kahn, D. (2005), "Der Prozess im Fokus", in Becker, J., Kugeler, M. and Rosemann, M. (Eds.), *Prozessmanagement: Ein Leitfadens zur prozessorientierten Organisationsgestaltung*, 5th ed., Springer, Berlin.
- Conti, T. (2013), "How should quality-related concepts evolve to face the challenges of world globalization?", *The TQM Journal*, 2013, pp. 641–658.
- DIN EN ISO 9001 (2008) Deutsches Institut für Normung, *Quality management system - Requirements (ISO 9001:2008)*.
- Feo, J.A. de (2010), "Using International Standards to Ensure Organization Compliance", in Juran, J.M. and Feo, J.A. de (Eds.), *Juran's quality handbook: The complete guide to performance excellence*, 6th ed., McGraw Hill, New York, pp. 467–490.
- Feo, J.A. de and Thompson, J.D. (2010), "The Juran Transformation Model and Roadmap", in Juran, J.M. and Feo, J.A. de (Eds.), *Juran's quality handbook: The complete guide to performance excellence*, 6th ed., McGraw Hill, New York, pp. 279–312.
- Friedli, T., Mundt, A. and Thomas, S. (2013), *Management globaler Produktionsnetzwerke: Strategie, Konfiguration, Koordination*, Hanser, München.
- Gembrys, S. and Herrmann, J. (2007), *Qualitätsmanagement, TaschenGuide*, Vol. 137, Haufe, Planegg.
- Gundlach, C. and Jochem, R. (Eds.) (2008), *Praxishandbuch Six Sigma: Fehler vermeiden, Prozesse verbessern, Kosten senken*, 1st ed., Symposium, Düsseldorf.

- Jochem, R. (2010), "Prozessmanagement und Qualitätsmanagement", in Jochem, R., Mertins, K. and Knothe, T. (Eds.), *Prozessmanagement: Strategien, Methoden, Umsetzung*, 1st ed., Symposium, Düsseldorf, pp. 101–125.
- Juran, J.M. (2010), "Quality's Impact on Society and the National Culture", in Juran, J.M. and Feo, J.A. de (Eds.), *Juran's quality handbook: The complete guide to performance excellence*, 6th ed., McGraw Hill, New York, pp. 41–68.
- Kinkel, S. and Maloca, S. (2009), "Produktionsverlagerung und Rückverlagerung in Zeiten der Krise", *Mitteilungen aus der ISI-Erhebung*, Dezember 2009, available at: <http://www.isi.fraunhofer.de/isi-media/docs/i/de/pi-mitteilungen/pi52.pdf>.
- Kinkel, S., Maloca, S. and Jäger, A. (2009), *Produktions- und FuE-Verlagerungen ins Ausland: Verbreitung, Motive und strategische Implikationen für das deutsche verarbeitende Gewerbe ; [Produktionsverlagerung ins Ausland 2004-2006], ISI-Schriftenreihe "Innovationspotenziale"*, Fraunhofer-IRB-Verl., Stuttgart.
- Malorny, C. (2007), "Total Quality Management als Grundlage für die Entwicklung der Unternehmenskultur", in Pfeifer, T. and Schmitt, R. (Eds.), *Handbuch Qualitätsmanagement*, 5th ed., Hanser, München, pp. 995–1008.
- Mehra, S. and Agrawal, S.P., "Total quality as a new global competitive strategy", *International Journal of Quality & Reliability Management*, pp. 1009–1025.
- Rothlauf, J. (2010), "Total Quality Management in Theorie und Praxis. Zum ganzheitlichen Unternehmensverständnis", *Total Quality Management in Theorie und Praxis*.
- Schreiber, F. (2007), "Integrierte Managementsysteme QM - UM - SIM", in Pfeifer, T. and Schmitt, R. (Eds.), *Handbuch Qualitätsmanagement*, 5th ed., Hanser, München, pp. 207–250.
- Seghezzi, H.D., Fahrni, F. and Friedli, T. (2013), *Integriertes Qualitätsmanagement: Der St. Galler Ansatz*, 4. überarbeitete Auflage, Hanser, München.
- Spath, D. (2009), "Grundlagen der Organisationsgestaltung", in Bullinger, H.-J., Spath, D., Warnecke, H.-J. and Westkämper, E. (Eds.), *Handbuch Unternehmensorganisation: Strategien, Planung, Umsetzung*, 3rd ed., Springer, Berlin, Heidelberg, pp. 3–24.
- Ulrich, H. (2001), *Systemorientiertes Management: Das Werk von Hans Ulrich*, Studienausg., Haupt, Bern, Stuttgart, Wien.
- Wagner, K. (2007), "Ausgestaltung von QM-Systemen auf Basis der ISO-9000-Reihe", in Pfeifer, T. and Schmitt, R. (Eds.), *Handbuch Qualitätsmanagement*, 5th ed., Hanser, München, pp. 173–206.
- Zanker, C., Kinkel, S. and Maloca, S. (2013), "Globale Produktion von einer starken Heimatbasis aus", *Mitteilungen aus der ISI Erhebung*, März 2013, available at: <http://www.isi.fraunhofer.de/isi-media/docs/i/de/pi-mitteilungen/PI-63.pdf>.
- Zink, K.J. (2004), *TQM als integratives Managementkonzept: Das EFQM Excellence Modell und seine Umsetzung mit Selbstbewertungsprozess ; berücksichtigt Reviews des EFQM-Modells von 2000 und 2002*, 2nd ed., Hanser, München [u.a.].