Measuring the soft sides of TQM and Lean

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Introduction

Total Quality Management (TQM) rests on a number of values and implementing TQM effectively means that these values are well accepted, practiced and deployed within an organization (Hendricks and Singhal, 1999; Dayton, 2001 and Shin et al., 1998). Previous research claims that the achievement of world-class quality and TQM via roadmaps will never succeed without a company culture characterized by the values of TQM (Dahlgaard & Dahlgaard-Park, 2006). The application of Lean thinking has become a well-spread concept to many different types of organizations and not only to the automotive industry from where it originates (Hines et al., 2004). Lean has developed from the same roots as TQM (Dahlgaard & Dahlgaard-Park, 2006) and in the same way as TQM has its values, Lean rests on a number of principles (in this paper being seen as an equality to values) and it is reasonable to assume that these values and principles should be present in an organization when entering the journey towards a successful Lean transformation (Achanga et al., 2006 and Bhasin & Burcher, 2006). Many researchers agree that the philosophy and the principles of TQM are sound and that TQM pays off when it is effectively implemented. (Hendricks & Singhal, 1999 and Hansson & Eriksson, 2002). The measurements of organizational success however, have primarily been focused on financial numbers or hard measurements such as cost of quality, reduced inventory and delivery dependability (Motawi, 2001). Therefore, measuring the softer sides of TQM and Lean in terms of organizational behaviours and organizational changes are needed as a compliment to the traditional measures (McNabb & Sepic, 1995 and McAdam & Bannister, 2001). Since it seems that organizational culture is important when it comes to implementing both TQM and Lean, how do we know if the culture needs to be changed?

The purpose of this paper is to examine TQM and Lean in regards to values and principles, implementation problems and measurements for success. The purpose is also to present an approach to measure organizational culture and values as a part of the implementation strategy for TQM and Lean.

Organizational culture and values

Rokeach (1973) defines a value as *'an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to its opposite or converse mode of conduct or end-state of existence'*. A value can also be described as a type of social cognition that facilitates a person's adaptation to his or her environment, and values have implications for his or her behavior (Fishbein, 1975 and Wiener, 1988). A value is consequently something that guides us in our choices, governs our actions and helps us adapt to our environment. A shared set of values within an organization is often referred to as the company culture or corporate culture. In fact, shared values are the very essence of cultures and of organizational cultures in particular (O'Reilly et al., 1991). O'Reilly et al. (1991) also state that *'If there is no substantial agreement that a limited set of values is important in a social unit, a strong culture cannot be said to exist'*. A strong culture improves the performance of the organization in two ways according to Grönfeldt & Strother (2006). It energizes the employees by appealing to their higher ideals and undefined values, and it shapes and coordinates behaviors and decisions.

Schein (2004) states that culture creation and management are the essence of leadership. The leaders have great influence on which culture will be predominant in the organization and how the leader acts and behaves influences the attitudes and behaviors of the rest of the employees. The culture of an organization consists of the shared norms, values, and beliefs of members. By establishing a strong culture, leaders can indirectly influence the attitudes and behavior of members (ibid). One of the key roles for a leader is to make sure that all employees understand the values underlying the organizational culture. A major pitfall in implementing or changing that culture occurs when management fail to 'walk the walk' and just give lip service to these values (Grönfeldt & Strother, 2006).

Establishing a new or modified organizational culture is a long-term process. Even though modifications of organizational structures can be done rather quickly, creating a shared understanding of the organization's vision and values may take longer (Sinkula et al., 1997).

TQM

TQM is generally considered to be based on a number of values or core values as they sometimes are referred to (see i.e. Hellsten & Klefsjö, 2000). The definition and labeling of these values vary slightly from author to author (a summary can be found in Lagrosen (2006)). However the similarities between the values are striking. According to Lagrosen (2000), these values are both the outcome and the ingredients of a successful TQM implementation. The value 'Leadership Commitment' was found to be the most crucial common prerequisite for successful TQM implementation and for creating a healthy work environment (Lagrosen et al., 2007). Other values agreed upon by many researchers are that of customer focus and continuous improvement. Effectively implementing TQM means that the values are well accepted, practiced and deployed within a firm (Hendricks & Singhal, 1999). Not creating a conductive culture, based on shared values, is pointed out as a one main contributory factor of failure to implement TQM (Dayton, 2001 and Shin et al., 1998). The organizational culture is therefore a key element in TQM and this culture needs to permeate all levels of the company (Dale, 2003). Dale (2003) furthermore claims not

only that TQM provides the opportunity to influence behaviors and attitudes but also that there is a shortage of information and guidance on how to make a cultural change. Since many organizations have faced difficulties in implementing values into their work procedures a model on how to progress with TQM is suggested by Hellsten & Klefsjö (2000) that could facilitate the implementation (see Figure 1).

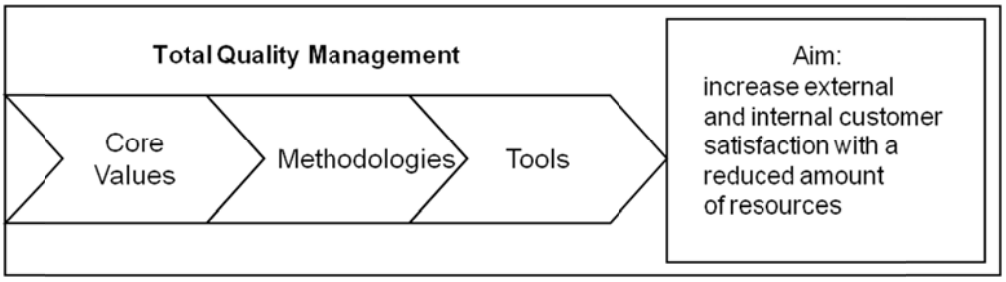

Figure 1. Role of core values, methodologies and tools, modified from Hellsten & Klefsjö (2000).

The model suggests starting by defining the company (core) values. The next step is identifying methodologies that are both suitable to the organization and support the values. The final step is to use suitable tools to support the methodologies. All this is done with the aim if increasing external and internal customer satisfaction with a reduced amount of resources.

A developed model (see Figure 2) has been suggested as an attempt to prevent some of the problems related with the failure to implement TQM (Ingelsson, 2009 and Eriksson, 2009). The proposed development is adding a strategy for selecting members of the organisation, with the intention of helping the organisation to select people sharing the defined values. This includes planning which new members to recruit and how to use existing co-workers in a better way, by putting the right person in the right place. This might even include dismissing members of the organisation who do not share the selected values (Chatman, 1991).

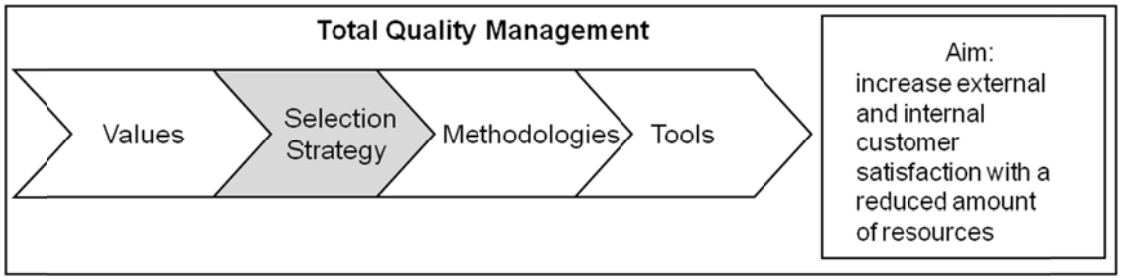

Figure 2. New suggestion of implementing TQM modified from Ingelsson (2009)

Lean

Lean has had an impact in the academic and industrial world during the last decades. The main focus within Lean is that of eliminating waste (Muda) and originates from the shop-floors in Japan and in particular from Toyota Car Corporation (Hines et al., 2004). Since the mid-twentieth century, Toyota has developed their productions system (TPS) as an alternative to traditional mass production and the production system has enabled manufacturing of high-quality, reliable cars at a low production cost (Osono et al., 2008). In the mid 80´s Massachusetts Institute of Technology (MIT) started a research project; International Motor Vehicle Program (IMVP) in

which car manufacturers from all over the world was compared. This resulted in the book 'The Machine that Changed the World' (1990) which showed the performance gap between Toyota and other car manufacturers. This study and the book led to a great interest in what came to be named Lean Production (Womack et al., 2007).

The concept has after 1990 widened to incorporate more than shop-floor focus. In 1996 Womack & Jones presented their five principles of Lean: specify customer value, identify and manage the value stream, use 'pull' mechanism to support flow in the value stream and finally, when the other four principles are in place, the pursuit for perfection. Liker (2004) describes Lean through 14 principles divided into four parts of a pyramid, the '4 P' model (se Figure 3), influenced by Toyotas internal training document 'Toyota Way' (Liker, 2004).

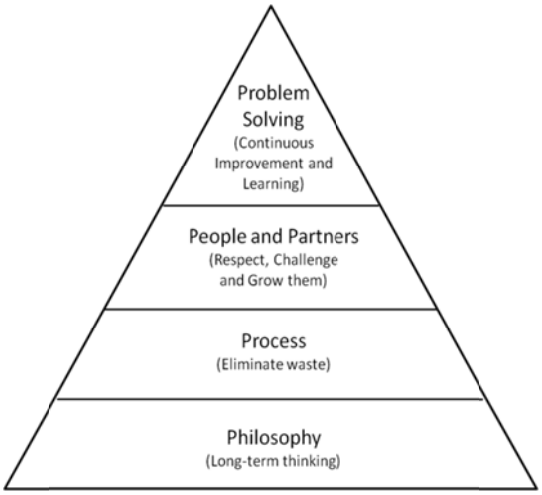

Figure 3. The 4P Model of the Toyota Way (Liker 2004)

The values, principles and techniques of Lean are often depicted as a house or a temple where the foundation most often consists of the philosophy or values of the organization. Lean should, in the same way as TQM, be seen as a conceptual and physical system not a toolbox. Organizations that consider Lean as a toolbox and only use one or some of the tools when implementing Lean will not be successful (Liker, 2004). Lean is not a method which other organizations can put into practice directly by simply practicing Toyotas lean activities since it´s a system that has been specially made for and by Toyota. Lean philosophy requires a total change of the mindset of the organization (Womack & Jones, 1996 and Liker, 2004). When implementing Lean, organizations can use different roadmaps or frameworks. However, implementing Lean is a forever ongoing process (Bicheno, 2004) or as Karlsson & Åhlström (1996) states *'lean should be seen as a direction, rather than as a state to be reached after a certain time'*.

Leaders are crucial to the outcome of a Lean implantation or transformation (Liker, 2004). The leader's role is to change the culture and this is done by being involved in the actual work with identifying waste and values stream mapping where it occurs. They need to learn to see waste (ibid). Leadership has also been identified as the most important factors when it comes to implementing Lean in SMEs (Achanga et al., 2006). Leadership includes factors such as having a clear vision, good levels of education and the willingness to support the initiative (ibid). Lean leaders are both passionate about involving people as well as having an in-depth understanding of the

work in addition to general managerial knowledge (Liker, 2004). Seddon (2005), looking mainly at service organizations, argues that leadership is being able to talk about how the work works with the people who do it.

Both Bhasin & Burcher (2006) and Achanga et al. (2006) have pointed out cultural changes as one critical factor for success. Within Lean the major way of changing the organizational culture is by doing. Shook (2010) writes in his paper about his experiences from the NUMMI factory: *"What my NUMMI experience taught me that was so powerful was that the way to change culture is not to first change how people think, but instead to start by changing how people behave – what they do.'*

Measuring organizational culture and values

The evidence presented on the connection between TQM and Lean and success is mostly based on hard measures. Hansson (2003) found a relationship between successful TQM implementation and financial performance. The link between TQM and financial performance is maintained by several other researchers (see, for instance Eriksson et al., 2003; Hendricks & Singhal, 1996 and Hendricks & Singhal, 1997). Based on an extensive survey and synthesis of TQM literature, Motawi (2001) offered a set of critical factors/dimensions and more than 45 supporting performance measures of TQM. None of the supporting measures could be categorized as a soft measurement, i.e. to what extent the critical factors are present in the organization. Bhasin & Burcher (2006) lists a number of studies were Lean initiatives have been successful and were the measurements for this success focuses solely on hard measurements. The measures listed are amongst others reduction of lead-time, reduction of inventory and cost reduction.

The need for applying soft measures to examine the existing culture in an organization before implementing TQM is of importance for success (McNabb & Sepic, 1995). This to attain a baseline of values currently held by the managers and co-workers and if the measured climate contradicts the TQM philosophy, actions must be taken to change the values and organizational culture before proceeding with TQM (ibid). McAdam & Bannister (2001) show in a study that it is necessary to establish the degree to which TQM values has been implemented before trying to measure the performance. The study also indicates that a wide framework consisting of both hard and soft measures should be used in attempting to measure the effect of successful TQM (ibid). Beatty (2006) points out that commitment to quality by both the individual and the organization are two key areas that should be assessed at the onset when implementing TQM.

Methodology

Literature studies were conducted to examine TQM and Lean regarding values and principles, implementation problems and measurements of success.

With the literature study as a base a questionnaire with statements about the main principles of Lean was developed to further evolve an existing survey used to measure the values 'Leadership commitment' and 'Participation of everybody'. These values have been identified as the two most important values within TQM in relation to perceived work-place health (Lagrosen et al., 2010). The added statements were categorized into five principles that were found to be distinct for Lean. Three

statements for each of the Lean principles were designed by each one of the researchers. After discussing the statements, three statements within each principle were agreed upon via consensus as best representing said principle.

In order to test the questionnaire it was handed out to employees in a department within a multinational organization. The department´s main task was to work with customer unique development projects, both short and long-time and they had just begun the work with continuous improvements based on Lean principles. The respondents were asked to mark on a seven-point agreement scale to what extent they agreed with the statements. The extremities of the scale were “Disagree completely” and “Agree completely”. The questionnaire was handed out and collected on the same occasion and 18 managers and employees were present at the time. The response rate was 100% and the data was computed using SPSS and the results were then analyzed by the researchers.

Results

The literature study showed similar problems when implementing Lean and TQM. To achieve a successful Lean transformation the need for a shared value base is just as important as within TQM. The lack of not creating this shared value base is pointed out as one main reason for not successfully implementing TQM and Lean. The focusing on tools instead of the awareness of the need for system thinking as well as underestimating the impact of organizational culture on the success seems to be common problems. The measuring of values and organizational culture e.g. the soft side appears to be lacking within both concepts even though the organizational culture is pointed out as a factor for success. Most found measures were of the hard kind; financial or process oriented. The need for using soft measurements seems to be necessary. In addition, it appears to be a shortage on information and guidance on how to make a cultural change in an organization. Within Lean the way of making this change is by doing, to focus on behaviors rather than trying to make people think in a different way.

Even though Lean and TQM are said to originate from the same roots the researchers found that there are some areas within Lean that are not quite so apparent in TQM. The principles that were considered more distinct within Lean than TQM was: Long-term thinking, System thinking, Elimination of waste, Focus on creating customer value and Lean leadership. Regarding Focusing on creating value for the customer, the term value is used somewhat differently when it comes to identifying what is important for the customer.

The added principles were considered important for achieving changes in the organizational culture. For instance, Lean leadership seems to be more hands on and present; more of the ‘walk the walk’ kind of leadership. Based on these findings three statements within each principle were constructed and used in a questionnaire with the purpose to create an approach to measure organizational culture. The agreed upon statements categorizes by principle were:

Long-term thinking

We have a common and agreed upon vision for the company

High customer satisfaction is valued higher then big financial profit

The decisions made in our company are based on the company's long-term objectives

System thinking

I know the overall objectives for the company

I know how my work is connected to other parts of the company

I know how my work contributes to the overall objectives of the company

Elimination of waste

To eliminate waste is something we continuously work with at our work place

I know how to identify waste within my work

We solve problems when and where they arise

Focus on creating customer value

I know what creates value for our customers

I know what our customers reel needs are

At our company we aim to remove work tasks that do not add value for the customer.

Lean leadership

Management decisions are based in a long-term thinking, even if it at the cost of short term financial goals.

My managers take responsibility for their actions.

Our managers are recruited internally

To test the internal consistency reliability for the five added principles the Cronbach´s Alpha coefficient was calculated for each of them using SPSS. A value of 0.6 or over can be seen as acceptable (Hair et al., 1998). However, since the coefficient tends to increase with the number of items or statements, the results were considered acceptable since there were only three statements included in each of the principles. The result from SPSS regarding the Lean principles is presented in Table I.

PRINCIPLE	MEAN	STD. DEVIATION	CRONBACH ALPHA
Long-term thinking	4,43	1,16	0,66
System thinking	5,56	0,98	0,82
Elimination of waste	5,11	0,82	0,59
Focus on creating customer value	5,22	0,86	0,53
Lean leadership	5,18	0,67	0,78

Table I. The results from SPSS regarding Lean principles.

Two of the principles did not reach the value of 0.6; the principles ‘Elimination of waste’ and ‘Focus on creating customer value’. The principles ‘Long-term thinking’ and ‘Lean leadership’ showed high score, over 0.75 and one of the principles; ‘Long-term thinking’ just over 0.6.

Conclusions

To be successful when it comes to implementing TQM or Lean, one of the major factors seems to be the culture that exists within the organization. Many researchers agree on the fact that changing the existing culture might be needed to succeed in the attempt to reach world class quality. If so, how do we know if we have the needed organizational culture? There are many examples on hard measurements used to verify how well an organization has implemented Lean or TQM but none found that showed soft measurements like measuring values and organizational culture.

When entering the journey towards TQM or Lean it might be needed to take the soft side more into account in order to improve the chance of reaching a successful implementation. The prerequisite seems to be that you have at least some devoted leaders in the organization, leaders that are committed to the values within Lean and TQM and who are willing to live by and act according to these values. The next step is to assess to what extent the values are present within the rest of the organization and to make up a strategy on how to work with the values and culture in the organization; to broaden the scope for the implementation strategy. At this point, how to select members of the organization needs to be taken into account as well as other ways of strengthening the culture.

The questionnaire developed in this paper could, when used together with the existing questionnaire (Lagrosen et al., 2010), be one way of assessing the organizational culture were the mean value of each value or principle could indicate which values or principles that needs to be addressed. A high mean value would indicate a strong presence of the value or principle in the organization and a low the opposite. The questionnaire needs to be developed further since two of the principles had borderline internal consistence reliability so the statements within these principles need to be improved. Furthermore, the questionnaire needs to be tested more before it can be used as a measure of the soft side of TQM and Lean.

References

Achanga, P., Shehab, E., Roy, R. & Nelder, G. (2006). Critical success factors for lean implementation within SMEs. *Journal of Manufacturing Technology Management,* Vol. 17, No. 4, pp. 460-471.

Beatty, J., R. (2006). The quality journey: historical and workforce perspectives and the assessment of commitment to quality. *International Journal of Productivity and Quality Management,* Vol. 1, No. 1/2, pp. 139-163.

Bhasin, S. & Burcher, P. (2006). Lean viewed as a philosophy. *Journal of Manufacturing Technology Management,* Vol. 17, No. 1, pp. 56-72.

Bicheno, J. (2004). *The new lean toolbox: towards fast, flexible flow*, ([3rd edn) Buckingham: PICSIE Books, p. 211 s.

Chatman, J.A. (1991). Matching People and Organizations: Selection and Socialization in Public Accounting Firms. *Administrative Science Quarterly,* Vol. 36, No. 3, pp. 459-484.

Dahlgaard, J.J. & Dahlgaard-Park, S.M. (2006). Lean production, six sigma quality, TQM and company culture. Emerald Group Publishing Limited. pp. 263-281.
Dale, B.G. (2003). *Managing Quality*: Blackwell Publishing.
Dayton, N.A. (2001). Total quality management critical success factors, a comparison: The UK versus the USA. In *Total Quality Management.* Carfax Publishing Company. pp. 293-298.
Eriksson, H., Johansson, F. & Wiklund, H. (2003). Effects of In-Company Quality Awards on Organizational Performance. *Total Quality Management & Business Excellence,* Vol. 14, No. 2, pp. 235-242.
Eriksson, M. (2009). Creating customer value in commercial experiences. In *Department of Engineering and Sustainable Development.* Östersund: Mid Sweden University. p. 65.
Fishbein, M. & Ajzen, I. (1975). Belief, attitude, intention and behaviour: an introduction to theory and research, Reading, Mass.: Addison-Wesley, p. xi, 578 s.
Grönfeldt, S. & Strother, J. (2006). *Service leadership: the quest for competitive advantage,* Thousand Oaks, Calif.: SAGE Publications, p. xiii, 319 s.
Hair, J.F., Anderson, R.E., Tatham, R.L. & William, C. (1998). Multivariate Data Analysis. Upper Saddle River, NJ: Prentice Hall.
Hansson, J. (2003). Total quality management - aspects of implementation and performance : investigations with a focus on small organisations. In *Department of Business Administration and Social Science* Luleå: Luleå University of Technology [Luleå tekniska univ.]. pp. xvi, 100 s.
Hansson, J. & Eriksson, H. (2002). The impact of TQM on financial performance *Measuring Business Excellence,* Vol. 6, No. 4, pp. 44-54.
Hellsten, U. & Klefsjö, B. (2000). TQM as a management system consisting of values, techniques and tools *The TQM Magazine,* Vol. 12, No. 4, pp. 238-244.
Hendricks, K.B. & Singhal, V.R. (1996). Quality awards and the marked value of the firms: an emirical investigation. *Management science,* Vol. 42, No. 3, pp. 415-436.
Hendricks, K.B. & Singhal, V.R. (1997). Does implementing an effective TQM program actually improve operating performance? Empirical evidence from firms that have won quality awards. *Management science,* Vol. 43, No. 9, pp. 1258-1274.
Hendricks, K.B. & Singhal, V.R. (1999). Don't count TQM out. *Quality Progress,* Vol. 32, No. 4, pp. 35.
Hines, P., Holweg, M. & Rich, N. (2004). Learning to evolve: A review of contemporary lean thinking. *International Journal of Operations & Production Management,* Vol. 24, No. 10, pp. 994 - 1011.
Ingelsson, P. (2009). How to create a commercial experience. Focus on leadership, values and organizational culture. In *Department of Engineering and Sustainable Development.* Östersund: Mid Sweden University. p. 66.
Karlsson, C. & Åhlström, P. (1996). Assessing changes towards lean production. *International Journal of Operations & Production Management,* Vol. 16, No. 2, pp. 24-41.
Lagrosen, S. (2000). Born with Quality, TQM in a Maternity Clinic. *The International Journal of Public Sector Management,* Vol. 13, No. 5, pp. 467-75.
Lagrosen, Y. (2006). *Values and practices of quality management: health implications and organisational differences,* Göteborg: Chalmers tekniska högskola, p. vi, 92.

Lagrosen, Y., Bäckström, I. & Lagrosen, S. (2007). Quality Management and Health a double connection. *International Journal of Quality and Reliability Management,* Vol. 24, No. 1.

Lagrosen, Y., Bäckström, I. & Lagrosen, S. (2010). The relationship between quality management and employee health - exploring the underlying dimensions. *International Journal of Productivity and Quality Management,* Vol. 5, No. 2.

Liker, J.K. (2004). *The Toyota way : 14 management principles from the world's greatest manufacturer,* New York: McGraw-Hill, p. 330 s.

McAdam, R. & Bannister, A. (2001). Business performance measurement and change management within a TQM framework. *International Journal of Operations & Production Management,* Vol. 21, No. 1/2, pp. 88-108.

McNabb, D.E. & Sepic, F.T. (1995). Culture, Climate, and Total Quality Management: Measuring Readiness for Change. *Public Productivity & Management Review,* Vol. 18, No. 4, pp. 369-385.

Motawi, J. (2001). Critical factors and performance measures of TQM. *The TQM Magazine,* Vol. 13, No. 4, pp. 229-300.

O'Reilly, C.A., Chatman, J. & Caldwell, D.F. (1991). People and organizational culture: A profile comparison approach to assessing person-organization fit. pp. 487-516.

Osono, E., Shimizu, N. & Takeuchi, H. (2008). *Extreme Toyota : radical contradictions that drive success at the world's best manufacturer,* Hoboken, N.J.: John Wiley & Sons, p. xiv, 306 p.

Rokeach, M. (1973). *The nature of human values,* New York London: Free Press ; Collier Macmillan, p. x, 438 s.

Schein, E.H. (2004). *Organizational culture and leadership,* (3. edn) San Francisco: Jossey-Bass, p. xvi, 437 s.

Seddon, J. (2005). *Freedom from command & control: rethinking management for lean service,* New York: Productivity Press, p. xviii, 238 p.

Shin, D., Kalinowski, J.G. & El-Enein, G.A. (1998). Critical implementation issues in total quality management. *SAM Advanced Management Journal (07497075),* Vol. 63, No. 1, pp. 10.

Shook, J. (2010). How to Change a Culture: Lessons From NUMMI. *MIT Sloan Management Review,* Vol. 51, No. 2, pp. 62-68.

Sinkula, J.M., Baker, W.E. & Noordewier, T. (1997). A Framework for Market-Based Organizational Learning: Linking Values, Knowledge, and Behavior. In *Journal of the Academy of Marketing Science.* Springer Science & Business Media B.V. pp. 305-318.

Wiener, Y. (1988). Forms of Value Systems: A Focus on Organizational Effectiveness and Cultural Change and Maintenance. *The Academy of Management Review,* Vol. 13, No. 4, pp. 534-545.

Womack, J.P. & Jones, D.T. (1996). *Lean thinking : banish waste and create wealth in your corporation,* New York: Simon & Schuster, p. 350 s.

Womack, J.P., Jones, D.T. & Roos, D. (2007). *The machine that changed the world: [the story of lean production -- Toyota's secret weapon in the global car wars that is revolutionizing world industry],* (New edn) London: Simon & Schuster, p. viii, 339 s.