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DIGITAL ASSESSMENT OF THE EXECUTION DISCIPLINE OF MANAGEMENT DECISIONS IN THE UNIFIED DIGITAL ECOSYSTEM OF THE HEALTHCARE SYSTEM

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Abstract

The thesis proposed a digital method for assessing how orders, instructions and action plans issued in health administration were executed. An Execution Discipline Index (EDI) was built from five indicators drawn from e-document and task-tracking records: on-time completion rate, average delay, overdue backlog, reopened tasks and report quality. Indicators were normalised against fixed goalposts, weighted with the analytic hierarchy process and aggregated, while unit-level dynamics were tracked with Shewhart p-charts. The method was tested on an illustrative dataset simulated in Python, covering 3,246 tasks of eight units over 12 months. Index values ranged from 59.5 to 83.5, and the control chart isolated a genuine deterioration in one unit. A traffic-light dashboard with graded escalation rules was developed.

Keywords: execution discipline, management decisions, digital health, composite index, control chart, Ijro.gov.uz.

Annotatsiya

Tezisda sog‘liqni saqlash boshqaruvida qabul qilingan buyruq, topshiriq va chora-tadbirlar rejalari qanday ijro etilayotganini raqamli baholash usuli taklif etildi. Ijro intizomi indeksi (EDI) besh ko‘rsatkichga tayandi: muddatida bajarilgan topshiriqlar ulushi, o‘rtacha kechikish, muddati o‘tgan qoldiq, qayta ochilgan topshiriqlar va hisobot sifati. Ko‘rsatkichlar belgilangan chegaralar bo‘yicha me’yorlandi, vaznlar ierarxiyalar tahlili usulida aniqlandi, bo‘linmalar dinamikasi p-nazorat kartalari orqali kuzatildi. Usul Python dasturida yaratilgan shartli ma’lumotlarda, sakkiz bo‘linma bo‘yicha 12 oyda 3246 ta topshiriq misolida sinab ko‘rildi. Indeks 59,5 dan 83,5 gacha oraliqda bo‘ldi, nazorat kartasi bitta bo‘linmadagi haqiqiy pasayishni o‘z vaqtida ajratib berdi. Svetofor tamoyilidagi panel va bosqichma-bosqich choralar tizimi ishlab chiqildi.

Kalit so‘zlar: ijro intizomi, boshqaruv qarorlari, raqamli sog‘liqni saqlash, kompozit indeks, nazorat kartasi, Ijro.gov.uz.

Аннотация

В тезисе был предложен способ цифровой оценки исполнения приказов, поручений и планов мероприятий в управлении здравоохранением. Индекс исполнительской дисциплины (EDI) был построен на пяти показателях: доля поручений, исполненных в срок, средняя просрочка, накопленный остаток просроченных поручений, доля повторно открытых поручений и качество отчетов. Показатели были нормированы по заданным границам, веса были

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определены методом анализа иерархий, динамика подразделений отслеживалась с помощью р-карт Шухарта. Метод был проверен на условных данных, смоделированных в Python: 3246 поручений восьми подразделений за 12 месяцев. Значения индекса составили от 59,5 до 83,5, контрольная карта своевременно выделила реальное ухудшение в одном подразделении. Была разработана панель по принципу светофора с правилами поэтапного реагирования.

Ключевые слова: исполнительская дисциплина, управленческие решения, цифровое здравоохранение, композитный индекс, контрольная карта, Ijro.gov.uz.

INTRODUCTION

A management decision in health administration is only as good as its execution. An order to expand screening, a regional instruction to repair an oxygen supply line or an action plan to equip rural clinics turns into a result only after a named unit receives the task, completes it on time and reports on it truthfully. Research on public management warns that what an organisation chooses to measure shapes how its staff behave, so the measure itself has to be designed with care [1].

Uzbekistan has already built the infrastructure that makes execution measurable. Resolution PQ-3962 of 5 October 2018 introduced measures to strengthen executive discipline in state bodies and organisations [2], and at that stage more than 2,800 presidential decrees and instructions were being monitored through a unified electronic system in test mode [3]. Resolution PQ-5132 of 31 May 2021 made “Ijro.gov.uz” the unified interagency electronic system of execution discipline: from 1 May 2021 execution control, control card files and reports have been kept only in this system, and heads of bodies are personally responsible for complete and timely execution [4]. In the health sector, Resolution PQ-415 of 28 December 2023 approved the National Digital Healthcare System Program, appointed UZINFOCOM as the single integrator and required all medical and pharmaceutical organisations to connect to the Digital Healthcare Platform in stages [5].

The network covered by these acts is large. The 2024 health compendium of the Statistics Agency listed 1,432 hospital institutions, 8,011 ambulatory-polyclinic institutions and 105.7 thousand physicians [6]. By 1 January 2026 the number of ambulatory-polyclinic institutions had risen to 8,912, of which 5,929 were small business entities [7]. These facilities receive tasks from the Ministry of Health, regional health departments and local authorities, and the task records already exist in electronic form. What is missing is an agreed way to turn them into a fair, comparable and timely score.

The thesis asks three questions. RQ1: which indicators from task records capture execution discipline without rewarding formal box-ticking? RQ2: how should they be weighted and combined? RQ3: how can managers tell a real deterioration from month-to-month noise and respond in proportion? The answer is an Execution Discipline Index (EDI), unit-level control charts and a traffic-light escalation protocol, demonstrated on a clearly labelled simulated dataset.

LITERATURE REVIEW

Three bodies of work inform the design. The first concerns digital-era governance. Dunleavy and co-authors argued that digital technologies allow governments to reintegrate fragmented functions around shared data [8]. Electronic execution control

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is a direct case: the instruction, its deadline and the report sit in one record visible to every level of management. The World Health Organization's global strategy likewise asks countries to use digital data for health system management and accountability, and not only for clinical care [9].

The second body of work describes the risks of measurement. Bevan and Hood showed that the star-rating targets of the English health system raised reported performance, but part of the gain came from gaming, summed up as hitting the target and missing the point [10]. Behn added that measures serving control, learning and motivation require different designs [1]. For execution discipline the lesson is concrete. An index built only on on-time closure invites units to close unfinished tasks early, so reopened tasks and report quality have to act as counterweights.

The third body of work supplies the statistical tools. The OECD and Joint Research Centre handbook treats normalisation, weighting, aggregation and sensitivity analysis as explicit choices that must be documented [11]. The analytic hierarchy process turns expert judgement into weights and checks whether those judgements are consistent [12]. Statistical process control separates common-cause from special-cause variation and is well established in healthcare improvement [13], with practical guidance available on p-charts for proportions [14]. Funnel plots warn against league tables that penalise small units for random variation [15], and a review of clinical dashboards found that they help when feedback is timely and easy to read [16]. Work on executive discipline usually treats it as a legal duty, while health informatics concentrates on clinical dashboards; the thesis joins the two by scoring administrative execution with the statistical care used for clinical quality.

METHODOLOGY

Data model and indicators

The unit of observation is a task, that is, one assignment created from a management decision, with a responsible unit, a deadline, a closure date, a reopen flag and an attached report. The control cards that PQ-5132 requires each body to keep in Ijro.gov.uz record the assignment, its deadline and the execution report [4], which are the fields the index needs. Five indicators are computed for each unit u over a period of T months (Table 1). The core indicator is the on-time completion rate:

$$\mathrm{OTR}_u = \frac{\sum_{t=1}^{T} c_{ut}}{\sum_{t=1}^{T} n_{ut}} \qquad (1)$$

where c_{ut} is the number of tasks of unit u closed on or before the deadline in month t and n_{ut} is the number of tasks due in that month. Put simply, the formula answers the question of what share of the work was finished when it was supposed to be finished.

The remaining indicators have different units, so each is converted to a common 0 to 1 scale with fixed goalposts:

$$s_{ku} = \frac{x_{ku} - L_k}{U_k - L_k} \qquad (2)$$

where x_{ku} is the raw value of indicator k for unit u, and L_k and U_k are the lower and upper goalposts in Table 1. For indicators where a lower value is better (delay, backlog, reopened tasks) the score is reversed as $1 - s_{ku}$, and all scores are capped at 0 and 1. In everyday terms, every indicator becomes a mark from 0 (worst acceptable level) to 1 (target), and fixed goalposts mean a unit's mark does not depend on how other units perform.

Table 1

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Indicators of the Execution Discipline Index[1]

Indicator	Definition	Direction	Goalposts L–U	Weight
On-time rate	Share of due tasks closed on or before the deadline, formula (1)	Higher is better	0.60–1.00	0.349
Average delay	Mean delay of late tasks, days	Lower is better	0–30 days	0.184
Overdue backlog	Tasks still open after the deadline at month end, share of all tasks	Lower is better	0–0.20	0.184
Reopened tasks	Closed tasks returned by the controller as not executed, share	Lower is better	0–0.20	0.098
Report quality	Controller's checklist score: completeness, evidence, measurable result	Higher is better	0.50–1.00	0.184

Table 1 shows that the on-time rate carries about one third of the total weight, while delay, backlog and report quality share most of the rest. Reopened tasks receive the smallest weight because they occur rarely, yet they remain in the index to penalise premature closure.

Weighting, aggregation and monitoring

Weights were obtained from a 5 × 5 pairwise comparison matrix in which the on-time rate was judged twice as important as delay, backlog and report quality and three times as important as reopened tasks. Consistency was checked with the ratio:

$$CR=\frac{(\lambda_{max}-m)/(m-1)}{RI} \quad (3)$$

where λ_{max} is the largest eigenvalue of the comparison matrix, m = 5 is the number of indicators and RI = 1.12 is Saaty's random index for a matrix of this size [12]. The matrix gave λ_{max} = 5.010 and CR = 0.002, far below the usual 0.10 limit. In plain words, the expert judgements behind the weights do not contradict one another. In practice a panel of health administrators should fill the matrix.

The index is the weighted sum of normalised scores:

$$EDI_u=100\cdot\sum_{k=1}^{m} w_k s_{ku} \quad (4)$$

where w_k is the weight of indicator k, and the weights sum to one. The EDI therefore runs from 0 to 100. Simply put, a score of 80 means that the unit reached, on

[1] Source: Developed by the author based on [11]; [12]. Weights are the author's calculation from the illustrative pairwise matrix described in the text; goalposts are proposed values for discussion.

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average, 80 per cent of the target level across all five aspects of execution, with the most important aspects counting more.

A single index value says nothing about whether a change is real. Each unit is therefore monitored with a Shewhart p-chart for the monthly on-time rate [13]; [14]. Months 1 to 6 serve as the baseline, and the lower control limit for month t is:

$$LCL_{ut}=\bar{p}_u-3\sqrt{\frac{\bar{p}_u(1-\bar{p}_u)}{n_{ut}}} \quad (5)$$

where $\bar{p}_u$ is the unit's baseline on-time rate and n_{ut} is the number of tasks due in month t. A signal is raised when a monthly rate falls below the LCL or when two of three consecutive months fall more than two standard errors below the baseline. The limit widens automatically for units with few tasks, which protects small polyclinics from being labelled weak because of chance [15]. Put simply, the chart distinguishes an unlucky month from a genuine change in the way a unit works.

Illustrative dataset

Facility-level execution data are not published, so the method was tested on an illustrative (hypothetical) dataset simulated in Python (seed 2026): eight units of a hypothetical regional health administration over 12 months. Monthly task counts followed a Poisson distribution with means from 18 to 60, on-time probabilities ranged from 0.80 to 0.93, delays of late tasks followed a gamma distribution with unit-specific means of 4 to 9 days, reopen probabilities ranged from 0.04 to 0.09 and report-quality scores were drawn from beta distributions. Two changes were built in on purpose: the on-time probability of Hospital B fell by 12 percentage points from month 9, and that of District medical association 2 rose by 6 points from month 7 after a hypothetical corrective plan. The simulation produced 3,246 tasks, none of which describes a real facility.

ANALYSIS AND RESULTS

Figure 1 places the index in the management cycle: the upper row follows a decision to execution, the central layer holds records already kept in Ijro.gov.uz and the Digital Healthcare Platform, and the lower row turns them into monitoring, evaluation and feedback.

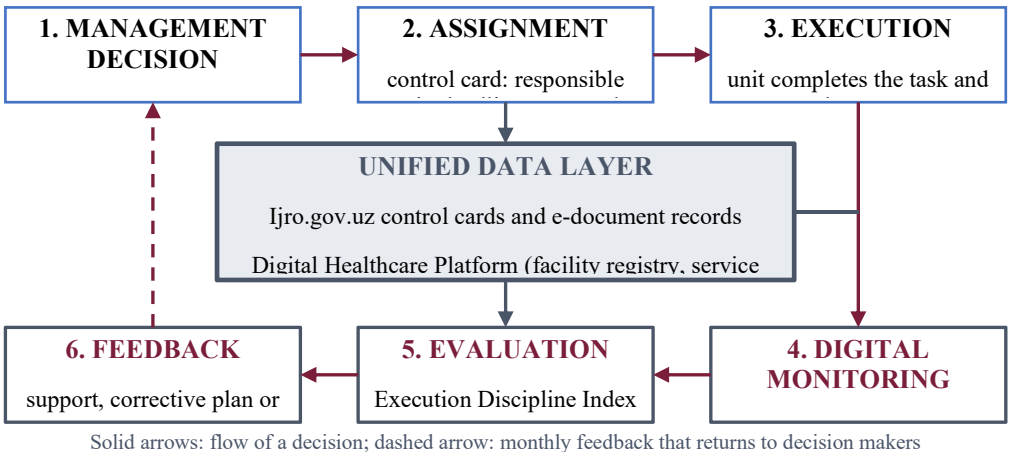


Figure 1. Digital execution cycle of a management decision[2]

[2] Source: Developed by the author based on [4]; [5]; [8]; [13].

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The figure shows that the assessment adds no new reporting burden: it reads data that units already enter when they receive and close tasks. The dashed return arrow matters most: evaluation results have to reach decision makers in time to change the next instruction.

Table 2

Execution Discipline Index by unit, illustrative (hypothetical) data for 12 months[3]

Unit	N	On-time, %	Delay, days	Backlog, %	Reop., %	Quality	EDI	Signal	Status
Regional health dept.	724	92.4	4.3	1.5	4.0	0.85	81.7	–	green
Hospital A	525	88.6	4.7	2.9	4.4	0.83	76.2	–	amber
Hospital B	505	80.6	6.5	6.3	8.9	0.74	59.5	10, 12	red
DMA 1	381	87.7	6.9	4.2	5.8	0.81	71.2	–	amber
DMA 2	343	83.1	8.3	4.4	7.6	0.73	62.6	–	red
DMA 3	300	86.7	5.6	3.0	4.3	0.82	73.2	–	amber
Family polyclinic	236	91.9	4.2	1.7	1.3	0.87	83.5	–	green
Emergency station	232	84.5	6.4	3.4	5.2	0.75	67.8	–	amber

Table 2 shows EDI values from 59.5 to 83.5 and a pooled on-time rate of 87.3%. The family polyclinic and the regional health department are green, four units are amber and two are red. Hospital B is the only unit with a statistical signal: its on-time rate fell from 83.0% in the baseline months to 70.1% in months 10 to 12, month 10 lay below the lower limit ($z = -3.11$) and month 12 completed the two-of-three rule. The chart therefore recovered the deterioration built into the simulation within two months of its start. District medical association 2 shows why level and trend must be read together. Its EDI of 62.6 is red, yet it has no low signal and its on-time rate in the last three months (81.9%) exceeded its baseline (80.4%). The appropriate response is to support a unit that is already improving rather than to sanction it.

Hospital B lost most points on the on-time rate (18.0 of a possible 34.9) and report quality (9.0 of 18.4), which suggests a capacity problem rather than a reporting one. The ranking proved robust: with equal weights or with weighted geometric aggregation, which limits compensation between indicators, the order of the eight units stayed the same (Spearman $\rho = 1.00$, author's calculation). Table 3 turns the status into proportionate action.

Table 3

Traffic-light status and escalation rules[4]

Status	Condition	Response
Green	EDI ≥ 80 and no low signal on the p-chart	Monthly dashboard only; good practice shared with other units

[3] Source: Author's calculation on data simulated in Python (seed 2026); illustrative (hypothetical) example, not data of real facilities. N: number of tasks; Reop.: reopened tasks; Quality: report quality score; Signal: months with a low p-chart signal; DMA: district medical association. Status thresholds as in Table 3.

[4] Source: Developed by the author based on [14]; [16]; [4]. Time limits are proposals for a pilot.

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Status	Condition	Response
Amber	65 ≤ EDI < 80, or one low signal with EDI ≥ 80	Unit head reviews overdue tasks within 5 working days and records causes in the control card
Red, improving	EDI < 65, no low signal, last-quarter on-time rate above baseline	Methodological support from the regional health department; no sanction while the trend holds
Red	EDI < 65 with a low signal, or two consecutive months of signals	Corrective plan within 10 working days, review by the deputy head of the regional health department; hearing at ministry level if red persists for 3 months

Table 3 shows that escalation depends on two conditions at once, the level of the index and the presence of a statistical signal. One noisy month never moves a unit to the red tier. The rules keep the personal responsibility of heads set by PQ-5132 [4] and give them an early warning.

CONCLUSION AND SUGGESTIONS

On RQ1, five indicators from existing task records describe execution discipline more fully than the on-time rate alone and make premature closure visible. On RQ2, fixed goalposts, AHP weights and weighted aggregation give a transparent index whose ranking held under alternative choices. On RQ3, unit-level p-charts separated a real decline from noise and, together with the index level, supported graded escalation.

Four practical steps follow. First, the Ministry of Health could add a reopen flag and a short report-quality checklist (completeness, supporting evidence, measurable result) to control cards, since these two fields are the main safeguards against formal compliance. Second, the monthly dashboard could serve unit heads as a learning tool before it enters formal ratings. Third, a six-month pilot in one region would allow the weights to be set by an expert panel and the index to be compared with inspection findings. Fourth, linking tasks in Ijro.gov.uz to service indicators on the Digital Healthcare Platform would show whether better execution leads to better services.

The results are illustrative. Validation with real task records, a check of how report quality is scored by different controllers and a study of whether units adapt their behaviour to the index are the natural next steps of this research.

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