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PROJECT MANAGEMENT OF SOFTWARE DEVELOPMENT ENTERPRISES: GENERALISED TRENDS OF ARTIFICIAL INTELLIGENCE DEVELOPMENT IN PROJECT MANAGEMENT

Software has become an evolving digital asset rather than a one-off deliverable. Global IT spending grew from USD 4.239 trillion in 2021 to USD 5.436 trillion in 2025 (+28.2%), with the fastest growth in data-centre systems and software [1]. At the same time, the classical "iron triangle" of time, cost and scope remains a necessary but insufficient frame for judging project success: about 31% of software projects are cancelled before completion, 53% exceed their budget, and up to 70% of projects that meet formal constraints do not meet the long-term expectations of stakeholders [2; 3]. Against this background the purpose of the paper is to generalise, on the basis of the author's dissertation research, the trends that describe how artificial intelligence (AI) is transforming project management in software development enterprises.

The empirical basis of the study is an original survey of 93 Ukrainian software development enterprises of four size groups (up to 50 employees – 37; 51–200 – 23; 201–1000 – 20; over 1000 – 13), supplemented by the public financial statements of 72 legal entities for 2020–2025 obtained from open registers. Management practices were coded into six sub-indices normalised to the interval [0; 1]: project management maturity (PMM), project results (PRI), DevOps/CI/CD maturity (DOI), AI readiness (AIR), crisis adaptability (CRA) and integration of metrics (IMI). Group differences were tested by ANOVA and the Kruskal–Wallis test, the structure of indicators by principal component analysis (KMO = 0.838), the drivers of results by OLS regression, and the typology of enterprises by k-means clustering. The results allow seven trends to be formulated.

Trend 1. Convergence of methodologies into hybrid governance. A comparative analysis of nine methodological frameworks against twelve project management business processes shows that none of them alone covers the strategic, project, engineering and business levels of

management at the same time [4; 5]. The survey confirms this: 79.6% of enterprises declare Agile/Scrum, yet the dominant real configuration is hybrid – iterative delivery embedded in contractual, budgetary and compliance constraints. Consequently, AI tools are adopted not into a "pure" Agile process but into a multi-layer governance structure.

Trend 2. Shift of performance criteria from plan compliance to value and engineering resilience. Enterprises increasingly combine the classical indicators of schedule and budget with the four DORA metrics – deployment frequency, lead time for changes, change failure rate and time to restore service – and with business outcomes such as NPS, CSAT and benefits realisation [6]. In the sample, no single engineering metric is recorded by more than 55.9% of enterprises, which indicates an uneven measurement culture. The dissertation formalises this trend in the AIPM/PPI methodology, where the integral Performance & Predictability Index is computed as $PPI=0.413\cdot MS+0.327\cdot ES+0.260\cdot BS$ (managerial, engineering and business sub-indices; weights derived by the analytic hierarchy process, consistency ratio 0.046). Across the sample the mean PPI is 0.535 (standard deviation 0.115); 70 enterprises (75.3%) fall into the "red" zone below 0.60, 23 into the "yellow" zone, and none reaches the "green" zone above 0.80.

Trend 3. AI moves from a developer's instrument to a management contour. AI readiness is the weakest of the six sub-indices (AIR = 0.450 for the whole sample). AI is used mainly for code generation (74.2% of enterprises), documentation and testing, whereas its use for forecasting deadlines, risk assessment and resource planning remains marginal. The "instrumental" phase of AI adoption is thus largely complete, while the "managerial" phase – forecasting of the PPI, anomaly detection in project telemetry, risk heat maps and scenario simulation – is only beginning. The AVIPG concept (Adaptive Value-Oriented IT Project Governance) proposed in the dissertation therefore treats AI analytics as a separate fifth contour of governance, with human-in-the-loop rules that keep the final decision with the manager.

Trend 4. Integration becomes the scarce factor, not the tools themselves. Regression of the results index on the other sub-indices ($R^2 = 0.340$; $F = 8.95$; $p < 0.001$) shows that only two predictors are statistically significant: management maturity ($\beta = 0.2415$; $p = 0.028$) and integration of metrics ($\beta = 0.2664$; $p = 0.021$). DevOps maturity has no direct effect ($p = 0.430$) although it is strongly correlated with integration ($r = 0.76$). Hence the value of AI analytics is created only where

managerial, engineering and business data are connected in one loop; adding AI tools to fragmented processes does not change results.

Trend 5. Differentiation by maturity type instead of universal recipes. Clustering yields three empirically stable types of enterprises (silhouette 0.272): the start-up/fragmented type (n = 41; PPI = 0.44), the transitional Agile type (n = 33; PPI = 0.55) and the mature enterprise type (n = 19; PPI = 0.71). Scenario modelling on the cluster centroids (table 1) shows that the formalisation of a hybrid methodology raises the PPI by +0.112, +0.146 and +0.056 respectively, and its combination with AI analytics by +0.122, +0.153 and +0.062. The contribution of AI to the total effect grows with maturity – 32%, 27% and 46% – so the same AI investment gives the largest return in enterprises that have already built integrated processes.

Trend 6. Economic justification of AI adoption through resilience rather than short-term margins. The financial statements of 72 legal entities show that between 2020 and 2025 the median compound annual growth rate of revenue increased from 5.2% to 15.8% and the share of profitable entities from 71.4% to 94.7%, while differences in profitability between size groups are not statistically significant (Kruskal–Wallis H = 6.01; p = 0.111). Hence the return on hybrid governance and AI analytics should be assessed through avoided losses, shorter time-to-market (−15…−26%) and lower change failure rate (up to −50% for the lowest DORA class) rather than through margin alone. The discounted model built on these parameters gives a positive net present value for all three types, with payback periods of 2.4, 1.5 and 1.2 years.

Table 1

Expected effect of the hybrid methodology and AI analytics on the integral index PPI by enterprise type (scenario modelling on cluster centroids, n = 93)

Enterprise type	n	PPI, baseline	ΔPPI, hybrid methodology	ΔPPI, hybrid methodology + AI analytics	Share of AI in the effect, %
Start-up / fragmented	41	0.440	+0.112	+0.122	32
Transitional Agile	33	0.551	+0.146	+0.153	27
Mature enterprise	19	0.711	+0.056	+0.062	46

Source: calculated by the author on the basis of the survey data

Trend 7. Regulated, explainable and cyclic use of AI. The EU regulation on artificial intelligence and customers' audit requirements turn AI in project management into a governed process: outputs must be explainable, decisions logged and forecast accuracy reviewed retrospectively. In the AIPM/PPI methodology this is implemented as a seven-stage cycle from initialisation and telemetry collection to managerial decision and retrospective, with feedback loops that return refined weights, thresholds and metrics to the beginning of the cycle.

Conclusions. The generalised trends show that artificial intelligence is transforming project management in software development enterprises not as a stand-alone technology but as an element of adaptive, value-oriented governance. Its effect is conditional on three prerequisites revealed by the empirical data: formalised management processes (maturity), an integrated loop of managerial, engineering and business metrics, and a differentiated implementation path according to the maturity type of the enterprise. Under these conditions the combination of a hybrid methodology with AI analytics moves transitional enterprises from the "red" to the "yellow" zone of the PPI (0.704) and increases the project results index of start-up enterprises by 24%.

References:

1. Gartner (2025) Gartner Forecasts Worldwide IT Spending to Grow 7.9% in 2025. Available at: https://www.gartner.com/en/newsroom/press-releases

2. The Standish Group (2020) CHAOS 2020: Beyond Infinity. Boston: The Standish Group International.

3. Project Management Institute (2024) Pulse of the Profession 2024: The Future of Project Work. Newtown Square: PMI.

4. Piliukov A. (2026) Conceptual basis of project management of software development enterprises. *Economic Bulletin of National Technical University of Ukraine "Kyiv Polytechnic Institute"*, no. 36, pp. 101–108. DOI: https://doi.org/10.20535/2307-5651.36.2026.360552

5. Bosovska M., Piliukov A. (2026) Modelling impact of hybrid methodology on performance of IT-enterprises. *Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu*, no. 4, pp. 200–210. DOI: https://doi.org/10.33271/nvngu/2026-4/200

6. DORA (2024) Accelerate State of DevOps Report 2024. Google Cloud. Available at: https://dora.dev/research/2024/dora-report/