

6.2 The production down time

In a shaft, just as in any production plant, time is among the most valuable “inventory” that needs to be strategically used in order to maximize its outcome. It becomes very crucial to know where to draw a line in order to be able integrate the operations management tools. Lean is a good tool in operations management however if not used wisely can become a hazard to the profitability of the organization. Having observed the system over a short period of time minor issues which appear to be masked as “reducing waste” have occurred which allow away production time. One striking example was the repair and replacement of winches in the shaft: the winches have to be removed and take all the way out of the shaft to the engineering department for the engineers to assess whether to replace or repair the winch. Then the winch will be transported back to the shaft and put back in place for operation. This is a very time consuming process which in turn costs the company lots of money, all because the company aims to “reduce waste”. The other of such examples is the ordering of materials required for blasting, this is yet another time consuming process which has also lead to the people being openly dishonest in a very obvious way just because the system requirements are not considerate of the type of working environment.

6.3 The degree to which the people are empowered to make decisions and take decisive actions independently

One of the key elements which are working against the logical progress of the shaft is the way the system has been programmed. The people at the lower levels have the greatest insight of what is happening in the shaft, especially as far as their area of operation is concerned. Many of them have over time acquired the expertise of knowing how to detect certain faults and address the basics in their designated fields because of their experience gained. However the current method of operation does not allow the people at this level to take decisive actions or empower them to do so at all, rather it makes them so dependant that it paralyzes their ability to apply their minds. As a result of this, the people at this level begin to feel redundant and lose the zeal to work. The people then shift the blame to cover up for their lack of commitment. They cannot be held accountable for anything if they are not entrusted with anything. At this rate the only thing that drives them for progress is a bonus at the end of the month.

7. Future trends of TOC

A comprehensive review of academic literature on the TOC, including papers published in referred and non-referred journals and books enables us to classify them on the basis of the TOC philosophy and its application in business disciplines. The review shows that the vast majority of the papers have concentrated on the concept and philosophy enhancement of TOC. Several articles have been published in the production sector also. But very little work has been done on service sector. In the application category a number of articles report the application of TOC concepts in the area of production and management accounting. Few papers have been published on the comparison of TOC with various existing theories such as TQM, JIT etc. Much work remains to be done in terms of developing measures of the three dimensions of the throughput orientation construct and empirically testing the hypothesis. Future research could be directed towards the simulation of the case studies of organizations by identifying the bottleneck stations and developing a detail schedule for it with the application of finite scheduling method [16].

8. Conclusion

There is a wide gap in TOC documented research based on developing countries, this could be mean the introduction of TOC in these countries is slow, or the academic side of TOC in these countries needs to be encouraged. South Africa has shown great potential where TOC application is concerned as it has highly developing industries and an extremely competitive market.

References

- [1] Şimşit, Z., Günay, N. and Vayvay, Ö., Theory of Constraints: A Literature Review. *Procedia - Social and Behavioral Sciences*, vol. 150, pp.930-936, 2014.
- [2] Mabin, V.J and Balderstone, S.J., "The performance of the theory of constraints methodology", *International Journal of Operations & Production Management*, vol. 23, no. 6, pp. 568 – 595, 2003.

- [3] Mabin, V. 1999. Goldratt's Theory of Constraints "Thinking Processes": a systems methodology linking soft with hard, in *Proc. of the 17th International Conference of the System Dynamics Society and 5th Australian and New Zealand Systems Conference*, Wellington, New Zealand, 20–23 July 1999.
- [4] Goldratt, E.M. and Cox, J., *The Goal*, North River Press. Great Barrington, MA, USA 1984.
- [5] Goldratt, E.M., Computerized shop floor scheduling. *The International Journal of Production Research*, vol. 26, no. 3, pp.443-455, 1988
- [6] Goldratt, E., Optimized production timetable: a revolutionary program for industry. In *APICS 23rd Annual Conference Proceedings*, 1980.
- [7] Watson, K.J., Blackstone, J.H. and Gardiner, S.C., The evolution of a management philosophy: The theory of constraints. *Journal of Operations Management*, vol. 25, no. 2, pp.387-402, 2007.
- [8] Spencer, M.S. and Cox, J.F., Optimum production technology (OPT) and the theory of constraints (TOC): analysis and genealogy. *The International Journal of Production Research*, vol. 33, no. 6, pp.1495-1504, 1995.
- [9] Cook, D.P. A simulation comparison of traditional, JIT, and TOC manufacturing systems in a flow shop with bottlenecks. *Production and Inventory Management Journal*, vol. 35, no. 1, p.73, 1994
- [10] Holt, J.R., Candid comparison of operational management approaches. *Washington State University- Vancouver, Vancouver*, pp.1-11, 1999.
- [11] Mabin, V.J. and Balderstone, S.J., *The world of the theory of constraints: a review of the international literature*. CRC Press, 1999.
- [12] Balderstone, S.J. and Mabin, V.J., A Review of Goldratt's Theory of Constraints (TOC)–lessons from the international literature. *Annual Conference of the Operational Research Society of New Zealand*, 1998.
- [13] Wee, H.M., Budiman, S.D., Su, L.C., Chang, M. and Chen, R., Responsible supply chain management–an analysis of Taiwanese gutter oil scandal using the theory of constraint. *International Journal of Logistics Research and Applications*, pp.1-15, 2015.
- [14] Lau, E. and Kong, J., Identification of constraints in construction projects to improve performance. In *Proceedings of the Joint Conference on Construction, Culture, Innovation and Management, Dubai, November* pp. 26-29, 2006
- [15] Qassim, R.Y., 2000. The theory of constraints in manufacturing. *Journal of the Brazilian Society of Mechanical Sciences*, vol. 22, no. 4, pp.503-511, 2000.
- [16] Mahapatra, S.S. and Sahu, A., Application of theory of constraints on scheduling of drum-buffer-rope system, 2006.
- [17] Mathu, K. M., *Supply Chain Constraints in the South African Coal Mining Industry*. Ph.D Thesis. Vaal University of Technology, 2010.
- [18] van Heerden, F.J., *Determining the Capacity Constraint Resource in an underground coal production section*. In. Goldratt, E.M. and Cox, J., 1992. *The Goal*. Great Barrington, MA. North River Press, 10, pp.343-354, 1992.
- [19] Smith, M. and Pretorius, P.J., Applying the theory of constraints to increase economic value added: Part 1-Theory, 2002.
- [20] Rahman, S.U., Theory of constraints: a review of the philosophy and its applications. *International Journal of Operations & Production Management*, vol. 18, no. 4, pp.336-355, 1998.
- [21] Nagel, V., Kloppers, B., Choolan, F., Kruger, L., Fraser, C. and Kew, R., Lonmin's capital allocation process–the evolution from individual ranking to portfolio optimisation. In *6th International Platinum Conference (Platinum–metal for the future), October 2014*.
- [22] Lonmin, 2015, *Annual report 2015*, Lomnin, London, UK, accessed on 19 October 2016 [http://www.lonmin.com/reports/2015/online_annual_report_2015/strategic_report/performance/operations.html].
- [23] K. Mabote, *The effective application of the theory of constraints in Rowland mine shaft-Marikana-Lonmin: A case study*, Masters Thesis, University of Johannesburg, South Africa.

Biography

Tlotlo Ramasu is currently a fulltime Masters student at the Department of Quality and Operations Management, University of Johannesburg. Miss Ramasu Reimer holds a Diploma in Food Technology and a Bachelor of Technology degree in Operations Management from University of Johannesburg. She worked with Tiger brands culinary division after graduating from University of Johannesburg.

Kehinde Sobiya is currently a Research fellow at the Department of Mechanical Engineering Science, University of Johannesburg, South Africa. Dr. Sobiya holds a PhD degree in Metallurgical and Materials Engineering from University of the Witwatersrand.

Esther Akinlabi is a Professor and the Vice Dean (Teaching and Learning) at the Faculty of Engineering and Built Environment, University of Johannesburg. She Earned her PhD in Mechanical Engineering from the Nelson Mandela Metropolitan University. She has published journal and conference papers. Prof. Akinlabi is a rated NRF researcher and won numerous prestigious awards in South Africa.

Tlotlo Ramasu is currently a fulltime Masters student at the Department of Quality and Operations Management, University of Johannesburg. Miss Ramasu Reimer holds a Bachelor of Technology degree in Operations Management from University of Johannesburg.