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AN ANALYSES OF THE MOST IMPLEMENTED QUALITY MANAGEMENT SYSTEMS AND THEIR COMPARATIVE REVIEW

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ABSTRACT
This study analyses some quality management systems connected to the Total Quality Management in a comparative method. The most implemented and therefore most significant quality systems which are analyzed are: ISO 16949 (based on ISO 9000), Toyota Production System and Six Sigma. Forecasted Result: Combination of above mentioned Quality Systems is to suggest an contemporary universal model of Total Quality Management applicable for future implications.
Key Words: TQM, Toyota Production System, JIT, Kaizen, Six Sigma, ISO 16949, ISO 9000

1. INTRODUCTION: TOTAL QUALITY MANAGEMENT
Due to very competitive environment in domestic and international markets, all business firms presently suffer very hard times. The key role for an excellent performance of every company is to increase customer satisfaction. There is tremendous diversity on influences affecting customer satisfaction world. As shown in the rings of Figure 1 customer demands regard positive experience.

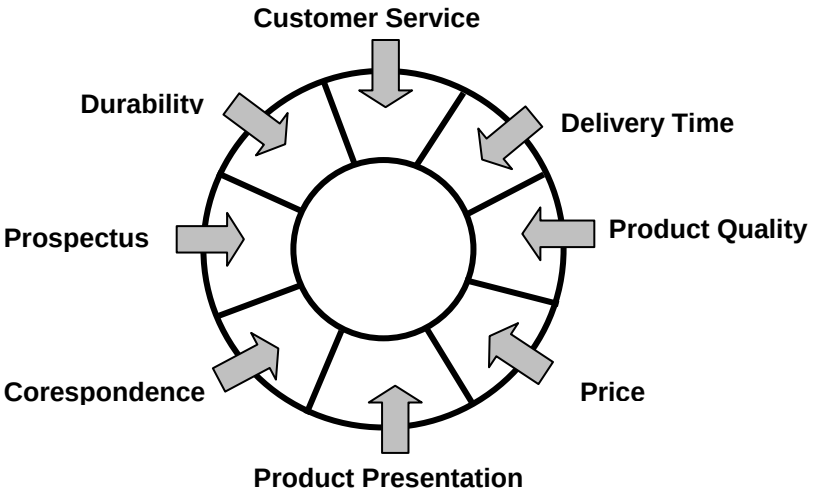

Figure 1. Customers Satisfaction World [1].

As detailed in the Fgure 1, influences on the customer satisfaction would be separated into two main categories:

- Methods and Process
- Behaviour and Attitude.

All competitors are in search for an appropriate business strategy or business excellence model**,** aiming zero defect processes in all aspects of business. That strategy is well known as **Total Quality Management (TQM)**. As defined in DIN ISO: "*TQM is a management approach for an organization, centered on quality, based on the participation of all its members and aiming at long-term success through customer satisfaction, and benefits to all members of the organization and to society*." (Figure 2).

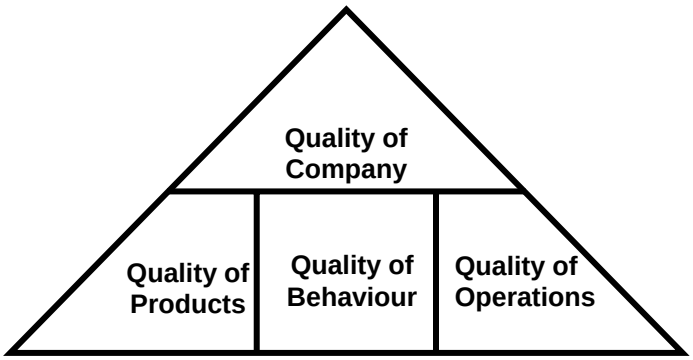

Figure 2. Quality of company [1].

TQM necessiates that things are to be done right at the first time, and ensure that defects and waste are eliminated from operations what means that the Total Quality of company (quality of company, products, behavior and operations) reduces costs and lead time of product (Figure 3).

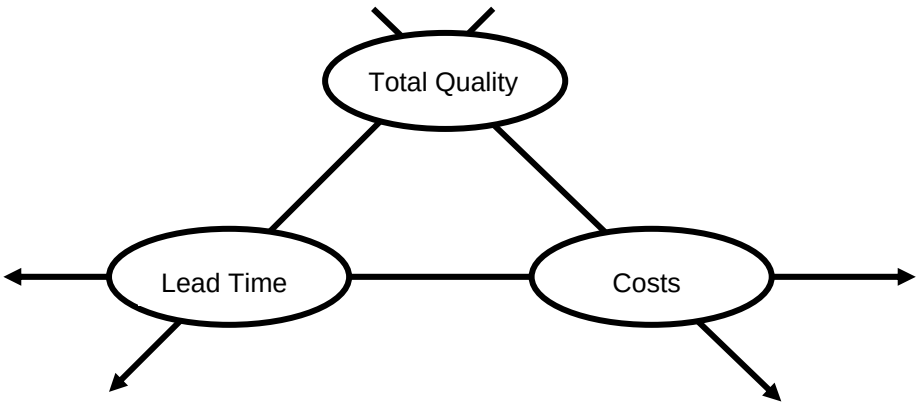

Figure 3. Effect of total quality on time and costs [2].

2. ISO 16949/ISO 9000

ISO 16949 was prepared by the international Automotive Task Force and Japan Automobile manufacturers Association, Inc. (JAMA), with support from ISO/TC 176, Quality management and quality assurance. ISO 16949 is the standard system for development of a quality management system that puts the stress on the defect prevention and the reduction of variation and waste in the supply chain. TS 16949 is applied to the design/development, production and, when relevant, installation and servicing of automotive-related products.

ISO 16949 is based on ISO 9000 with the sector-specific supplemental requirements. It consists of 4 practical chapters, in which are requirements for a quality management system specified. Main requirements of ISO 16949/ ISO 9000 are shown in Figure 4.

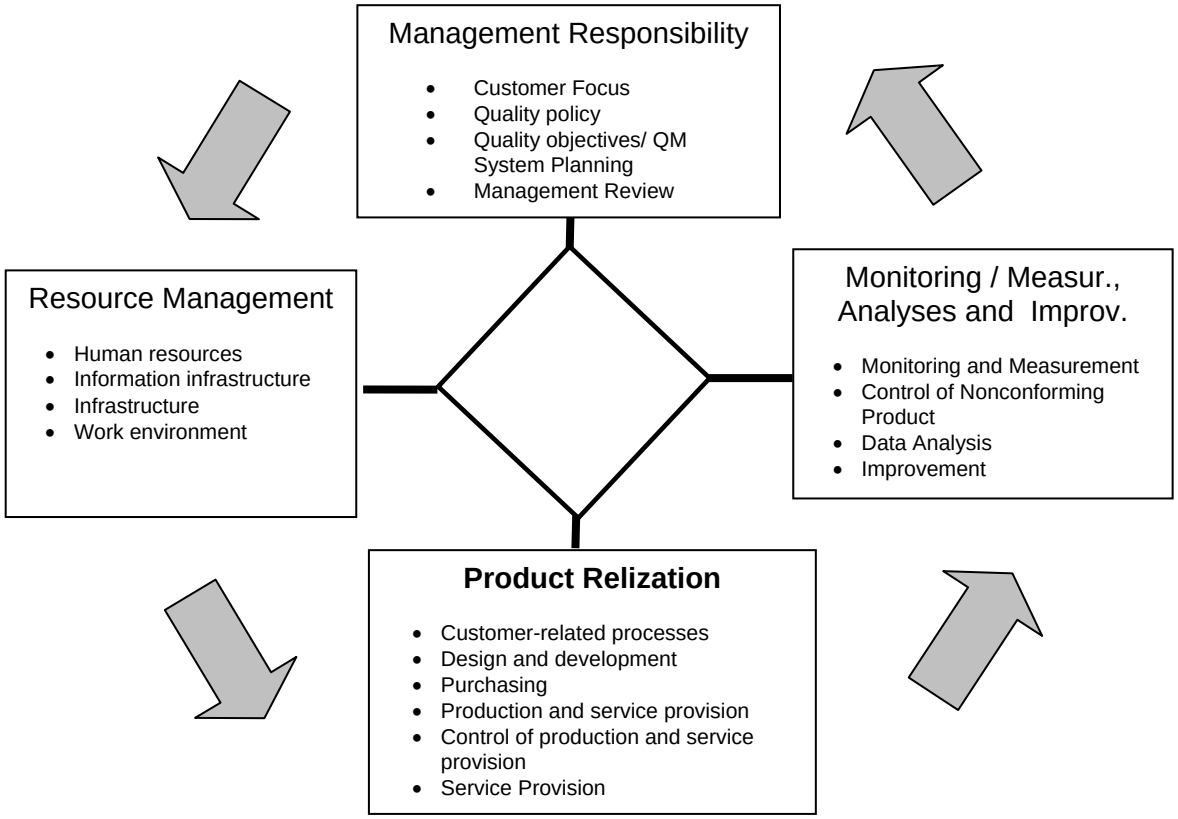

Figure 4. ISO 16949/ISO 9000 [3].

3. TOYOTA PRODUCTION SYSTEM

The Toyota Production System (TPS) was developed between 1948 and 1975 by Taiichi Ohno, Shigeo Shingo and Eiji Toyoda. The TPS organizes manufacturing and logistics for the automobile manufacturer, included interaction with suppliers and customers. The system is a major precursor of the more generic "Lean Manufacturing". The main goals of the TPS are high product quality, low costs and product delivery on time. By using Kaizen method (contineous improvement) TPS designs out overburden (Muri), inconsistency (Mura) and eliminates waste (Muda), Figure 5.

There are 7 kinds of muda targeted in the TPS: over-production, motion (of operator or machine), waiting (of operator or machine), conveyance, processing itself, inventory (raw material), correction (rework and scrap). Reduction of all these kinds of waste lead to reduction of product lead time and costs (Figure 5)

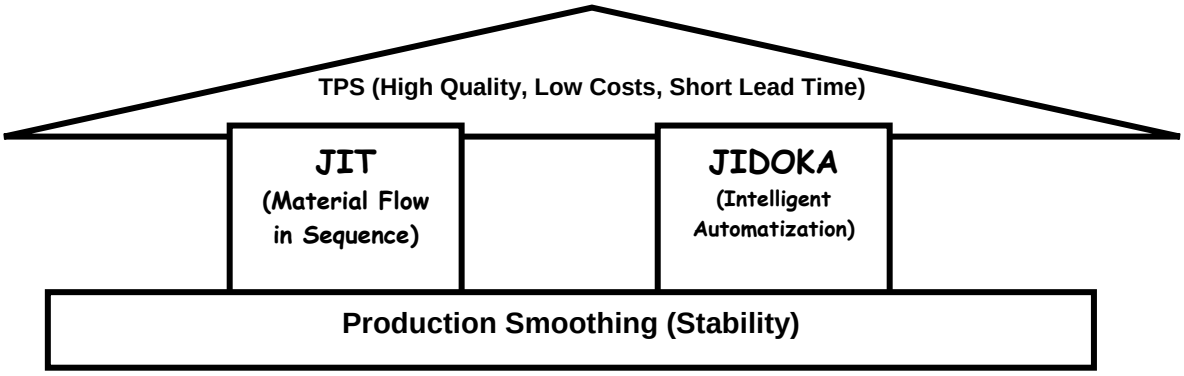

Figure 5. Toyota Production System [4].

4. SIX SIGMA

Six Sigma is used to represent standard deviation of a population. The term "six sigma process" comes from the notion that if one has six standard deviations between the mean of a process and the nearest specification limit, there will be practically no items that fail to meet the specifications. This is based on the calculation method employed in a Process Capability Study. The term "Six Sigma" has its roots in this tool. Six Sigma system systematically improves the processes by eliminating defects. In particular, processes that operate with six sigma quality produce at defect levels below 3.4 defects per (one) million opportunities (DPMO). Six Sigma has two key methodologies: DMAIC (improves existing business process in five steps: *define, measure, analyse, improve and control*) and DMADV (creates new product or process design for predictable, defect-free performance in five steps: *define, measure, analyse, designe and verify*). Both methodologies are inspired by Deming's Plan-Do-Act-Check circle. The core of the Six Sigma methodology represents a data-driven, systematic approach to problem solving by using statistical tools, with a focus on customer impact like FMEA, 5S, Poka Yoke, Stakeholder analyse, Value Stream Map, Ishikawa Diagramm, TPM etc..

SUCCESS = QUALITY x ACCEPTANCE … (1)

5. COMPARATIVE REVIEW

From the above written facts and from personal practical experience all mentioned business approaches can be valued and compared as in the Table 1.

Table 1.Comparative review of quality systems

	Quality of Product	Quality of Behaviour	Quality of Operations	Low Costs	Short Lead Time	Participation of Employee	Customer Relation
ISO 9000	moderate	moderate	moderate	week	week	moderate	week
ISO 16949	moderate	moderate	moderate	week	week	moderate	moderate
Toyota Produktion System	strong	strong	strong	strong	strong	strong	strong
6 Sigma	strong	moderate	strong	moderate	moderate	strong	strong

6. CONCLUSION

According to the previous analysis, it is possible to name main principles for TQM model:

- Quality as most valuable target
- Management responsibility
- Management training
- Management review
- Focus on human resources
- Customer focus
- Strategical business values of company
- Set and follow up of objectives
- Supplier integration
- Integrated prosseses
- Prevent failures (Methods of 6 Sigma)
- Continues improvement-Kaizen
- Lean Management
- Benchmarking

Above mentioned comparison lead us to conclusion that the road to business excellence or TQM model has its base in ISO 9000/ISO 16949 and must be at least combination of Toyota Production System and 6 Sigma data-driven method.

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