TOCICO Application Exams

There are four Application examination subjects:

- **Supply Chain Logistics**
- **Project Management**
- **Thinking Process**
- **Finance and Measures**

The examination summaries below are from the TOCICO website www.tocico.org, which also has some downloadable sample exam questions.

Certification > Supply Chain Logistics

Introductory Comments:

A TOC expert certification in Supply Chain Logistics certifies that the individual has sufficient knowledge and tools (capability) to successfully implement both the Operations (Drum-Buffer-Rope and Buffer Management) and Distribution solutions of TOC. The Supply Chain Logistics expert exam is divided into two parts. The total examination time is 8 hours. Typically, the exam is divided into two four-hour parts. A passing grade for certification is 70% correct for both parts of the exam overall. The expert exam consists of a mixture of objective and open-ended (i.e. essay) questions. Some of the exam questions will focus on one or more case studies presented in the exam. The exam overall addresses the three main topics described below.

Part I Thinking Processes applied to Supply Chain Logistics

Objective: Demonstrate the ability to analyse any environment and its supply chain logistics system using the four fundamental questions of the thinking processes.

A. Why change?

1. **Knows the goals of the Supply Chain Logistics function.**

B. What to change?

1. **Knows how failure to meet its goals impacts the other entities in the system.**
2. **Knows the fundamental limitation(s) that the Supply Chain Logistics solution(s) enables organisations to overcome.**
3. **Knows and understands the core conflict in Operations and Distribution systems.**
4. **Knows and understands other conflicts in the Operations and Distribution systems.**
5. **Can verbalise the specific key assumptions underlying the conflicts of Supply Chain Logistics and demonstrate how they cause the specific, common undesirable effects.**
6. **Can identify the system's constraint(s) for the system (i.e. internal supply chain, entire supply chain, operations, distribution).**

C. What to change to?

1. **Is able to create the necessary injections that:**
   a) overcome the erroneous assumptions that underlie the core conflicts in Supply Chain Logistics for any type of organisational system, and

b)demonstrate the ability to build the logical connections from the proposed injections to appropriate predicted effects.
2. Can identify situations when (and can demonstrate ability to use TP tools) to generate appropriate additional injections that are required to create a customised solution to address common concerns and/or to create the necessary buy-in.
3. Explain how the Five Focusing Steps (Process of Ongoing Improvement) are applied in the system (supply chain, operations, distribution).

D. How to cause the change?

1. Has sufficient knowledge to identify and communicate obstacles that predictably arise in Supply Chain Logistics implementations as well as derive intermediate objectives (IO's) .
2. Create IO maps and PreRequisite Trees (PRT's).
3. Is knowledgeable about and has the capability to address metrics/measures needed to successfully implement Supply Chain Logistics solutions.

Part II Operations

Objective: Demonstrate understanding of the TOC Operations solution. Demonstrate the ability to compare and contrast Drum-Buffer-Rope (DBR) and Buffer Management with Lean/Just-in-Time (JIT) and Material Requirements Planning (after being provided brief descriptions of the method(s) they are asked to compare DBR to).

1. Can effectively compare and contrast conventional rules and practices (i.e. process layout, capacity, scheduling of work and control metrics) with those of DBR and Buffer Management, along with an explanation of the impact of each on the operational and financial measures of performance.
2. Demonstrates ability to apply the solution in the four possible plant types (VATI).
3. Understands when Critical Chain should be applied in a plant instead of S-DBR.
4. Understands how to apply Simplified DBR (S-DBR) in make-to-stock (MTS), make-to-order (MTO) and combination environments (MTS and MTO).
5. Create a schedule based on S-DBR principles. Establish buffer(s) required, their location(s) and size. Establish a raw material release schedule. Set and execute policies on batch sizes and on dealing with idle time on non-constraints.
6. Explain the appropriate measures of performance.
7. Able to effectively apply buffer management:
   a) Know how and when to expedite, and
   b) Understand buffer resizing, and
   c) Explain how to use buffer management statistics to improve the system.
8. Explain how to effectively overcome the layers of resistance (to change) through application of the buy-in steps.

Part III Distribution

Objective: Demonstrate understanding of the TOC Distribution solution. Demonstrate the ability to compare and contrast the TOC Distribution Solution with other Supply Chain Solutions that are explained in the exam.

1. A. Can compare and contrast conventional rules and practices for distribution/logistics with the TOC distribution solution, along with an explanation of the impact of each on the operational and financial measures of performance.
2. Explain the appropriate measures of performance.

3. **Demonstrate the understanding of and ability to apply the Distribution solution in environments with and without aggregation of demand:**
   a) Determine the size and location of buffers, and
   b) Explain the impact of the solution on inventories and lead time.
4. **Explain how to effectively overcome the layers of resistance (to change) through application of the buy-in steps.**

Certification > Project Management

Introductory Comments:

Base-level competency related to Critical Chain Project Management that is evaluated in the Fundamentals Exam (thus presumed to be in place) includes:

- **The ability to identify the critical chain and its length in a single-project network (given padded activity times and (some) resource contention)**
  - Recognizes that activity times should be cut by 50% in the beginning – and by a bit less later
  - Buffers should be 50% of reduced durations.
  - Correctly removes resource contention to minimise total project lead time
  - Scheduling via pushing all tasks as late in time as possible and working backwards
- **The ability to correctly size and position the required buffers**

A TOC expert certification in Project Management certifies that the individual has sufficient knowledge and tools (capability) to successfully practice TOC's Critical Chain application where needed in organisations.

There are three elements being evaluated in the project management experts' certification exam via a mixture of objective and open-ended questions. Those questions will be in the context of an integrated, holistic case for Parts II-III.

Part I Project Management Fundamentals (Planned Duration: 2 hrs)

Objective: Demonstrate the ability to compare and contrast the differences between Theory of Constraints' Critical Chain and traditional project management methodologies and demonstration of base knowledge regarding CCPM beyond that which is evaluated in the Fundamentals Exam.

1. **Can contrast conventional rules and practices for project network building, scheduling and control metrics with those of Critical Chain Project Management beyond those evaluated at the Fundamentals level.**
2. **Knows how CCPM addresses each of the following:**
   a) Resource Contention that emerges after buffers have been inserted
   b) Gaps that emerge in the Critical Chain due to insertion of feeding buffers
   c) Emergence of an apparently "new" Critical Chain due to the insertion of feeding buffers
3. **Can explain why items 2(a) – 2(c) could be a trap of optimisation.**
4. **Demonstrates understanding re Project Planning:**
   a) Defining project scope
   b) Build the project network and work breakdown structure
   c) Correctly identifying the drum or synchronizer
   d) Can address traditional costing, 'crashing', and resource leveling, etc. issues
5. **Knows the difference between single-project and multi-project solutions.**

Continued…..

Part II TOC Thinking Processes & Project Management (Planned Duration: 2 hrs)

Objective: Demonstrate the ability to analyse any environment and its project management system using the four fundamental questions of the thinking process.

1. **Why change?**
   a) Knows the goals of the project function, and
   b) Knows how failure to meet its goals impacts the other entities in the system.
2. **What to change?**
   a) Understands the core conflict in single- and multi-project environments
   b) Knows the fundamental limitation that CCPM enables organisations to overcome
   c) Able to answer the 4 breakthrough technology questions from Necessary and Sufficient
   d) Can verbalise the specific key assumptions in the conflict and demonstrate how they cause the specific, common undesirable effects
3. **What to change to?**
   a) Is able to create the necessary injections:
   - 1. that overcome the erroneous assumptions that underlie the core conflicts in project management for any type of organisational system
   - 2. demonstrates the ability to build the logical connections from the proposed injections to appropriate predicted effects
   b) Can identify situations when (and can demonstrate ability to use TP tools) to generate appropriate additional injections that are required to create a customised solution to address common concerns and/or to create the necessary buy-in. Sample situations could include:
   - **Vendor problems**
   - **Changes to scope**
   - **Team, resource manager and project manager conflicts**
   - **"Escalation of commitment"**
   - **Pressure to cut the buffers**
   - **Challenges to staggering projects' release**
4. **How to cause the change?**
   a) Has sufficient knowledge to identify and communicate obstacles as well as derive intermediate objectives that predictably arise due to CCPM especially regarding the use of the three primary components of CCPM (staggering, buffering and buffer management)
   b) Can develop IO maps and PRTs
   c) Is knowledgeable about and has the capability to address metrics needed to monitor project status and ensure required control including:
   - 1. Establishing appropriate buffers and buffer management reporting system
   - 2. Distinguishing between buffer management and buffer watching (i.e. correctly diagnose when a project is in jeopardy)

Part III Project Management and the Logistical Solutions (Planned Duration: 2 hrs)

Objective: Demonstrates (a) understanding of the role and (b) sufficient capability to ensure the project management system successfully supports a Process of On-Going Improvement.

1. **Project Management and POOGI:**
   a) Knows the goals of the project function, and
   b) Knows how failure to meet its goals impacts the other entities in the system
   c) Understands the use of measures to align all levels of the organisation with long term corporate goals

2. **Project Selection**
   a) Can select projects from a holistic perspective (focused on improving the system's constraint)
   b) Knows how to balance given market, research and development and finance issues and risk appropriately
3. **Portfolio Management**
   a) Knows the appropriate reporting and metrics required to create a portfolio management decision making model to tie their tactics and investments to the organisation's short run and long run strategy.
   b) Knows the roles and information needs of the portfolio (pipeline) manager, master scheduler, and project vs. resource vs. task managers
4. **Can articulate sufficient contrasting details and issues associated with a subset of different project environments such as construction, engineer-to-order manufacturing, software development, high tech new product development, pharmaceutical product development, MRO, consulting projects**

Certification > Thinking Process

Introductory Comments:
This is an eight-hour exam focused on a Thinking Process analysis of a case study.

The Thinking Process Exam Expectations

The applicant should have experience at the Jonah-Jonah level (meaning to have the ability to teach the thinking process effectively to others--the applicant does not have to be a certified Jonah-Jonah) and have applied the Thinking Processes on many topics over a period of time.

The applicant has already proved general knowledge of TOC concepts as evidenced by passing the Fundamentals Exam.

The Thinking Process Exam goes well beyond the Thinking Process questions on the Fundamentals Exam which focused on: Knowledge, Comprehension and Basic Application. The Thinking Process Exam focuses on: Analysis (breakdown of information), Synthesis (putting facts together) and Evaluation (judgment of solutions).

The case study in the exam is significantly longer than the Thinking Processes cases in the Fundamentals exam. The case is complex enough to require significant Thinking Process skills, yet simple enough to be able to be solved during the limited exam period. The case represents an environment common to most parts of the world. It does not require any specific subject matter skill nor extensive knowledge of any particular solution. However, knowledge of TOC concepts is always helpful.

The applicant will demonstrate competency in all five Thinking Process Tools: Current Reality Tree, Evaporating Cloud, Future Reality Tree, PreRequisite Tree and Transition Tree.

Because of the limited time to take the exam, a full, detailed Thinking Process analysis of the case is not possible. The applicant will be tested on several elements of the analysis representing each of the Thinking Process Tools and on creating a partial Current Reality Tree, a partial Future Reality Tree, a partial PreRequisite Tree and a partial Transition Tree.

The exam will be graded upon the applicant's clear, effective, and logical application of the Thinking Process Tools consistent with the elements of the case. Grader has a full solution to the case as well as samples of 'excellent', 'good' and 'poor' responses for each question on the exam. The applicant does NOT need to provide the exact, same solution to the questions. Rather, the applicant must show proficient use of the Thinking Process Tools and the Categories of Legitimate Reservation. Most questions require the creation of cause - effect diagrams.

Thinking Process Exam Contents

The exam contains questions totaling 100 points. The questions range from 2 points to 15 points each.

A typical exam contains the following structure and question types:

Initial Narrative: The case background providing the relevant current state.

- **Question (10 Points): Creating an Evaporating Cloud on a minor issue in the Case.**
- **Question (3 Points): Correcting an illogical cause - effect branch into a logical cause - effect branch.**
- **Question (2 Points): Seeking to resolve cause insufficiency reservation in a partial logic branch.**
- **Question (3 Points): Seeking to identify causality for an effect based on the Case.**
- **Question (10 Points): Evaluating and correcting a given Evaporating Cloud.**
- **Question (4 Points): Improving upon an implied (partial) Feedback Loop drawn from the Case.**
- **Question (4 Points): Demonstrating the logical extension (further effects) of an entity in the Case.**
- **Question (15 Points): Creating the Current Reality Tree connecting from the Core Problem to a subset of the provided UnDesirable Effects.**

Additional Narrative: Additional case background or added information helpful in finding a direction for the future.

- **Question (5 Points): Creating the Desired Effects from the given UnDesirable Effects.**
- **Question (10 Points): Creating a Negative Branch Reservation from a suggested Injection.**
- **Question (4 Points): Writing a paragraph about other areas needed in the solution.**
- **Question (4 Points): Providing at least one additional Injection.**
- **Question (10 Points): Creating the Future Reality Tree connecting from the key Injection(s) to a subset of the Desired Effects.**
- **Question (8 Points): Finding an effective Intermediate Objective to a given Obstacle and creating a small PreRequisite Tree.**
- **Question (8 Points): Creating a limited Transition Tree between a given Current Reality state and a desired Future Reality state.**

Total of 100 Points possible. A passing Grade is 70 points.

Certification > Finance and Measures

Introductory Comments:

This is a four part exam, the fourth part being an integrated case. Each segment is 2 hours.

Part I Finance and Accounting Fundamentals (2 hours)

Objective: Demonstrate a practical knowledge of the fundamentals of both managerial and financial accounting and their underlying economic principles. Demonstrate the ability to compare and contrast the differences between The Theory of Constraints Throughput Accounting and the above.

1. **Understanding "rules" and terms of GAAP financial statements**
2. **Understanding "Contribution" or "Direct Costing" financial statements**
   a) Create financial statements from a common set of data elements under the rules for standard costing/gross margin vs. direct costing/contribution margin. Proper placement of standard variances.
   b) Timing differences on balance sheet recognition and statement of cash flows recognition.
3. **Understand and contrast full absorption accounting**
   a) Traditional and Activity Based Costing
   b) Direct (or variable) costing vs. throughput accounting
   c) Product profitability analysis as well as financial statement reporting
   - Problem set deriving product profitability from common data set using:
   - **1. Full absorption costing with various drivers**
   - **2. Direct costing vs. TOC product profitability**
   - **3. Lean Accounting vs. TOC accounting**
   - **4. Compare and contrast logic for use of 3c1, 3c2 and 3c3 (above)**

   - Possible distortions resulting from use of each.

4. **Understanding standard cost allocation methodologies:**
   a) Impacts on unit costs
   b) Product profitability
   c) Capital budgeting and investment planning decisions

Part II TOC Thinking Process: Finance & Measures (2 hours)

Objective: Demonstrate the ability to analyse any environment's finance, measures and decision making system using the four fundamental question of the thinking process.

1. **Why change?**
   a) Understand and explain the UDE linkages to the core problem associated with external accounting requirements that overlap the internal decision making system and measures.
   b) Understand interdependencies of fundamental building blocks of return on Investment and the possible dysfunctions when they are used as KPI (key performance indicators).
2. **What to change?**
   a) Understand and explain the core conflicts in finance and measures in any type of organisational system through the cloud format.
   b) Demonstrate the ability to surface the erroneous assumptions that underlie the core conflicts in finance and measures in any type of organisational system.

3. **What to change to?**
   a) Know how to link the ROI key components system subcomponents to a decision making system synchronized with a constraint focus.
   b) Be able to create the necessary injections:
   - **that overcome the erroneous assumptions that underlie the core conflicts in finance and measures in any type of organisational system**
   - **build the logical connections from the proposed injections to their predicted effects**
   - **Add the additional injections necessary to round out solution to mitigate the risk and create the necessary buy-in.**
4. **How to cause the change?**
   a) Create:
   - **injection maps**
   - **IO maps (focused on understanding the integration of new finance and measures in overall solutions)**
   - **Pre-requisite trees**
   - **ransition trees to ensure a realistic, time sequenced implementation plan to implement your solution sets.**

   b) Understand and communicate the obstacles and intermediate objectives that predictably arise across the organisation/supply chain from changes in finance and measures to any level in the organization.

Part III Finance and Logistical Solutions (2 hours)

Objective: Demonstrate the ability to understand and design the new measures and decision making system to successfully support a Process of On Going Improvement using the logistical solutions of the Theory of Constraints.

1. **Finance and Metric Requirements to support the decision making system for Supply Chain Logistics (Drum Buffer Rope and Replenishment Inventory Management). Requirements include being able to:**
   - **Demonstrate the TOC methodology to design the buffer management reporting information system. (All types of buffers (stock, time and capacity),size, expedite, relevant data feedback loop, improvement)**
   - **Understand the use of measures to align all levels of the organisation with corporate long term goals.**
   - **Contrast traditional accounting “measures” and “Rules” that reinforce “push” vs. “pull”, in product environments.**
   - **Understand implementation of buffer management reporting for planning, process improvement and investment decisions.**
   - **Understand the role of budgeting in a TOC environment.**
   - **Know the role of measures and how they are used throughout the organisation/supply chain in a Theory of Constraints Organisation.**
2. **Critical Chain Project Management (CCPM)**
   - **Demonstrate the TOC methodology to design the buffer management reporting information system (project buffers, feeding buffers).**
   - **Understand the use of measures to align all levels of the organisation with corporate long term goals.**
   - **Contrast traditional accounting “measures” and “Rules” that reinforce “push” vs. “pull”, in project environments.**
   - **Demonstrate the ability to use Portfolio management to prioritise projects and investments in a Theory of Constraints Organisation.**
   - **Contrast traditional project risk measures for individual project planning and execution that reinforce re-planning Vs buffer management.**
   - **Understand the role of Earned Value Analysis in both traditional and TOC environments.**

3. **The integration of all enterprise logistical systems (DBR, Replenishment, CCPM) and the appropriate reporting and measures to create a portfolio management decision making model to tie their tactics and investments to the organisation's short run and long run strategy.**

Part IV HOLISTIC Decision Making CASE (2 hours)

Objective: Demonstrate the ability to synthesize, analyse, make decisions and implement the solution set as well as to identify and mitigate the risks associated with the decision.

Are you interested in sitting the one or more of the Application exams?
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Find out more on our website: www.toc-lean.com/TOCICO_Exams.htm

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