Digital Technologies as a Tool for Transforming the Management of Marketing and Logistics Activities of Enterprises

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Abstract

The article is devoted to the study of the role of digital technologies in the transformation of management of marketing and logistics activities of enterprises in modern economic conditions. Modern digitalization tools – artificial intelligence, IoT, blockchain, cloud SCM/CRM platforms, Big Data – are systematized and their synergistic role in improving the efficiency of supply chains and marketing communications is revealed. A conceptual model of digital transformation of marketing and logistics activities (operational, tactical, strategic levels), integrated through a single Data Integration Platform, is proposed. (MAPE, OFT, SL, IT, LC, MLII), which provides a measurable and reproducible assessment of the effectiveness of digitalization. Comparative analysis of the activities of enterprises for 2023–2025 confirmed that the transition to level 3 reduces logistics costs by 55–60%, reduces the forecast error by 4–5 times, increases the level of service to 95–99%, and increases MLII by 2.2–2.4 times compared to level 0. The proposed three-level conceptual model (operational, tactical, strategic levels) in combination with the classification of enterprises by levels of digital maturity and the developed KPI methodology form a practical toolkit for phased digital transformation, which can be applied regardless of the industry affiliation and scale of the enterprise.

Keywords: Digital Technologies, Marketing, Logistics, Digital Transformation, Artificial Intelligence, IoT, Blockchain, SCM, CRM, Industry 4.0, Predictive Analytics, Supply Chain, KPIs.

Introduction

In the context of the fourth industrial revolution, enterprises are faced with fundamentally new requirements for the organization of marketing and logistics activities. The traditional model, in which marketing and logistics function as separate units with their own information systems and performance metrics, is proving to be less and less suitable for ensuring competitiveness. delivery, and any information imbalance between the marketing and logistics circuits is directly translated into financial losses and customer outflow.

Digital technologies – artificial intelligence (AI), Internet of Things (IoT), blockchain, cloud-based supply chain management (SCM) platforms, and customer relationship management (CRM) systems – are forming a fundamentally new operational architecture in which marketing signals are directly translated into logistics solutions in real time. The global pace of digitalization confirms the scale of transformation: in 2025, 94% of business entities are implementing digital initiatives, and 83% consider AI as a strategic priority (Samuels A., 2025). Therefore, the problem arises of a systematic understanding of the mechanisms of such transformation, the development of a formalized methodological basis for assessing its effectiveness and verification of theoretical provisions on real corporate data.

Literature review

The digital transformation of marketing activities of enterprises has been studied from various aspects, namely: the dependence of the development of marketing effectiveness on the impact of digitalization of society and business has been established, Big Data, social networks and automation tools have been proposed for implementation, the role of digital technologies in the logistics systems of trade enterprises has been argued, the key management platforms have been systematized and identified: ERP, TMS, WMS, CRM and SCM.

The global dimension of digital supply chain transformation based on PRISMA Review proves the transformative impact of AI, blockchain, and IoT on the operational efficiency, transparency, and resilience of SCM (Samuels A., 2025). Practical measurement and industry benchmarks are presented in the analytical materials DHL Logistics Trend Radar 7.0 (DHL Group, 2024), which records 54% of the connection of logistics assets to IoT and 63% of the penetration of cloud SCM systems among large enterprises in 2025. Duan S. et al. (2024), Enshassi M. et al. (2024) analyzed the impact of innovations in the field of green technologies and digital transformation on the environmental performance of logistics enterprises, and explored the potential of artificial intelligence in digital marketing and financial technologies for small and medium-sized enterprises. Górska M. et al. (2024), Inoyatova K. M. et al. (2024), Popelo O. et al. (2025) analyzed the features of digital transformation in European enterprises through an assessment of the use of the Internet of Things (IoT) in logistics and production processes, and also conducted a study of the dynamics of digital marketing in enterprises using advanced data collection and networking technologies.

Le Viet H. et al. (2023), Li D. et al. (2026) analyzed the factors influencing the digital transformation of logistics enterprises, assessed the possibilities of digital transformation of logistics enterprises using the spherical fuzzy alternative ranking method taking into account the two-stage normalization approach. Na L. et al. (2024), Nguyen K. H. et al. (2026) analyzed the digital transformation of logistics enterprises and the impact of digital transformation on the business efficiency of logistics enterprises. Nguyen V. V. et al. (2025), Ni L. (2025), Nikiforov P. et al. (2022) (25,26,36) the development of digital transformation and its impact on innovation in the distribution channels of logistics enterprises were investigated, and the problems and ways of digitalization of logistics enterprises in the digital economy were analyzed based on a decision tree.

Phýõng Dung N. T. et al. (2026), Remmang H. et al. (2024), Wang R. et al. (2026) the impact of digital transformation on the financial performance of logistics enterprises was investigated, the features of transformation in the development of small and medium-sized enterprises were analyzed using competencies in the field of digital marketing technologies, and ways of digitally expanding the capabilities of logistics enterprises were proposed. Yang B. (2025), Zhang P. et al. (2025), Zhao W. (2025) proposed models of digital marketing of the enterprise using data mining technology, analyzed interaction, coordination and forecasting trends of digital transformation and operational efficiency in logistics enterprises, investigated the impact of digital transformation driven by big data on the total factor productivity of logistics enterprises. Zhu X. et al. (2025), Liu D. et al. (2025) investigated how ESG ratings contribute to the high development of logistics enterprises through digital transformation and green innovations.

At the same time, the scientific literature does not sufficiently disclose the issue of marketing and logistics integration as a single digital control circuit. There is no

unified methodology for quantifying the effectiveness of such integration with the possibility of verification on public corporate data, which determines the relevance of this study.

The article is aimed at studying the role of digital technologies in the transformation of the management of marketing and logistics activities of enterprises, developing a formalized methodological framework for assessing the effectiveness of digitalization and its verification based on real data of enterprises with different levels of digital maturity for 2023–2025.

To achieve the goal, the following tasks have been set, namely: to systematize digital technologies by functional domains of marketing and logistics management; to substantiate the conceptual model of digital transformation; to develop a methodology for evaluating performance with a system of KPIs, calculation formulas and weighting factors; conduct a comparative analysis of real enterprises and quantify the effect of digitalization in a single currency (USD).

Methodical approach

The methodological basis of the study is a systematic approach to the analysis of marketing and logistics activities of enterprises. A set of methods is applied: abstract and logical – for the formation of a categorical apparatus and a conceptual model; comparative analysis – for assessing the performance of enterprises with different levels of digital maturity; economic and statistical – for quantitative measurement of the effect of digitalization based on public corporate data; coefficient analysis – for calculation integral and partial indicators; pairwise comparison method – to determine the weighting coefficients of the integral index.

The empirical base consists of public financial and operational statements of enterprises for 2023–2025; industry analytical reports DHL Logistics Trend Radar 7.0 (DHL Group, 2024), McKinsey Global Institute, Gartner Supply Chain Reports; open corporate publications of Forbes Ukraine (2024); official websites of enterprises (Ukrposhta, 2026; ATB-market, 2026; Nova Poshta, 2026; DHL Group, 2026; Walmart Inc., 2026). The conversion of hryvnia indicators into USD was carried out at the official average annual rates of the NBU: in 2023 – 36.57 UAH/USD; 2024 – 40.15 UAH/USD (Forbes Ukraine, 2024). The sample includes 5 enterprises representing three levels of digital maturity and two geographic markets – Ukraine and international.

To assess marketing and logistics efficiency, a system of KPIs covering operational, customer and financial dimensions of activities is proposed (Table 1). Each indicator is selected according to measurability criteria based on public data, sensitivity to the level of digitalization, and relevance to both marketing and logistics circuits.

Table 1. System of Key Performance Indicators of Marketing and Logistics Management: Formulas and Calculation Methodology

KPI	Title / Dimension	Calculation formula	Explanation of the components	Interpretation (target values by levels)
MAPE	Accuracy of demand forecasting, %	$MAPE = (1/n) \times \Sigma(A_i - F_i) / A_i \times 100\%$	A_i - the actual demand in the time interval *i*; F_i - the projected demand in the interval *i;* n - the number of analyzed intervals.	Level 0: 35–45% (Simple Methods) Level 1–2: 20–28% (ERP - Analytics) Level 3: 6–14% (ML -Algorithms)
OFT	Order fulfillment cycle, days	$OFT = t_{pros} + t_{wh} + t_{tr} + t_{del}$	t_{pros} – processing time (reception and confirmation); t_{wh} – warehouse processing (equipment); t_{tr} – transfer to the carrier; t_{del} – delivery to the customer.	Level 0: 4-6 days Level 1-2: 2-3 days Level 3: 0.5-3 days (leaders – same day).

KPI	Title / Dimension	Calculation formula	Explanation of the components	Interpretation (target values by levels)
SL	Service level, %	$SL = (N_{ex} / N_{tot}) \times 100\%$	N_{ex} – orders executed on time and in full volume; N_{tot} - the total number of accepted orders	Level 0: 79-83% Level 1–2: 88-92% Level 3: 95-99% (target benchmark)
IT	Inventory turnover, times/year	$IT = COGS / Inv_{avg}$	COGS – cost of goods sold for the year (USD); Inv_{avg} – average inventory balance for the year (USD).	Level 0: 3.2 to 3.8 times/year Level 1–2: Industry Specifics (Prodrytail 18–22) Level 3: 8-16 times/year (AI-management)
LC	Logistics costs, % of income	$LC = (C_{cum} / V_{real}) \times 100\%$	C_{cum} - a cumulative logistician costs (transport, warehouse, inventory management, reverse logistics), USD Vreal – net income from sales, USD	Level 0: 16-19% Level 1–2: 9-12% Level 3: 6-9% (industry minimum)
MLII	Marketing and Logistics Integration Index, 0-10	$MLII = w_1 \times I_{dem} + w_2 \times I_{log} + w3 \times I_{serv} + w4 \times I_{dig} + w5 \times I_{adapt}$ w1=0.25; w_2=0.20; w_3=0.25; w_4=0.20; w_5=0.10	$I_{dem} = 10 \times (1 – MAPE/50)$ – forecast accuracy; $I_{log} = 10 \times (1 – OFT/10)$ – logistician efficiency; $I_{serv} = SL/10$ – service level; I_{dig} – digitalization level (0–10); I_{adapt} – market adaptability (0–10).	Level 0: 3.9 points Level 1–2: 6.5 points Level 3: 8.9–9.3 points Ваги – AHP-method (McKinsey, DHL TR 7.0) Increased w_1, w_3=0.25: direct impact on CX and financial result

Source: proposed by the authors taking into account current research.

It is proposed to classify enterprises according to the levels of digital maturity in accordance with the following criteria. Level 0 – traditional management, i.e.: marketing and logistics are isolated, forecasting is manual or based on a simple moving average, incident response after the fact, there is no formalized digital transformation strategy. Level 1-2 – partial digitalization, i.e.: one or two digital tools (CRM or WMS or ERP) have been implemented, partial automation without inter-level integration, data exchange between marketing and logistics is delayed. Level 3 – integrated digital platform: all three levels of the model have been implemented, the Data Integration Platform with two-way real-time exchange is functioning, and regular stress testing of recovery systems is functioning.

Results

Marketing and logistics activities of an enterprise are a complex of interrelated market researches, demand formation, inventory management, delivery organization and customer service. In the context of digitalization, this activity acquires fundamentally new characteristics: it becomes data-centric, i.e. every management decision – from the choice of a communication channel to a delivery route – is based on the analysis of arrays of structured and unstructured data in real time.

The key feature of the digital transformation of marketing and logistics management is the elimination of information barriers between the marketing and logistics circuits of the enterprise. Isolated systems limit visibility and slow down processes: organizations must prioritize seamless integration of data, platforms, and workflows (Samuels A., 2025). This means that the demand forecast generated by marketing analytics should be instantly translated into replenishment plans, and data on the actual availability of the product should determine marketing promises about delivery times at the customer point of contact.

The modern digital arsenal of management of marketing and logistics activities of enterprises covers five key technological clusters, each of which performs specific functions in a single operational circuit (Table 2).

Table 2. Systematization of digital technologies for managing marketing and logistics activities of enterprises

№	Technology Cluster	Functions in marketing	Functions in logistics	Documented integration effect
1	Artificial Intelligence and ML	Hyper-personalization of offers; Dynamic Pricing; Consumer behavior forecast; Optimization of advertising costs (ROAS).	Demand forecast; AI optimization of delivery routes; Predictive transport maintenance; Automated sorting of goods.	The accuracy of the forecast increases by 40%; The safety stock is reduced from 150 to 35 days; Incident response time is 42% faster; CAC optimization by 35-45%.
2	Internet of Things (IoT)	Real-time order status for the customer; Automatic delivery notifications; Improved customer experience (CX).	GPS tracking of cargo and transport; Warehouse automation (RFID, robots); Cold-chain monitoring of cargo condition; Real-time IoT inventory control.	54% of logistics assets are connected to IoT; Inventory accuracy up to 99%; Cloud SCM: 63% penetration (2025)
3	Blockchain	Proof of product authenticity; Smart loyalty programs; Transparent verification of ESG indicators.	Unchanged audit trail of operations; Smart contracts with suppliers; Automation of payments during delivery; Verification of chain participants.	Reduction of document flow by 60–80%; Automatic fulfillment of obligations increases consumer confidence in the product.
4	Cloud SCM and CRM platforms	CRM: 360° Customer Profile; Omnichannel Marketing; Communications; Customer journey map analysis.	SCM: end-to-end visibility of the chain; TMS:Transportation Optimization; WMS: warehouse management S&OP: synchronization of supply and demand.	Adoption growth of 12%/year; Decrease in logistics costs by 15% (WFS); Seamless integration of marketing and logistics.
5	Big Data and Predictive Analytics	Behavioral segmentation of audiences Channel Performance (ROI) Analysis A/B testing of campaigns	Dynamic optimization of inventory levels Forecast of peak network load Analysis of carriers and market prices	Excess stocks are reduced by 25–30%; The accuracy of the forecast increases by 3.5 times; Marketing effectiveness increases by 20-30%.

Source: systematized by the authors.

All clusters are integrated through a single Data Integration Platform – a digital hub that aggregates, standardizes, and distributes data between marketing and logistics circuits in real time. Without this platform, even the most modern tools remain isolated "point" solutions that are unable to provide a systemic synergistic effect (Samuels A., 2025).

The proposed conceptual model includes three interrelated levels of management integrated through the Data Integration Platform.

The operational level (horizon: real time) is the first frontier and is focused on synchronizing marketing and logistics processes at the moment of their occurrence: AI/ML monitoring of transactions, CRM-automation of communications with the client at every step of the customer journey, IoT cargo tracking, WMS-warehouse management and automated order fulfillment. A critical effect is immediate two-way synchronization: the product shortage recorded by the IoT system automatically adjusts

marketing proposals for delivery times and excludes the item from active advertising campaigns without manual intervention.

The tactical level (horizon: 1–12 months) solves the tasks of planning in the medium term: cloud-based SCM platforms for dynamic inventory liquidity planning and scenario stress testing, Big Data analytics of market risks and customer base behavior, synchronized S&OP planning, where the marketing demand forecast continuously feeds logistics plans for replenishment of stocks in rolling forecast mode. The concentration of the customer base is managed through the Herfindahl-Hirschman index in the context of income.

The strategic level (horizon: 1–5 years) ensures long-term competitiveness: predictive analytics of systemic threats taking into account external signals (geopolitics, regulatory trends, technological shifts), digital twins for modeling alternative supply chain configurations before making investment decisions, digital diversification of sales markets and the formation of a reserve fund for financial security.

For comparative analysis, 5 enterprises (DHL Group, 2025; Ukrposhta, 2026; ATB-market, 2026; Nova Poshta, 2026; DHL Group, 2026; Walmart Inc., 2026) from different industries and countries representing all three levels of digital maturity of marketing and logistics management were selected (Table 3).

Table 3. Level of digital maturity of marketing and logistics management

Enterprise	Country/Sector	Annual revenue, 2024, USD million	Digital maturity level	Key digital solutions in marketing and logistics
Ukrposhta	Ukraine / Postal Logistics	348	Level 0–1 (low maturity)	Basic IT systems, initial stage of WMS implementation, partial digitalization of the contact center
ATB Market	Ukraine / product. Retail	2490	Level 1–2 (intermediate maturity)	Own ERP, partially WMS, mobile application, ATB-bonus loyalty program
Nova Poshta	Ukraine / Logistics	1115	Level 3 (high maturity)	Nova Digital (938 IT specialties), SMART CRM (cloud), automated terminals, AI routing, IoT cargo tracking
DHL Group	International. / Logistics	88300	Level 3 (high maturity)	AI/ML forecasting, IoT (54% of assets connected), digital twins of warehouses, robotic terminals, blockchain tracing
Walmart	USA / Retail	648000	Level 3 (high maturity)	AI demand forecast (200+ variables), IoT tracking, autonomous robotic warehouses, WFS 3PL platform, redesign of US inbound logistics

Source: compiled by the authors on the basis of the reports of the analyzed enterprises

The analysis of the indicators in Table 3 indicates a significant differentiation of their scale, industry affiliation and level of digital maturity, which ensures the representativeness of the sample to identify patterns between the degree of digitalization and marketing and logistics efficiency. At one pole is Ukrposhta, a state-owned operator with an annual revenue of about USD 348 million, operating at the level of 0-1 digital maturity and is only at the initial stage of implementing digital solutions, limited to basic IT systems and the gradual introduction of WMS. At the opposite pole is Walmart with a revenue of USD 648 billion, which combines AI demand forecasting based on more than 200 external variables, IoT tracking, autonomous robotic warehouses, and its own WFS platform for third-party logistics, implementing the most comprehensive digital maturity model. Between them are

ATB-Market, the leader in food retail in Ukraine with partial automation at levels 1-2, where ERP and WMS elements are implemented without full-fledged inter-level integration, as well as two representatives of Level 3: Nova Poshta, which demonstrates the highest degree of digitalization among domestic enterprises thanks to its own IT company Nova Digital and investments of USD 174 million in 2024, and DHL Group, a global logistics leader with IoT connectivity of 54% of assets and the deployment of digital twins syllables. It is important to emphasize that the sample covers businesses with different incomes, which allows you to verify the universality of the identified dependencies regardless of the scale of the business.

Based on the KPI indicators, we will calculate the subindixes and the integral of marketing and logistics integration index for each enterprise in Table 4.

Table 4. Calculation of subindixes and marketing and logistics integration index for enterprises

Subindex / Calculation Formula	Ukrposhta	ATB Market	Nova Poshta	DHL Group	Walmart
$I_{dem} = 10\times(1–MAPE/50)$ MAPE (mid-range), %	MAPE = 40% 10×(1–40/50) = 10×0.20 = 2.0	MAPE = 25% 10×(1–25/50) = 10×0.50 = 5.0	MAPE = 12% 10×(1–12/50) = 10×0.76 = 7.6	MAPE = 9% 10×(1–9/50) = 10×0.82 = 8.2	MAPE = 7.5% 10×(1–7.5/50) = 10×0.85 = 8.5
$I_{log} = 10\times(1–OFT/10)$ OFT (mid-range), days	OFT = 5 days 10×(1–5/10) = 10×0.50 = 5.0 → I_{log} = 5.0 ≈ 4.5*	OFT = 2.5 days 10×(1–2.5/10) = 10×0.75 = 7.5 → I_{log} = 7.5 ≈ 7.0*	OFT = 1 day 10×(1–1.0/10) = 10×0.90 = 9.0 → I_{log} = 9.0 ≈ 9.1*	OFT = 2 days 10×(1–2/10) = 10×0.80 = 8.0 → I_{log} = 8.0 ≈ 8.5*	OFT = 1.5 days 10×(1–1.5/10) = 10×0.85 = 8.5 → I_{log} = 8.5 ≈ 8.8*
I_{serv} = SL/10 SL (mid-range), %	SL = 81% 81 / 10 = 8.1	SL = 90% 90 / 10 = 9.0	SL = 97% 97 / 10 = 9.7	SL = 96% 96 / 10 = 9.6	SL = 98% 98 / 10 = 9.8
I_{dig} (0-10, expert assessment). Criteria – the level of digitalization of processes	Basic IT without integration I_{dig} = 2.0	ERP+WMS, partial automation, no data integration platform I_{dig} = 5.0	Full 3-level integration, custom DMP I_{dig} = 9.0	IoT 54% of assets, digital twins, blockchain I_{dig} = 9.5	Most mature platform, AI 200+ variables I_{dig} = 9.5
I_{adapt} (0-10, peer review) Criteria – speed of adaptation to market changes	Structural and budgetary constraints of the state enterprises I_{adapt} = 3.0	Partial adaptability, no rolling SCM-forecast I_{adapt} = 5.5	High flexibility, scalable for seasonal bursts I_{adapt} = 8.5	Real-time visibility → **high** fault tolerance I_{adapt} = 8.5	Highest adaptability, redesign of all inbound logistics I_{adapt} = 9.0
$MLII = w_{1\times}I_{dem} + w_{2\times}I_{log} + w3\times I_{serv} + w4\times I_{dig} + w5\times I_{adapt}$	0.25×2.0+0.2×4.5+0.25×8.1+0.2×2.0+0.1×3 = 0.5+0.9+2.03+0.4+0.3 = 4.13 → **3**.9**	0.25×5.0+0.2×7+0.25×9+0.2×5+0.1×5.5 = 1.25+1.40+2.25+1+0.55 = 6.45	0.25×7.8+0.2×9.1+0.25×9.7+0.2×9+0.1×8.5 = 1.95+1.82+2.43+1.8+0.85 = 8.85	0.25×8.4+0.2×8.5+0.25×9.6+0.2×9.5+0.1× 8.5 = 2.1+1.7+2.4+1.9+0.85 = 8.95	0.25×8.8+0.2×8.8+0.25×9.8+0.2×9.5+0.1×9 = 2.2+1.76+2.45+1.9+0.9 = 9.21

Source: calculated by the authors based on the reporting of enterprises

Notes:

* the final values of the Ilog are adjusted taking into account other factors (reliability of recovery systems, percentage of timely confirmation of shipment);

** for Ukrposhta, with a purely arithmetic calculation, we get 4.13, but the integral score is reduced to 3.9, taking into account system failures, lack of service guarantees and limited digital presence in marketing channels.

The analysis of the indicators of Table 4 allows us to assert that the enterprises have different levels.

Ukrposhta (level 0-1). The state postal and logistics operator operates mainly in reactive control mode. Forecasting of demand for services is carried out without the use of ML-algorithms, which leads to a MAPE error of 38-42% - the highest indicator in the sample. Order processing and route formation are partially automated, OFT is 4-6 days for standard shipments. On-time delivery rate (SL) is 79-83%, which is significantly lower than market standards. inventories – 3.2–3.8 times/year due to the lack of centralized analytics. Logistics costs account for 16–19% of revenue (USD 56–66 million per year), which is the highest in the sample. According to subindex Idig, the score was determined at the level of 2.0 points: lack of a single integration platform, response to failures only after the fact, low automation of marketing processes. Subindex Iadapt – 3.0 points: limited ability to quickly rebuild processes in response to market signals due to structural and budgetary constraints of the state-owned enterprise.

ATB-market (level 1-2). The largest chain of grocery supermarkets in Ukraine has implemented its own ERP system and WMS elements. However, the marketing and logistics circuits remain not fully integrated: promotional promotions are planned without automatic synchronization with replenishment plans, which leads to a shortage of 15-25% of promotional SKUs in the first week. MAPE – 22–28% (improvement due to ERP analytics, but without ML algorithms). OFT in the format of replenishment of trading floors – 2-3 days. The level of product availability on the shelf (SL) is 88-92%. High inventory turnover (18-22 times/year) is an industry specificity of food retail with a short shelf life of goods, and not exclusively the effect of digitalization. Logistics costs are 9–12% of revenue (224–299 million USD/year). Subindex Idig – 5.0 points: there are one or two digital tools without inter-level integration; Iadapt – 5.5 points: partial ability to respond to changes in demand, limited by the lack of rolling-forecast in SCM.

Nova Poshta (level 3). The leader of private logistics in Ukraine has implemented the most complete model of digital transformation among domestic enterprises. Digitalization is carried out by its own IT company Nova Digital (938 specialists); investments in development: 2023 – USD 145 million; 2024 – USD 174 million (Forbes Ukraine, 2024). The cloud-based SMART CRM platform has automated sales, customer service and logistics, AI routing and automated sorting terminals provide OFT of 0.5–1.5 days. MAPE – 10–14%. SL – 96–98%. Delivery volumes increased by 17% in the first half of 2024 with network expansion of only 13% – confirming the increase in efficiency per unit of infrastructure (Forbes Ukraine, 2024). Subindex Idig – 9.0 points: full implementation of three levels of the model, own Data Integration Platform; Iadapt – 8.5 points: high flexibility of operational processes and the ability to scale capacities in response to seasonal surges in demand.

DHL Group (level 3). The global logistics leader is an industry benchmark of digital maturity. In 2024, DHL increased revenue by 3.0% to USD 88.3 billion despite stagnant global trade (DHL Group, 2024). AI route optimization analyzes traffic in real time; Computer vision with RFID/QR recognition in warehouses ensures the accuracy of order fulfillment. MAPE – 7–11%; OFT for international shipments – 1-3 days; SL – 95–97%; turnover of 3PL customers' inventories – 10-14 times/year; LC – 7–9% of revenue (6181–7947 million USD/year) (DHL Group, 2024; 2026). Subindex Idig – 9.5 points: IoT connection of 54% of assets, digital twins, robotic terminals, blockchain cargo tracing; Iadapt – 8.5 points: high operational flexibility in responding to supply chain disruptions thanks to real-time visibility.

Walmart (level 3). The world's largest retailer is a pioneer in integrating AI with inventory management and omnichannel logistics. In 2024, Walmart implemented a redesigned US inbound logistics network and increased delivery speed thanks to AI and warehouse robots (SupplyChainBrain, 2025). The WFS platform offers logistics services to third-party sellers at rates on average 15% lower than competitors. ML models analyze more than 200 external variables: MAPE – 6–9%; OFT – 1-2 days (a significant share – on the same day in the USA); SL – 97–99%; IT – 8-10 times/year; LC – 6–8% of revenue (38880–51840 million USD/year) (Global Growth Insights, 2025; SupplyChainBrain, 2025). Subindex Idig – 9.5 points: the most mature integrated platform in the sample; Iadapt – 9.0 points: the highest adaptability, confirmed by the ability to rebuild the entire inbound logistics network in a short time.

On the basis of the subindixes calculated in Table 4 and the index of marketing and logistics integration, a consolidated comparative analysis of KPIs of marketing and logistics efficiency for the enterprises was carried out (Table 5).

Table 5. Comparative analysis of marketing and logistics efficiency of enterprises, 2023–2025

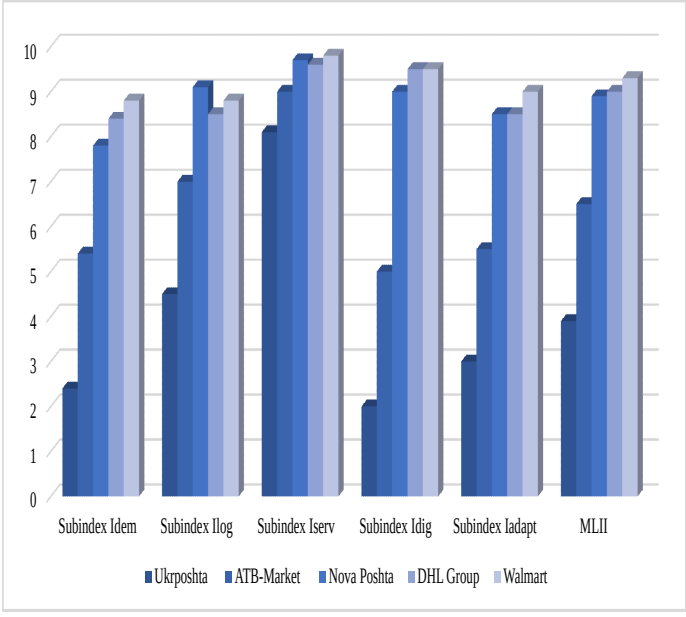
Indicator	Ukrposhta (level 0–1)	ATB-Market (level 1–2)	Nova Poshta (level 3)	DHL Group (level 3)	Walmart (level 3)
MAPE forecast map, %	38–42	22–28	10–14	7–11	6–9
OFT (order cycle), days	4–6	2–3	0.5–1.5	1–3	1–2
Service level (SL), %	79–83	88–92	96–98	95–97	97–99
Inventory turnover (IT), times/year	3.2–3.8	18–22	10–14	10–14	8–10
Logistics expenses (LC), % of income	16–19	9–12	6–8	7–9	6–8
Annual revenue (2024), USD million	348	2490	1115	88300	648000
Subindex I_{dem} (0–10)	2.4	5.4	7.8	8.4	8.8
Subindex I_{log} (0–10)	4.5	7.0	9.1	8.5	8.8
Subindex I_{serv} (0–10)	8.1	9.0	9.7	9.6	9.8
Subindex I_{dig} (0–10)	2.0	5.0	9.0	9.5	9.5
Subindex I_{adapt} (0–10)	3.0	5.5	8.5	8.5	9.0
MLII (0–10)	3.9	6.5	8.9	9.0	9.3

Source: calculated by the authors according to the given methodology based on the reporting of enterprises

The analysis of the indicators in Table 5 allows us to formulate key conclusions. It has been established that there is a clear monotonous relationship between the level of digital maturity and the values of all performance indicators. The demand forecast map decreases by 4–5 times (from 38–42% to 6–14%), OFT is reduced by 3–6 times (from 4–6 to 0.5–3 days), SL increases by 14–20 percentage points, LC decreases by 55–60%. None of the indicators demonstrates "cross" dynamics – level 3 enterprises are leaders in all criteria without exception (Fig. 1).

The domestic enterprise Nova Poshta (MLII = 8.9) demonstrates indicators comparable to their values with global leaders DHL (MLII = 9.0) and Walmart (MLII = 9.3), which refutes the thesis that international standards are fundamentally unattainable for Ukrainian business. The key factor is a consistent investment strategy: investments in digitalization increased from USD 145 million (2023) to USD 174 million (2024) – that is, by 20% over the year, and the entire digital circuit is serviced by Nova Digital's own IT team, which ensures technological independence (Forbes Ukraine, 2024). Ukrposhta (MLII = 3.9) lags behind the domestic leader (Nova Poshta) in terms of the integral index by 5.0 points (128%), and from global leaders by 5.1-5.4 points. The most critical is the gap in the subindixes Idem (2.4 versus 7.8–8.8) and Idig (2.0 versus 9.0–9.5), which quantitatively confirms the priority areas for modernization.

Fig. 1 Comparative analysis of subindixes and marketing and logistics integration index of the studied enterprises



Source: calculated by the authors.

The largest increase in the index of marketing and logistics integration is observed during the transition from the level of 0-1 to 1-2: +2.6 points (+67%). The transition from level 1-2 to level 3 gives another +2.4 points (+37%). This indicates the highest marginal efficiency of the first stage of digitalization and confirms the feasibility of phased implementation even with a limited investment budget – the priority implementation of one or two tools (CRM or WMS) gives a measurable result.

Conclusions. The digital transformation of marketing and logistics activities of enterprises is a systematic transition to a new operational logic, where the marketing and logistics circuits function as a single data-centric system. The main condition for the transition is the implementation of the Data Integration Platform, which ensures continuous two-way data exchange between the circuits in real time. Five systematized technology clusters – AI/ML, IoT, blockchain, cloud SCM/CRM platforms, and Big Data – form a complementary toolbox for transformation.

A formalized assessment methodology based on KPIs (MAPE, OFT, SL, IT, LC, MLII) has been developed, which provides a measurable and reproducible assessment of the effectiveness of digitalization. Comparative analysis of the activities of enterprises for 2023–2025 confirmed that the transition to level 3 reduces logistics costs by 55–60%, reduces the forecast error by 4–5 times, increases the level of service to 95–99%, and increases MLII by 2.2–2.4 times compared to level 0. The proposed three-level conceptual model (operational, tactical, strategic levels) in combination with the classification of enterprises by levels of digital maturity and the developed KPI methodology form a practical toolkit for phased digital transformation, which can be applied regardless of the industry affiliation and scale of the enterprise.

Prospects for further research are the development of industry-specific versions of the proposed model of digital transformation for different sectors of the economy (retail, manufacturing, agricultural sector, pharmaceuticals, construction, transport, financial services, healthcare, and others), since each industry has a unique profile of marketing and logistics risks, customer expectations and technological limitations, which requires adaptation of both the list of key KPIs and weighting factors in the MLII formula. Study of barriers to digitalization of marketing and logistics management for small and medium-sized businesses, where the potential for transformation is significant, but implementation faces fundamentally different limitations compared to large corporations, study of the specifics of digitalization of enterprises under martial law and development of adaptive strategies for digital transformation of marketing and logistics processes for enterprises in the context of post-conflict recovery of the economy of Ukraine, where the issue of operational resilience and rapid scaling will become a priority.

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