The following article is a critical review of "A Critical Look at Critical Chain"[1], which appeared in the Project Management Journal in 2003, and has 55 citations. One of the authors (Robert Barnes) makes a living on project management consulting, and the other two authors make a living in project management education. A review of the authors' footprint in the project management community reveals no other activity regarding Theory of Constraints or Critical Chain. So it seems likely that the authors are invested in the perpetuation of traditional project management.

The thesis of the paper is summarized in the abstract:

"Our conclusion is that although CCPM has a number of valuable concepts, it does not provide a complete solution to the needs of project management. Consequently, organizations should be very careful when considering the adoption of CCPM to the exclusion of conventional project management techniques and methods."

This statement is not factual, and the semantics are intended to foment resistance to CCPM. Organization members that are invested in the traditional project management will seize such a statement as an excuse to do more traditional project management, and forgo the improvement offered by CCPM. Further, every Critical Chain Project Management implementation that I have been involved with (at least a dozen) has implemented aspects of traditional project management, in particular the development of deliverables-oriented project plans.

In the guise of an introduction, the authors hope to poison the well by citing tradition:

"CCPM is being presented as an alternative to the classical methods for project planning and control, such as those contained in the management and engineering text books and in professional standards such as the PMI Guide to the Project Management Body Of Knowledge (PMBOK)."

[1] Raz, T., Barnes, R. and Dvir, D.(2003)."A Critical Look at Critical Chain Project Management," Project Management Journal, Vol. 34, No. 4, pp. 24-32

This inflammatory statement is probably intended to alert the organizational immune system about something non-traditional.

Another major obstacle raised is the cost of adoption, both in terms of cultural change and for the tools used. Any argument about cost should also consider the benefits of CCPM. The hallmark review of TOC literature[2] shows a mean time reduction of 70% in lead time, 65% in cycle time, 44% Due-date improvement, and a 64% increase in revenue or throughput, excluding the outlier of a 600% increase at Lucent.

The next section is an overview of the CCPM method, which claims the starting point is a list of tasks and duration estimates. While a cursory examination of Goldratt's "Critical Chain[3]" or even the Goldratt Sattelite Program[4] segments on Critical Chain may lead one to conclude that is the starting point, network development has become a required step in a CCPM implementation.

The authors next provide a discussion of the critical chain modeling approach of designating the resource-leveled critical path as the Critical chain, and adding the various types of buffers. I find no fault in the authors' description of this modeling technique.

There is a brief discussion of the drum scheduling approach for the multi-project Critical Chain model, and again this discussion is technically correct and does not attempt to prejudice the reader against Critical Chain.

The next section is a critique of CCPM, led by an attack on the assumption that safety is included in task estimates, and that the task duration will expand to consume this safety.

[2] Mabin, Victoria, J., and Steven J. Balderstone. The World of the Theory of Constraints: A Review of the International Literature. Boca Raton, FL: St. Lucie Press, 2000.
[3] Goldratt, Eliyahu M. Critical Chain. Great Barrington, MA: The North River Press, 1997.
[4] Goldratt, Eliyahu M., Goldratt Satellite Program: Chevalier Media, The Netherlands, 1999.

The authors present in counter-example a study of task durations which they claim contradicts the CCPM task estimation model. The authors fail to mention the following statement found in the abstract of their counter-example[5]:

"…although the majority of tasks are overestimated, the mean error is an underestimate of about 1%"

Since the mean error is an underestimate of about 1%, and only 1% the actual counterexample reference clearly buttresses both the CCPM claim that the task durations are expanding to fill the available time, and the CCPM claim that task durations are overestimated.

The next argument is against the capricious approach of cutting task durations, and I must agree with the authors here. Arbitrarily cutting task durations is a recipe for developing mistrust. Consequently, I subscribe to Rizzo's approach[6] of collecting a safe and average estimate of task duration from the resources performing the tasks.

With respect to buffers, the authors raise the objection that CCPM does not provide any scientific or objective basis for buffer size. I again defer to Rizzo, and Root Square Error method of buffer sizing[7]. This approach has been successfully defended with PHD Statisticians. This buffer sizing approach is also discussed in an earlier volume[8] of the Project Management Journal.

The next example describes the insufficiency of feeding buffers when there are diamond shape networks, with a starting path diverging then merging back into the Critical Chain.

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[5] Hill, J., Thomas, L.C. and Allen, D.E., "Experts estimates of task durations in software development projects", International Journal of Project Management 12(1):13-24, 2000.
[6] Rizzo, Anthony "The Project Management Soap Box" entry, Oct 30 2004 http://www.pdinstitute.com/soapbox/soapbox.html
[7] Ibid.
[8] Leach, Larry.(2003)." Schedule and Cost Buffer Sizing: How to Account for the Bias Between Project Performance and Your Model," Project Management Journal, Vol. 34, No. 2, pp. 34-47

This is illustrated in Fig. 5 of the paper. Here the authors make a technical misstep of not allowing the feeding buffers to push gaps into the critical chain. This is a common error even among Critical Chain practitioners, who exploit a diagnostic feature in some Critical Chain software packages which enable project managers to start projects with the feeding buffers partially consumed. The authors are correct to point this out as problematic, but good CCPM software tools make every attempt to block this invalid approach.

There is a brief diatribe on the fact that resource leveling will not result in an optimal schedule, which is typically deflected by TOC practitioners as irrelevant – The variation in the actual tasks during execution makes it impossible to determine an optimal schedule a-priori.

The discussion of the subtle nuances of task priorities will be lost on most managers, whom fail to make any priority call at all. In my view, the authors are welcome to make a contribution by weighting task priorities with the penalty of delay. The authors conclude this section with a specious argument about the buffers causing clutter on a Gantt chart. Organizations that wish to forgo an average 50% throughput improvement for simpler Gantt charts are not a target demographic for CCPM implementations.

In a discussion on resource utilization, the authors cite a study that showed assignment to two projects is optimal, and three is not problematic. In the discussion of the CCPM approach, the authors subtly (or perhaps elegantly) switch the scope to a task level discussion, and present CCPM as against assigning more than one task to be carried out concurrently by a given resource. To be explicit, there is no prohibition in TOC against concurrent assignment at the project level. Projects should be staggered on a drum,

resources provided prioritized task lists, and cultural prohibitions established against interrupting work on one task to start another (multitasking).

Resource buffers are impugned as chaotic and requiring a good deal of unscheduled communication. First, ample communication regarding the logistics of the project should be encouraged, not discouraged. Second, resource buffers are not formally used. Rather, standard reports of upcoming tasks by resource are provided to each resource.

The authors turn their attention to the multi-project environment, and correctly state that in many environments there is not one consistent drum. They fail to acknowledge that the CCPM solution for such environments includes the introduction of multiple drums, the introduction of a strategic drum, or the introduction of a virtual drum. A virtual drum uses a task, such as an integration task, rather than a resource to stagger the projects.

The scope of CCPM is next trivialized to within the narrow scope of project schedule, and the inherent uncertainty of the schedule. Studies have shown[2] cost and quality improve with Critical Chain implementations, so the authors fail to acknowledge this dependency.

There is a quick shot at CCPM as not integrated with the accepted body of knowledge, such as in the PMI PMBOK. Critical Chain is briefly mentioned in the 4th (2008) edition[9] of the PMBOK. Larry Leach, who was involved in the development of the Critical Chain approach, is a member of PMI, a certified Project Management Professional and has published articles in PM Network and in Project Management Journal, as well as several books which integrate CCPM and traditional project management.

The authors conclude by relegating the favorable scope of CCPM to a vanishingly small type of organization, and recommend organizations instead adopt CCPM within a broader

[9] A Guide to the Project Management Body of Knowledge, edition 4 (2008) ISBN 1933890517

conventional project management methodology (no doubt using the consulting services offered by the authors). This is an effective way to block CCPM implementations, as it takes years to fully adopt classic project management methods.