Bill's Building Blocks

Supply Chain Network Capacity

The MTA Service Advisory read "A C E Good Service" before I left home. The A Train to Brooklyn runs about every ten minutes. But just an hour later when I stood on the A Train platform at Penn Station nothing was running. The familiar announcement "The next Brooklyn bound express train is approaching the station…Please stand back of the yellow line" was not to be heard for nearly 30 more minutes. A police investigation dozens of blocks north had suddenly compromised the A Train's schedule. I normally wait toward the end of the platform where the subway cars are usually not as full. But when the next southbound express train finally arrived, every car was packed to the gills with a mass of people. The subway doors opened and no one got off! Still a number of us pushed into the car hoping the doors would still close. For a brief moment I thought that New York could use the same pushers that pack humanity into the subways in Tokyo. But then as the A Train lurched forward, my thoughts turned to just how much weight the groaning car that I was standing in could possibly hold?

Three types of constraints can limit supply chain network throughput. First is a policy constraint; for example, the subway runs around the clock and never shuts down. Second is an inventory constraint; the number of trains is limited by the MTA's inventory of operational engines. And third is a capacity constraint; for example, the capacity of a train is limited by the number of cars times the occupancy of each car.

You don't hear people talk much about capacity. It often seems to be taken for granted under the planning concept of "infinite capacity" used in Materials Requirements Planning, Master Production Scheduling, and Distribution Requirements Planning. Where MRP plans each inventory location taking into consideration lot sizing and lead time offsets, Capacity Requirement Planning plans each work center capacity taking into consideration lot sizing and lead time offsets. Rough Cut Capacity Planning used with Sales & Operations Planning is a coarse, longer term look-ahead at what capacity might be required. An Advanced Planning and Scheduling module added to an Enterprise Resource Planning system provides multi-echelon, "finite capacity" planning across a supply chain network.

The bottom line is that when transportation capacity is constrained, the queue time built into a schedule expands just like my experience waiting for the A Train at Penn Station.