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Justice in Time: A Theory of Constraints Approach¹

Abstract

If there is some truth to the adage that justice must not only be done, but must be seen to be done, then surely it must be seen to be done in a timely manner. Yet court congestion and delays – which threaten to undermine the justice system – have become global phenomena with significant adverse implications for social welfare, economic development, and civil rights. This work describes an application of the Theory of Constraints (TOC) to the judicial system for the purpose of designing an intervention to alleviate court congestion – an intervention that won the 2012 Goldratt Foundation New Knowledge Award. In cooperation with the Jerusalem District Court in Israel, the judicial process was reviewed through the lens of TOC, and a set of operational changes was implemented to reduce case processing time. Data collected before and after this intervention indicate the potential of achieving lead-time reduction by applying TOC to judicial environments.

- Judicial systems suffer from operational inefficiencies that result in significant delays.
- We offer a systematic approach to analyze such systems through the prism of the Theory of Constraints.
- Several suggestions for improvements are discussed and initial data are presented.

¹ The authors acknowledge with thanks the honorable judges of the Israeli court system: Dorit Beinich, Moshe Gal, Mussia Arad, Zvi Zilbertal, Itzhak Inbar, Jacob Zaban and the Judges of the Jerusalem District Court.

1. Introduction

Delays in legal proceedings and the suspension of the delivery of justice are hardly novel phenomena. More than five centuries ago, Hamlet included “the law’s delay” in his list of life’s miseries. Hamlet’s – or, rather, Shakespeare’s – indignation at delays in legal proceedings is not surprising: after all, such delays are detrimental not only to the injured party but also to social welfare. The legal maxim of “justice delayed is justice denied” (William Ewart Gladstone, in Platt, 1989) has been rightfully recognized as an essential characteristic of a sound justice system. If citizens are to trust the judicial system to be the watchdog of their rights and liberties, they should be able to expect a speedy outcome, so that the passage of time would not *ipso facto* render a just judgment null.

From an economic perspective, judicial delays increase the cost of doing business, negatively affect entrepreneurship (Chemin, 2009), discourage investments, and impede financial growth (Chemin, 2010). In fact, not only is the *efficiency* of the judicial system negatively affected by delays, but the *efficacy* of the ensuing decisions may be impaired as well. Research shows that long proceedings may impede a judge’s ability to reach a just resolution, either because witnesses become weary and disappear (President’s Commission on Law Enforcement and Administration of Justice, 1967: p.129; Nagel and Neef, 1978) or because judges invest less time in reaching settlements (Helland and Klick, 2007). Thus, the consequences of court congestion and delays for judges’ decision-making may be severe (Best and Tiede, 2015).

Despite the crucial importance of a timely judicial process for social welfare, severe congestion and delays in judicial systems are worldwide phenomena (Church et al., 1978; Dakolias, 1999; CEPEJ, 2015; CEPEJ, 2016; Voigt, 2016). To complicate matters further, evidence suggests that the demand for judicial intervention is increasing, along with its costs (Decker, Mohlen and Varela, 2011; CEPEJ, 2016). Increasing the expenditure on court systems may seem like a straightforward solution, but this strategy may not be feasible, and even when implemented, may not result in the desired outcome of reducing court congestion. For example, Beenstock and Haitovsky (2004) showed, using panel data from Israeli courts, that increasing the number of judges does not result in a higher rate of processed cases. Peyrache and Zago (2016) investigated the effect of court size in the Italian judicial system and

found that a major part of the court's congestion problem stems from the suboptimal structure of the justice system rather than from a lack of sufficient resources.

This JOM Forum article describes an application of the Theory of Constraints (TOC, Goldratt and Cox, 1988) to the judicial system with the goal of alleviating court congestion. The intervention that arose from this endeavor was adopted by the Jerusalem District Court in Israel, and later won the 2012 Goldratt Foundation New Knowledge Award. The key guiding principles of TOC were used not only to analyze the judicial process, but also to design the intervention (described below). The objective was to improve the operational performance of the judicial process, defined as reducing the average lead time of a case, without increasing the resources allocated to the court. Specifically, the intervention consisted of applying three main operational modifications to the judicial process: (1) introducing a new planning stage (which may seem counterintuitive, given the already congested system), to ensure the availability of all essential information prior to the most time-consuming phase of the trial; (2) modifying the scheduling policy from an unplanned ad-hoc policy to a case-level FIFO (first-in, first-out) policy; and (3) encouraging the transition from written to oral closing arguments. Descriptive data pertaining to periods before and after implementation of the intervention are presented, which indicate that the above-mentioned operational modifications show promise.

2. Overview of the Israeli Judicial System

To allow for a better understanding of the mechanisms and strategies implemented and evaluated in this research, we provide the reader with a general grasp of the nature of judicial proceedings in Israeli courts. These proceedings, with slight variations, are similar to those employed in the courts of other common law judicial systems.²

The Israeli courts system is divided into three layers: magistrate courts, district courts, and the Supreme Court. The thirty magistrate and six district courts are dispersed geographically, with the Supreme Court presiding from Jerusalem. The district courts comprise the middle layer of the system, with over 50,000

² Common law constitutes the basis of the legal systems of countries such as the United States, the United Kingdom, Australia, Canada, India, Ireland, and South Africa.

incoming cases per year over all six districts; these consist of both first-instance cases and appeals on the decisions rendered by the lower courts. In comparison, the magistrate courts receive about 600,000 cases annually. Thus, the district courts manage less than 8% of the cases; yet they employ more than 25% of the judges in the system (~160 judges in the district courts). Therefore, a substantial proportion of the judicial effort and resources is devoted to a relatively small proportion of the demand, which is a testament to the complexity of these cases (Israeli Judiciary, 2011).

The intervention described in this paper, initiated by the President of the Supreme Court for the purpose of piloting new managerial methodologies, focuses on first-instance civil cases. Research on the average judicial time by case type in Israel has found that civil cases in the regular procedure constitute the most time-consuming case type in the district courts (Aviv and Erental, 2021), and they are estimated to comprise approximately 20% of all first-instance cases managed by the district courts (Weinshall-Margel, 2013). Like most courts in Israel, the Jerusalem District Court implements the “one case one judge” policy for civil cases. The case is assigned to a judge as soon as the defense statement is submitted (up to 30 days after the claim is served to the court, according to the civil procedure), and that specific judge is responsible for the case during its entire life cycle. Descriptive statistics of the Jerusalem District Court case flow are presented in Table 1.

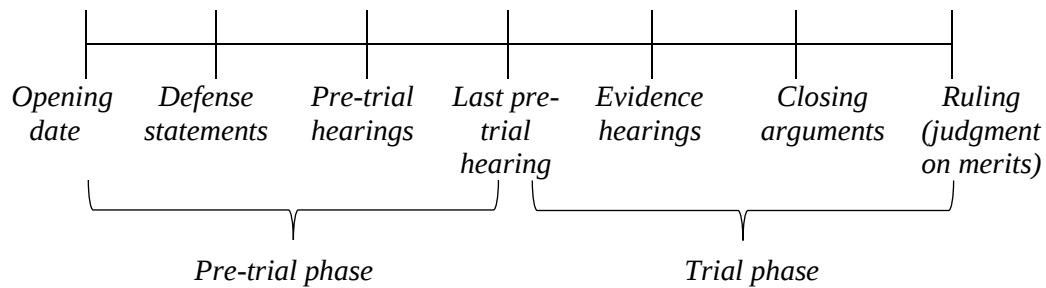
Table 1
Descriptive statistics: Jerusalem District Court case flow

Average number of incoming cases per year	5873
Average number of resolved cases per year	5680
Average annual inventory level (number of pending cases)	3987
Average number of judges (civil, criminal, and administrative)	23

Source: Israeli Judicial Administration semiannual statistics reports 2005-2011.

A typical case consists of two main parts: (1) a pre-trial phase (with an average of three sessions, each lasting about 10-20 minutes); and (2) a trial phase consisting of approximately three evidence sessions, each lasting about six hours, followed by closing arguments (Weinshall-Margel and Taraboulos, 2014). A generalized sequence of events in the life cycle of a civil case is depicted in Figure 1. Not all cases that enter the pre-trial phase continue to the trial phase, because at any stage, a case can be discontinued for various reasons such as a settlement agreement. Only 27% of civil cases heard by the district courts as a first-instance case end up with a judgment on the merits (Weinshall-Margel and Taraboulos, 2014).

Figure 1: Sequence of events in the judicial process



The operational performance of the Israeli judicial system is considered rather poor in comparison with that of other systems worldwide (CEPEJ, 2016). On average, for each judge in the Jerusalem District Court, there are around 60 open cases in the trial phase, making this a substantial part of the judge's Work-In-Process (WIP). The common scheduling scheme in civil cases is to plan each subsequent session upon completion of the preceding session, in the first available time slot in the calendar, which—due to the large number of cases managed by a single judge simultaneously—is usually about three to six months away. This long waiting time between sessions prolongs the duration of cases. Such an environment leads to case-juggling and multi-tasking, where these terms refer to situations in which the worker switches from one project to another. Prior empirical research has shown that efficiency is impaired in such an environment, due to delays in case resolution and the additional effort invested by the judge in reacquainting herself with the details of the case (Coviello, Ichino and Persico, 2014; Coviello, Ichino and Persico, 2015).

3. The Intervention

The main premise of TOC is that only a small proportion of the resources involved in a system's process are responsible for inefficiencies and delays. Consequently, TOC offers a methodology for identifying these limiting resources, improving their efficiency, and re-structuring the process around them.

Mabin and Balderstone (2000) reviewed TOC implementations in industries such as aerospace, energy, defense, and electronics, and reported that these implementations resulted in substantial operational improvements, such as a 65% reduction in manufacturing cycle time (a mean based on 14 studies). An

important development in TOC was the transition from considering production systems to examining service organizations (Reid, 2007), healthcare providers (such as hospitals, clinics, and health maintenance organizations), the retail industry, and supply chain management (Blackstone, 2001). Although the design of TOC was initially tailored to for-profit organizations, over the years, it has been generalized such that it is now also applicable to not-for-profit organizations (Scheinkopf, 1999; Cox, Blackstone and Schleier, 2003). A detailed review of the development of TOC research and its implementation can be found in Watson, Blackstone and Gardiner (2006). Based on the knowledge accumulated from these previous successful implementations of TOC, and because the judicial process is characterized by a high level of WIP and a high level of uncertainty, this method was deemed appropriate for the current intervention, as we outline below.

3.1. The Five Focusing Steps for Court Systems

TOC is based on two major characteristics: the so-called “five focusing steps” and a scheduling mechanism. In the following subsections, we outline the way in which the five focusing steps were applied to the judicial process, while in Section 3.2, we describe the scheduling mechanism that resulted from these efforts.

3.1.1. Step 1: Identify the System's Constraints

The TOC Dictionary defines a constraint as a factor that limits the performance of a system or an organization (Cox et al., 2012: p.28). A resource constraint (bottleneck) is defined as a resource whose capacity is less than or equal to the demand placed on it for the specified time horizon (Cox et al., 2012: p.9). In the adjudication system we identified the judges as the bottleneck, based on the following evidence: first, a previous study of the Israeli judicial system (Bar-Niv, Lieber and Ronen, 2010) suggested that the judges constitute the constrained resource. Second, studies of other systems found that the most expensive resource in the process usually constitutes as the bottleneck; in our setting, this resource is the judges. Finally, we confirmed this intuition by conducting an analysis in which we compared the demand placed on the judges with their capacity.

3.1.2. Step 2: Exploit the System's Constraints

Exploitation means “doing more” with the existing resources. Expressed more formally, “to exploit is to get more goal units by taking actions that make the best use of or take the best advantage of the constraint” (Cox et al., 2012: p.53). To achieve this objective, the time spent on actions that do not add value to the system should be reduced. In our setting, examples of such ineffective actions include preparing for hearings that are cancelled, hearing redundant witnesses, accepting last-minute requests that change the schedule, and cancelling hearings because of missing documents or information.

To improve the use of the judges' in-court time, we introduced a new planning stage. At the end of the preliminary hearings, prior to the beginning of the trial phase, the judges were asked to conduct a final, detailed pre-trial session. This additional planning step was designed to ensure the availability of all essential information and documents required to successfully complete the trial phase. Furthermore, it facilitated the process of scheduling all subsequent hearings (see Section 3.1.3) based on the parties' expectations of the time needed to complete the trial phase.

3.1.3. Step 3: Subordinate everything else to the above decisions

According to TOC, once a resource constraint has been identified and its time usage has been improved, all other resources and stakeholders in the process should operate at the rate of the constraint. A common way of achieving this goal is to adopt a scheduling mechanism that releases tasks into the system based on the pace of the bottleneck. Accordingly, tasks are detained in front of the constrained resource, thus limiting the amount of WIP for the bottleneck (Schrage and Ronen, 1990).

Prior to our intervention, the common scheduling practice in the Israeli court system was an unplanned ad-hoc scheduling approach or, expressed differently, a hearing-level FIFO system. According to this policy, a new hearing was scheduled only upon completion of the prior hearing. As mentioned, this policy resulted in the situation where a single judge was simultaneously managing a high number of cases (around 60) that were in their trial phases, which in turn yielded a waiting time of three to six months between consecutive hearings. Following the TOC concept of subordination, it was decided that the scheduling policy would be modified to a case-level FIFO scheme, which limits the number of

cases in the trial phase handled by the judge. Based on the plan drafted in the final pre-trial session (see Section 3.1.2), all the approved sessions associated with a given case are scheduled at one-week intervals. In so doing, the number of active cases in the trial phase is limited to five (on average); all other cases are placed on hold, and each of these cases is only permitted to enter the trial phase once another case has been completed.

Shifting to a case-level FIFO policy has two opposing effects on the total duration of a case. First, considering one case in isolation, once the trial phase has started, the duration of this phase will be shorter than under the hearing-level FIFO policy, due to the shorter waiting times between consecutive hearings. However, according to the second effect, the fact that fewer cases are heard simultaneously means that the number of cases waiting to enter the trial phase will increase. Our prediction was that the former effect would outweigh the latter such that the total duration of the trial phase would be shorter following this policy change. It is also worth noting that this heuristic and its implications are consistent with Little's law (1961). This law predicts that in a steady state, for a given demand rate for judicial services, reducing the number of units in the system (in our setting, the number of cases in their trial phases) will reduce the average time a case spends in the system.

The aforementioned modification to the scheduling policy is related to the work of Bray et al. (2016). These authors compared the hearing-level and the case-level FIFO policy within the context of the Roman Labor Court of Appeals. They modeled the scheduling problem as a multi-armed bandit and found that the hearing-level FIFO policy is optimal when the case-completion hazard rate function monotonically increases. In our setting, since the preliminary proceedings exhaust the judge's efforts for reaching a settlement (and even more so with the new final pre-trial session described above), the probability that a new trial-phase case will be completed in the subsequent session is lower than it is for an old trial-phase case. Thus, our scheduling policy is also supported by the theoretical findings of Bray et al. (2016).

3.1.4. Step 4: Elevate the System's Constraints

Elevating the system's constraints refers to actions that do not exploit the constraint, nor do they subordinate to it, but they use some other mechanisms to yield a higher throughput (Cox et al., 2012: p.49). Prior to our intervention, it was common practice in the Israeli courts to require attorneys to submit their closing arguments in written form. This practice represented a departure from the previous procedure of oral closing arguments and was invoked to divert effort to an offline channel, thereby reducing the in-court time. However, *de facto*, this practice had the opposite effect; the transition to written closing arguments nurtured a culture of submitting lengthy documents that required more time to prepare and inspect. While it is true that the resources (i.e., judges) were not idle during the preparation of these documents, the procedure still had the effect of increasing the level of WIP. Therefore, to reduce the overall lead time of cases, judges were instructed to schedule a pre-planned session for presenting oral closing arguments.

3.1.5. Step 5: When a Constraint has been Relaxed Go Back to Step 1

This step addresses the notion that an improvement process tends to be recursive in nature and calls for continuous modifications by tackling bottleneck after bottleneck. However, the global trend of increased demand for judicial intervention, together with the ubiquitous problem of limited budgets, led us to conclude that judges will remain the major bottleneck in the judicial process for the foreseeable future.

3.2. The Intervention Process

To launch the implementation of the aforementioned changes, a one-day workshop was scheduled during the annual court recess. During this workshop, which was attended by all judges at the Jerusalem District Court, the TOC methodology was introduced along with the set of proposed changes to the judicial process. All judges were requested to implement these changes, for all civil cases, starting from the first day after the court recess. That is, for each civil case that had already passed through its preliminary stages, the judge was asked to conduct a final pre-trial planning session and to schedule all evidence sessions in advance according to the new scheduling policy. In addition, the judges were

requested to provide oral closing arguments rather than using the traditional written form. As for cases that were already in the trial phase, the judges were instructed to conduct a short planning session at the end of the next evidence session and to schedule all future evidence sessions according to the new policy.

3.3. Evaluating the Intervention - Indicative Results

To evaluate the aforementioned operational modifications, we gathered data regarding case duration before and after the intervention (see Table 2). There were 64 civil cases that ended with a judgment on merits³ prior to the intervention and 107 cases that ended with a judgment on merits post-intervention.

Table 2
Pre- and post-intervention statistics

Mean lead time (months)			
	Before	After	Difference
Trial time	22.19 (13.75)	10.57 (10.37)	-52.37%
Total time	55.21 (30.79)	41.01 (19.00)	-25.72%

Note: Standard deviations are in parentheses.

The data show that post-intervention, there was a reduction of more than 50% in the “trial time”, which corresponds to the part of the case that underwent intervention. On average, the total life cycle of a case decreased by more than 25%. While it would be imprudent to draw a causal inference from these results, they show initial promise for the potential value of such an intervention.

4. Summary

This paper describes a field study, conducted in cooperation with the Jerusalem District Court in Israel, in which the Theory of Constraints was applied to a judicial process, resulting in an intervention that won the 2012 Goldratt Foundation New Knowledge Award. After describing the unique environment

³ As opposed to a settlement, cancellation, or alternative dispute resolution.

of the court system from an operational standpoint, we lay out the reasons for choosing TOC for this intervention. We then describe the five “focusing steps” of TOC, which are the core elements of its practical implementation, both from a theoretical standpoint and in terms of how they were applied to the current system. Thus, we detail the way in which each step was translated to operational changes in the judicial process. We then describe how the judges implemented the intervention process in practice.

The complexity of judicial systems stems from several factors, including decentralization, high process variety, and uncertainty about the duration and effort level required to reach a resolution. In addition, judicial systems suffer from low flexibility, because all major changes to processes and procedures must be anchored in legislation or regulation; in fact, only minor operational procedural adjustments can be introduced by judges or court officials. These considerations highlight another important practical contribution of our research, namely the ability to replicate the proposed strategies in other court systems, because the intervention does not require complex legislative initiatives. Rather, the changes proposed in this research are within the scope of the courts’ authority at the local level, without the need to undergo complicated, lengthy, and costly regulatory debates and proceedings.

On a final note, although court systems, due to their inherent complexity and high congestion, can serve as fertile soil for research using Operations Management (OM) tools, relatively little attention has been devoted to this topic (some notable exceptions include Simons and Russell, 2002; Falavigna et al., 2015; and Bray et al., 2016). This paper illustrates the strong potential of applying OM methodologies to the public policy space in general, and to judicial environments in particular.

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