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Productivity Tools: TPM and TQM

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ABSTRACT

Productivity is a major factor for operational management. Applying the productivity tools such as TQM and TPM besides knowing the productivity value can be two significant approaches that help organizer and policy maker to make strategies for future. This study has tendency to investigate how the TQM and TPM influence the productivity through the managerial components, efficiency and effectiveness. Reducing the price, improving the quality, increasing customer and job satisfaction, promoting the profit and the growth of organization, enhancing outcome and output that leads to raise the efficiency and effectiveness can be considered the results of implementation of TQM and TPM. The ways as to how the other productivity tools impact on efficiency and effectiveness can be probed in future studies.

Key words: Productivity, Output, Outcome, Productivity Tools, TQM, TPM

INTRODUCTION

Productivity is observed as a significant success factor for organizational operation in global and competitive situation (Hodgetts & Kuratko, 1998; Nachum, 1999) and to be probably the major area for operational and process management (Sink, Tuttle, & Shin, 1989). A. D. Neely, Adams, and Kennerley (2002), Sink et al. (1989), Sumanth (1998), stress that achieving the profitability, cost competitiveness, and growth in long-term would be generated through productivity improvement.

There is consensus among researchers that performance management is a significant component of continuous improvement and successful management (Acur & Englyst, 2006; Anderson, Fornell, & Rust, 1997; A. Neely, Gregory, & Platts, 2005). Likewise, it can help firms achieve their missions, visions, policies, objectives and targets (Dixon, Nanni, & Vollmann, 1990; Kaplan & Norton, 1996; Rantanen, Kulmala, Lönnqvist, & Kujansivu, 2007). Tuttle (1983) points out the managerial viewpoint in which organization components that create effective and efficient organization functioning regarding productivity classification meanings. In addition, according to the work that done by Keh et al. (2006) and (Mandl, Dierx, & Ilzkovitz, 2008), the effectiveness is resulted from the ratio of outcome over output and efficiency can be earned from the ratio of output by input. However, Saari (2006) focuses on both quantity and quality input as well as output as productivity determinants in his definition. He defines the total productivity as the ratio of output quality and quantity to input quality and quantity. It is obvious that the evaluating the productivity plays a crucial role in any organization, but as noted by Bernolak (1997), besides the identification of the determinants of productivity that managers might face them, how to enable meaningful productivity improvement, what are the influencing factors and how to boost them can be the other concerns. In other words, how to improve the productivity or whether there exist any tools whereby boosts the productivity. APO (2008) introduced the model that is called "The mechanics of business operation" in which, TQM and TPM consider as productivity tools along with other techniques such as ISO9000, PM, etc. The aim of this study is to review the Total Quality Management (TQM) and also Total Productive Maintenance (TPM) as Productivity Tools and explain as to

how by applying these techniques the productivity would be improved. In other words, how TQM and TPM impact on input as well as output and outcome to encourage the productivity.

TOTAL QUALITY MANAGEMENT

Total Quality Management (TQM), has been extensively identified since the mid-1980s. It is the combination of techniques, theories, strategies of quality in order to obtain the excellent quality. Total Quality Management (TQM) is defined by Ljungstrom and Klefsjo (Ljungstrom & Klefsjo, 2002, p.628) as, Management approach of 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. Also TQM searches for continuous enhancement in the quality of all people, processes, products, and services of an enterprise (Temtime & Solomon, 2002). Desai and Erubothu (2010) classify the influencing factors into:

(1) External Environment: Market Conditions, Market Competitiveness, Economic Environment, Technical Situation, Socio-Cultural Condition, Legal Environment.

(2) Internal factors: Corporate Planning, Top Management Leadership, Customer Focus, Human Resources, Quality and Process, Information and Analysis.

Likewise, they enumerate Product/Service Quality, Employee Satisfaction, Process Quality and Supplier Performance as Performance Metrics. There is a claim dating back many years which notes the existing interconnected relation between productivity and quality (Sink & Keats, 1982). They state that if efforts toward improving quality are efficient and effective, critical impact on enterprise productivity will soon follow. Mefford (1991) points out three mechanics that highlight the linkage between quality and productivity:

(1) Reducing defective processes and products, and using resources properly leads to improved productivity.

(2) Any improvement in quality rises productivity and vice versa.

(3) Motivated workforces can maintain quality levels, thus maximizing the output.

Desai and Erubothu (2010) emphasize the relation between TQM and productivity. If TQM is successfully implemented, productivity will certainly enhance. Figure 1 shows performance factors which affect productivity.

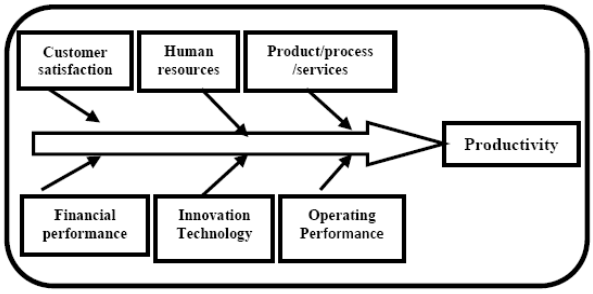

Figure.1 Performance factors influencing productivity
Source: Desai and Erubothu (2010)

It is clear that customer satisfaction is one of the most important factors influencing productivity. leadership, human resource focus, customer and market focus, strategic planning, information and analysis, the results of business and process management introduced by Malcolm Baldrige National Quality Award (MBNQA) as factors those relate with performance of organization (Black & Porter, 1996). Waldman (1994) expresses that the TQM means today as a systematic and organizations' extended strategy to move along with improving the services, goods and organization process continually improved competitive advantage (Douglas & Judge, 2001; Powell, 2006), and enhanced the performance of organization (Hendricks & Singhal, 1997; Reed, Lemak, & Montgomery, 1996) are the main TQM implementation.

Additionally, it is stressed in the study by Saylor (1996) and Creech (1994) that system of TQM must include the quality of all level of organization ranging from activity and process to products. Venkatesh (2007) claims that the object of TQM is quality that is referring to the output and effect. He believes that the systematize management is mains of attaining goal of this tool and that's why to consider TQM as software oriented. Mardani and Kazemilari (2012) points out to some achievements of TQM application that contain: improving the performance of organization including financial achievements (Hendricks & Singhal, 1997) and the quality of product (Agus, 2005) and with regard to intangible factor like customer satisfaction (Choi & Eboch, 1998; Rahman & Bullock, 2005), problem solving (Vouzas, 2004) and employee commitment (Rahman & Bullock, 2005). Basically, the customer satisfaction as well as the quality of operation and competitiveness of organization are considered the goals of business (Garvin, 1988; Lee & Schniederjans, 1994).

TOTAL PRODUCTIVE MAINTENANCE

The other significant productivity tool is Total Productive Maintenance (TPM). TPM is defined by Nakajima (1988) as the combination between the involvement of total employee and Japanese thought of managing total quality and "American preventive maintenance". This approach is derived by Japan to support the system of lean manufacturing. Ahuja (2009) refers to TPM as greatly known and acting as a weapon of strategy for enhancing manufacturing performance by improving production facilities effectively. Ahuja also proposes that TPM is a collection of methodologies and practices which improve manufacturing equipment performance, and was developed towards extensive efforts to maximize manufacturing productivity. Rhyne (1990) introduces TPM as a collaboration between production function and company maintenance to increase product quality, reduce waste, reduce the cost of manufacturing, increase equipment accessibility, and enhance the state of the organization regarding maintenance. However, this definition was changed in 1995 by Robinson and Ginde. They claim[39] that TPM is derived from improving the production methodology and is formed to maximize equipment reliability and make sure plant assets are managed efficiently. On the other hand, Witt (2006) saw TPM as a communication, in which there is an opportunity that enables operators, and maintenance engineers and people communally cooperate and deduce each other's language. Nakajima (1988), Steinbatcher and Steinbatcher (1993), Ahire and Rona (1995), and Forker (1996) proposed that

benefits deriving from TPM comprise six classifications: (M), (S), (D), (Q), (C), (P) with morale, safety, delivery, quality, cost, and productivity respectively. One of TPM's main goals is enhancing equipment and plant productivity with moderate investment in maintenance (Van der Wal & Lynn, 2002). Al-Hassan et al. (2000) proposed that optimizing facilities and equipment is the leading way to reduce life-cycle cost. Cost effectiveness can be an organization's straightforward result after removing the reduction causes of effective equipment. Changes in labour and capital input quality are connected to job experience, fixed productive equipment, and specific organization skills (Naoki, 2010). The TPM mostly emphasizes in maximizing the effectiveness of equipment through removing the whole of types of inefficiencies, hampering material, labour and capital productivity (Kodali & Chandra, 2001). The manner of such achievement is in maximizing the effectiveness of equipment production department, maintenance department.

THE IMPACT OF TPM AND TQM ON PRODUCTIVITY

In accordance with the managerial definition of productivity that is the combination of efficiency and effectiveness, considering the input as well as output and outcome is necessary to attain the productivity. In this way, both quality and quantity features of determinants must be considered so that to achieve the value of productivity accurately. Although, being costly and not be effective the improved quality on enhancing productivity (Deming, 1986; Mohanty, 1998; Parasuraman, 2002; Womack, Jones, & Roos, 1990) can be the main reason that the organizations ignore the quality when evaluating productivity (Kontoghiorghes & Gudgel, 2004). Improving the quality through making reduction of delay, rework, cost, and errors cause to considerable improvement in productivity (Deming, 1986; Deming & Study, 1982). Quality features must be considered, and so the quality level that is required to meet customer needs should be united. However, the customers might point out to the internal customers (i.e. employees) or external customers. To consider the satisfaction of aforementioned customers, the customer satisfaction and job satisfaction must be stressed in outcome of the organization that might place along with the other quantity aims of organization. Additionally, the inherent motivation impact on employee productivity effectively and can be a critical characteristic of workforce (Walters, 2007). In this way, Amabile (2000) claims that two workforce features including motivation and skill are necessary for both job satisfaction and productivity. On the other hand, with regard to the definition of output that involves goods or services earned throughout a producer section and are prepared for utilizing out of this section (OECD, 2001). Output can be appeared at the end of process. One way to attain the quality of output must be the level of customer satisfaction that would be appeared as one of the significant organizations' targets.

Likewise, outcome is the level of performance, and it connects to input, process, and output. In other words, outcomes point out to performance quantification (Ltd, 2007). Velocci (2002) states that strongly stressing on the customer and having a quality culture in a new castings plant diffuse rework, and scrap lead customer time to 75, 40, and 50% respectively, and also productivity became twice.

On the other side, job satisfaction promotes higher participation by workforces in decision making (Marelli & Signorelli, 2010). Tranfield and Akhlaghi (1995) identify ways of attaining high productivity and quality for modern organizations simultaneously, by emphasizing on customers and employees, and value added. They point out to a connection that exists between customer satisfaction and employee satisfaction where employee satisfaction can create value added by providing better service, which thus influences customer satisfaction and thus the growth and profit for the organization would be appeared. In figure 2, it can be seen that changes in perceived customer value are low when the mere price is considered and becomes high where both quality and price are considered.

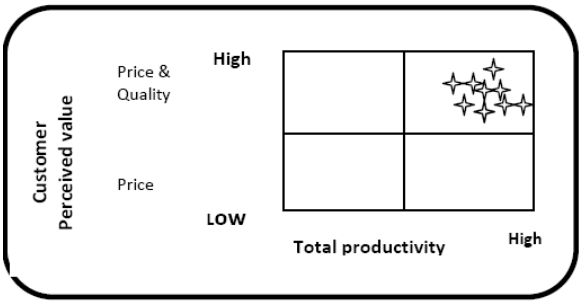

Figure.2 Value matrix and total productivity Source: Stainer (1997)

Stainer (1997) believes there must be a balance between total productivity and the perceived value. He explains that productivity is generated because real unit and volume cost, while value relates to customer and is the effect of quality and price.

In accordance with the aforementioned sections, the impacts of TQM on productivity can be as follows:

-Reducing defective process and products leads to increase efficiency.

-Increasing the customer satisfaction that causes increased outcome and improved effectiveness and consequently productivity.

-Improving the customer satisfaction is followed by increasing the profit of the organization. The increased income of organization can lead to increase the motivation of employees through some ways such as increasing the salaries or increasing given bonus that makes the outcome to go up that is followed by going up the effectiveness and consequently productivity.

On the other hand, TPM can affect the productivity through following ways:

-Increasing the involvement of employees that follows the improved employees' motivation and the improved job satisfaction is appeared then leads to enhanced outcome and effectiveness.

-Reducing the price of products that is extracted from reducing the waste leads to increase the profit of organization and consequently improved the salaries of workforces and improved job satisfaction that leads to enhance the effectiveness of organization and boost the productivity.

-An enhanced customer satisfaction is deriving from improved delivery and causes to go up the outcome that leads to improve the effectiveness and then productivity.

-Eliminating the inefficiencies of capital, material, and labour lead to improved efficiency and productivity.

CONCLUSIONS AND MANAGERIAL IMPLICATIONS

Productivity plays a crucial role in boosting the growth of the organization and helps them to survive in a competitive world. Nowadays, besides the measuring the productivity that enables the managers to know the current situation of their company, there are some tools and techniques that help managers to improve the productivity value. Among them, this study reviews the TQM and TPM and emphasizes that how these mentioned productivity tools can influence the productivity that defined based on managerial viewpoint. This paper highlight as to how TQM and TPM impact on the productivity through productivity components that are efficiency and effectiveness. TQM influences the effectiveness through the improving the outcome by increased customer satisfaction and also increasing the efficiency by increasing the quality of output. On the other hand, TPM by improving the performance of equipment and also increasing the involving the employees makes improved the job satisfaction or in other words outcome that leads to improve the productivity.

The results of both TQM and TPM in long term leads to decrease the price and increase the quality of output that can be the key factor to keep up the organization with competitors. Additionally, this situation follows by improved customer satisfaction and then increasing the profit of organization, which salaries of workforces can be gone up and causes the higher job satisfaction level. Although, according to the Tranfield and Akhlaghi (1995), job satisfaction makes the services value added to increase and consequently the customer satisfaction improves, as this is a chain makes to repeat theses relations, subsequently. Thus, applying TQM and TPM can be the best way that helps managers to keep their organization in stable and good condition. However, the other productivity tools also improve the productivity, but the investigation on those tools and how they affect the productivity can be directed in future studies.

REFRENCES

Acur, N., & Englyst, L. (2006). Assessment of strategy formulation: how to ensure quality in process and outcome. *International Journal of Operations & Production Management, 26*(1), 69-91.

Agus, A. (2005). The structural linkages between TQM, product quality performance, and business performance: Preliminary empirical study in electronics companies. *Singapore Management Review, 27*(1), 87-105.

Ahuja, P. (2009). Total productive maintenance. *Handbook of Maintenance Management and Engineering*, 417-459.

Al-Hassan, K., Chan, J. F. L., & Metcalfe, A. V. (2000). The role of total productive maintenance in business excellence. *Total Quality Management, 11*(4-6), 596-601.

Amabile, T. M. (2000). Stimulate creativity by fueling passion. *The Blackwell handbook of principles of organizational behavior*, 331-341.

Anderson, E. W., Fornell, C., & Rust, R. T. (1997). Customer satisfaction, productivity, and profitability: Differences between goods and services. *Marketing Science*, 129-145.

Bernolak, I. (1997). Effective measurement and successful elements of company productivity: The basis of competitiveness and world prosperity. *International Journal of Production Economics, 52*(1-2), 203-213.

Black, S. A., & Porter, L. J. (1996). Identification of the Critical Factors of TQM*. *decision Sciences, 27*(1), 1-21.

Choi, T. Y., & Eboch, K. (1998). The TQM paradox: relations among TQM practices, plant performance, and customer satisfaction. *Journal of Operations Management, 17*(1), 59-75.

Creech, B. (1994). *The five pillars of TQM: how to make total quality management work for you*: Truman Talley Books/Plume.

Deming, W. E. (1986). Out of the Crisis, MIT Center for Advanced Engineering Study. *Cambridge, Massachusetts*.

Deming, W. E., & Study, M. I. o. T. C. f. A. E. (1982). *Quality, productivity, and competitive position* (Vol. 183): Massachusetts Institute of Technology, Center for Advanced Engineering Study Cambridge, MA.

Desai, T. N., & Erubothu, A. T. (2010). A Study of the Interrelationship between Total

Quality Management and Productivity. *Productivity Press, Inc., 1988, 50*(4).

Dixon, J. R., Nanni, A. J., & Vollmann, T. E. (1990). *The new performance challenge: Measuring operations for world-class competition*.

Douglas, T. J., & Judge, W. Q. (2001). Total quality management implementation and competitive advantage: The role of structural control and exploration. *Academy of Management Journal, 44*(1), 158-169.

Garvin, D. A. (1988). *Managing quality: The strategic and competitive edge*: Free Press.

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, 43*(9), 1258-1274.

Hodgetts, R. M., & Kuratko, D. F. (1998). *Effective small business management*: Dryden Press Fort Worth.

Kaplan, R. S., & Norton, D. P. (1996). *The balanced scorecard: translating strategy into action*: Harvard Business school press.

Keh, H. T., Chu, S., & Xu, J. (2006). Efficiency, effectiveness and productivity of marketing in services. *European Journal of Operational Research, 170*(1), 265-276.

Kodali, R., & Chandra, S. (2001). Analytical hierarchy process for justification of total productive maintenance. *Production Planning & Control, 12*(7), 695-705.

Kontoghiorghes, C., & Gudgel, R. (2004). Investigating the association between productivity and quality performance in two manufacturing settings. *QUALITY CONTROL AND APPLIED STATISTICS, 49*, 579-582.

Lee, S. M., & Schniederjans, M. J. (1994). *Operations management*: Houghton Mifflin Boston, MA.

Ljungstrom, M., & Klefsjo, B. (2002). Implementation obstacles for a workdevelopment-oriented TQM strategy. *Total quality management, 13*(5), 621-634.

Ltd, A. E. C. (2007). Outcomes Vs. Outputs.

Mandl, U., Dierx, A., & Ilzkovitz, F. (2008). The effectiveness and efficiency of public spending. *European Economy-Economic Papers*.

Mardani, A., & Kazemilari, M. (2012). Relationship between national culture and TQM implementation, Case study: Iranian multinational electrical manufacturing companies.

Marelli, E., & Signorelli, M. (2010). Employment, productivity and models of growth in the EU. *International Journal of Manpower, 31*(7), 732-754.

Mefford, R. N. (1991). Quality and productivity: the linkage. *International Journal of Production Economics, 24*(1-2), 137-145.

Mohanty, R. (1998). Understanding the integrated linkage: Quality and productivity. *Total quality management, 9*(8), 753-765.

Nachum, L. (1999). Measurement of productivity of professional services: Anillustration on Swedish management consulting firms. *International Journal of Operations & Production Management, 19*(9), 922-950.

Nakajima, S. (1988). Introduction to TPM: Total Productive Maintenance.(Translation). *Productivity Press, Inc., 1988*, 129.

Naoki, S. (2010). Quality of Labor, Capital, and Productivity Growth in Japan: Effects of employee age, seniority, and capital vintage. *Discussion Papers (by fiscal year), 2009*, 2008.

Neely, A., Gregory, M., & Platts, K. (2005). Performance measurement system design: a literature review and research agenda. *International Journal of Operations & Production Management, 25*(12), 1228-1263.

Neely, A. D., Adams, C., & Kennerley, M. (2002). *The Performance Prism: The scorecard for measuring and managing business success*: Financial Times Prentice Hall London.

OECD. (2001). Measurement of aggregate and industry-level productivity growth. In Measuring productivity. *OECD manual*.

Parasuraman, A. (2002). Service quality and productivity: a synergistic perspective. *Managing Service Quality, 12*(1), 6-9.

Powell, T. C. (2006). Total quality management as competitive advantage: a review and empirical study. *Strategic management journal, 16*(1), 15-37.

Rahman, S., & Bullock, P. (2005). Soft TQM, hard TQM, and organisational performance relationships: an empirical investigation. *Omega, 33*(1), 73-83.

Rantanen, H., Kulmala, H. I., Lönnqvist, A., & Kujansivu, P. (2007). Performance measurement systems in the Finnish public sector. *International Journal of Public Sector Management, 20*(5), 415-433.

Reed, R., Lemak, D. J., & Montgomery, J. C. (1996). Beyond process: TQM content and firm performance. *Academy of management review*, 173-202.

Rhyne, D. M. (1990). *Total plant performance advantages through total productive maintenance*.

Robinson, C. J., & Ginder, A. P. (1995). *Implementing TPM: The North American Experience*: Productivity Pr.

Saari, S. (2006). Productivity. Theory and Measurement in Business. *Extracted from the book by Saari, S*.

Saylor, J. H., & Saylor, J. (1996). *TQM simplified: A practical guide*: McGraw-Hill New York.

Sink, D. S., & Keats, J. (1982). *PRODUCTIVITY AND QUALITY: WHAT IS THE CONNECTION?*

Sink, D. S., Tuttle, T. C., & Shin, S. (1989). *Planning and measurement in your organization of the future*: Industrial engineering and management Press Norcross, GA.

Stainer, A. (1997). Capital input and total productivity management. *Management Decision, 35*(3), 224-232.

Steinbacher, H. R., & Steinbacher, N. L. (1993). *TPM for America*: Productivity Press.

Sumanth, D. J. (1998). Total Productivity Management: A Systematic and Quantitative Approach to Compete in Quality, Price and Time, St: Lucie Press, Boca Raton, FL.

Temtime, Z. T., & Solomon, G. H. (2002). Total quality management and the planning behavior of SMEs in developing economies. *The TQM Magazine, 14*(3), 181-191.

Tranfield, D., & Akhlaghi, F. (1995). Performance measures: relating facilities to business indicators. *Facilities, 13*(3), 6-14.

Tuttle, T. C. (1983). Organizational productivity: A challenge for psychologists. *American Psychologist, 38*(4), 479.

Van der Wal, R., & Lynn, D. (2002). Total productive maintenance in a South African pulp and paper company: a case study. *The TQM Magazine, 14*(6), 359-366.

Velocci, A. L. (2002). Castings plant demonstrates power of focusing on quality. *Aviation Week and Space Technology, 157*(14), 61-62.

Venkatesh, J. (2007). An introduction to total productive maintenance (TPM). *Retrieved May, 20*, 2009.

Vouzas, F. (2004). HR utilization and quality improvement: the reality and the rhetoric–the case of Greek industry. *The TQM Magazine, 16*(2), 125-135.

Waldman, D. A. (1994). The contributions of total quality management to a theory of work performance. *Academy of management review, 19*(3), 510-536.

Walters, M. M. (2007). *Leadership and productivity: An examination of a leader-member exchange model.* CAPELLA UNIVERSITY.

Witt, C. E. (2006). TPM: the foundation of lean. *Material Handling Management, 61*(8), 42-45.

Womack, J. P., Jones, D. T., & Roos, D. (1990). The Machine Thai Changed the World: New York: Macmillan Publishing Co.