

THE IMPACT OF DIGITAL TECHNOLOGIES ON MANAGERIAL DECISION- MAKING

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Abstract. This paper examines how digital technologies, including big data analytics, business intelligence systems, cloud platforms and artificial intelligence (AI), are transforming managerial decision-making. Drawing on Herbert Simon's model of the decision process, the study analyses the effect of these technologies on each stage: intelligence, design, choice and implementation. The paper argues that digital tools increase the speed, accuracy and evidence base of managerial decisions, yet also create new risks such as automation bias, algorithmic opacity, data quality problems and skill gaps. Based on a systematic review of academic literature and recent industry surveys, the study proposes a human–AI augmentation approach and practical recommendations for organisations, with particular reference to Uzbekistan's digital transformation agenda.

Keywords: digital technologies, managerial decision-making, data-driven decision-making, business analytics, artificial intelligence, decision support systems, digital transformation.

Annotatsiya. Maqolada katta ma'lumotlar tahlili, biznes-intellekt tizimlari, bulutli platformalar va sun'iy intellekt kabi raqamli texnologiyalarning boshqaruv qarorlarini qabul qilish jarayoniga ta'siri tahlil qilinadi. G. Saymonning qaror qabul qilish modeli asosida texnologiyalarning har bir bosqichga ta'siri ko'rib chiqiladi. Raqamli vositalar qarorlarning tezligi, aniqligi va asoslanganligini oshirishi bilan birga, avtomatlashtirishga ortiqcha ishonch, algoritmlarning shaffof emasligi va malaka yetishmasligi kabi xavflarni ham keltirib chiqarishi ko'rsatiladi. Inson va sun'iy intellekt hamkorligiga asoslangan yondashuv hamda amaliy tavsiyalar taklif etiladi.

Kalit so'zlar: raqamli texnologiyalar, boshqaruv qarorlari, ma'lumotlarga asoslangan qarorlar, biznes-tahlil, sun'iy intellekt, raqamli transformatsiya.

Аннотация. В статье анализируется влияние цифровых технологий — анализа больших данных, систем бизнес-аналитики, облачных платформ и искусственного интеллекта — на процесс принятия управленческих решений. На основе модели принятия решений Г. Саймона рассматривается воздействие технологий на каждый его этап. Показано, что цифровые инструменты повышают скорость, точность и обоснованность решений, но одновременно порождают риски чрезмерного доверия автоматизации, непрозрачности алгоритмов и дефицита компетенций. Предложены подход, основанный на сотрудничестве человека и ИИ, и практические рекомендации.

Ключевые слова: цифровые технологии, управленческие решения, решения на основе данных, бизнес-аналитика, искусственный интеллект, цифровая трансформация.

INTRODUCTION

Decision-making lies at the core of management. Herbert Simon famously argued that managing is, in essence, the same as making decisions, and that every managerial function, from planning to control, consists of a chain of choices [1]. For most of the twentieth century these choices relied heavily on managers' experience, intuition and limited, often outdated, information.

The digital revolution has fundamentally changed this situation. Organisations now generate and store enormous volumes of data from transactions, sensors, customer interactions and online platforms. Business intelligence dashboards, predictive analytics and, most recently, generative AI tools make it possible to process this data in real time. According to McKinsey's global survey, 88 percent of organisations reported regular AI use in at least one business function in 2025, up from 78 percent a year earlier and just 20 percent in 2017 [10]. At the same time, only a small minority of firms have scaled these technologies across the enterprise, which shows that adoption alone does not guarantee better decisions.

For Uzbekistan, the topic is especially relevant. The "Digital Uzbekistan – 2030" strategy sets out an ambitious programme for digitalising public administration, industry and services [12]. Managers in both the public and private sectors are therefore expected to make decisions in a data-rich environment, often without adequate preparation.

The aim of this paper is to analyse how digital technologies affect the managerial decision-making process, to identify their main benefits and risks, and to propose recommendations for effective human–technology collaboration. The study uses a systematic literature review, comparative analysis and a review of recent industry survey data.

LITERATURE REVIEW

Research on the topic can be grouped into three streams. The **first stream** focuses on data-driven decision-making (DDD). Davenport and Harris showed that firms which systematically "compete on analytics" outperform their rivals [3]. Brynjolfsson and McElheran documented the rapid diffusion of DDD in US manufacturing and found that its adoption is associated with significantly higher productivity [2].

The **second stream** examines artificial intelligence as a decision-making agent. Agrawal, Gans and Goldfarb describe AI as a technology that sharply reduces the cost of prediction, thereby increasing the value of human judgement, which remains complementary to prediction [4]. Shrestha, Ben-Menahem and von Krogh propose a framework of decision structures in which decisions can be fully delegated to AI, made sequentially by AI and humans, or aggregated from both, depending on the decision's specificity, interpretability and speed requirements [5]. Jarrahi argues for "human–AI symbiosis", in which AI handles complexity and humans manage uncertainty and equivocality [6]. Raisch and Krakowski describe an "automation–augmentation paradox": focusing only on automation or only on augmentation is harmful, and organisations need to combine both over time [11].

The **third stream** addresses behavioural aspects. Kahneman's work on cognitive biases explains why intuitive judgements are often unreliable [9]. Yet people react ambiguously to algorithms: some studies show "algorithm aversion", where decision-makers abandon algorithms

after seeing them err [7], while others report "algorithm appreciation", where lay people prefer algorithmic advice to human advice [8]. Research on automation further warns of complacency and automation bias, where users accept system recommendations without sufficient scrutiny [13].

Despite this rich body of research, the literature rarely connects specific technologies with specific stages of the decision process. This paper addresses that gap.

RESULTS AND DISCUSSION

Impact across the stages of decision-making. Simon's classic model divides the decision process into intelligence (identifying the problem), design (developing alternatives) and choice (selecting an alternative), with implementation and review often added as a fourth stage [1]. The analysis shows that digital technologies transform every stage, as summarised in Table 1.

Table 1

The impact of digital technologies on the stages of managerial decision-making

Stage	Traditional approach	Digitally supported approach	Key technologies
Intelligence	Periodic reports, manager's observation, problems detected late	Real-time monitoring, automatic alerts, early detection of anomalies	IoT, BI dashboards, big data analytics
Design	Few alternatives, based on past experience	Many alternatives generated and simulated quickly	Simulation, scenario modelling, generative AI
Choice	Intuition and judgement, high risk of bias	Predictive and prescriptive models support evidence-based choice	Machine learning, optimisation, decision support systems
Implementation and review	Slow feedback, manual control	Continuous tracking of KPIs, rapid correction	ERP, CRM, cloud platforms, workflow automation

Source: compiled by the author based on [1], [5], [6].

At the **intelligence stage**, the most important change is the shift from periodic to continuous awareness. Instead of waiting for monthly reports, managers receive real-time signals about sales, inventory, customer complaints or equipment failures. Problems are detected earlier, when they are cheaper to solve.

At the **design stage**, simulation and scenario modelling allow managers to test many alternatives at low cost. Generative AI tools can draft options, summarise market research or produce first versions of plans within minutes, widening the range of alternatives considered.

At the **choice stage**, predictive analytics estimates the likely outcomes of each alternative, while prescriptive tools recommend the optimal one under given constraints. This reduces the influence of well-known biases such as overconfidence, anchoring and the availability heuristic

[9]. Routine, well-structured decisions, such as credit scoring, inventory replenishment or dynamic pricing, can increasingly be delegated to algorithms entirely [5].

At the **implementation stage**, ERP and CRM systems, together with KPI dashboards, provide immediate feedback, so that managers can correct decisions quickly. This turns decision-making from a one-off act into a continuous learning cycle.

Main benefits. The analysis identifies four groups of benefits: (1) *speed*, since information is collected and processed almost instantly; (2) *accuracy*, since decisions rely on larger and more reliable data sets; (3) *objectivity*, since quantitative evidence counterbalances personal biases; and (4) *decentralisation*, since accessible data allows decisions to be pushed down to lower levels of the organisation, closer to customers.

Main risks and limitations. Digital technologies also bring serious challenges. First, *automation bias*: managers may accept algorithmic recommendations uncritically [13]. Second, *algorithmic opacity*: many machine learning models are "black boxes", which makes it difficult to explain or justify decisions to stakeholders. Third, *data quality*: models trained on incomplete or biased data reproduce and amplify those errors. Fourth, *the value gap*: although most organisations already use AI, only 39 percent of McKinsey's respondents attribute any measurable EBIT impact to it [10], which indicates that technology must be accompanied by changes in processes and skills. Fifth, *ethical and legal concerns*, including privacy, accountability and cybersecurity. Finally, *the skills gap*: many managers lack the data literacy required to interpret analytical outputs.

The augmentation approach. The findings support the view that the most effective model is not the replacement of managers by machines but the augmentation of human judgement [6], [11]. Technology is best suited to structured, data-rich and repetitive decisions, while humans retain responsibility for strategic, ambiguous and value-laden decisions that require context, ethics and stakeholder negotiation. In this model the manager's role shifts from "information gatherer" to "interpreter and integrator" of insights.

RECOMMENDATIONS

Based on the analysis, the following recommendations are proposed for organisations, including those in Uzbekistan:

1. **Develop data literacy among managers** through regular training in analytics, data visualisation and the basics of AI, and integrate these subjects into management curricula at universities.
2. **Build a reliable data infrastructure**: invest in data quality, integration of information systems and clear data governance rules before deploying advanced AI tools.
3. **Classify decisions by type**: define which decisions can be automated, which should be supported by algorithms, and which must remain fully human.
4. **Keep a human in the loop** for high-stakes decisions and require explainable models where decisions affect employees, customers or citizens.
5. **Redesign processes, not only tools**: adapt workflows, roles and incentives so that analytical insights are actually used in decisions.
6. **Establish ethical and legal safeguards**: policies on data privacy, cybersecurity, algorithmic accountability and regular auditing of models.

7. **Start with pilot projects** with measurable KPIs and scale the successful ones, avoiding large investments without proven value.

CONCLUSION

Digital technologies have transformed managerial decision-making from an activity based mainly on experience and intuition into a data-driven, continuous and increasingly collaborative process between humans and machines. They affect every stage of the decision process, improving the speed, accuracy and objectivity of decisions.

However, technology alone does not guarantee better decisions. Its value depends on data quality, managers' competences, organisational processes and ethical safeguards. The most promising path is a human–AI augmentation model in which algorithms handle prediction and routine choices, while managers provide judgement, context and accountability. For Uzbekistan, where digital transformation is a national priority, developing the analytical and digital competences of current and future managers is a key condition for turning digital investment into better management.

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