



Economics of humanoid robots

Value for money or bottomless pit?

A Deloitte humanoid robotics series



We will guide you through the world of humanoids in three booklets



Media Noise



**Barclays Research
Expects Humanoid
Robots to
Fundamentally Reshape
the Real Economy**

*Financial Times*¹

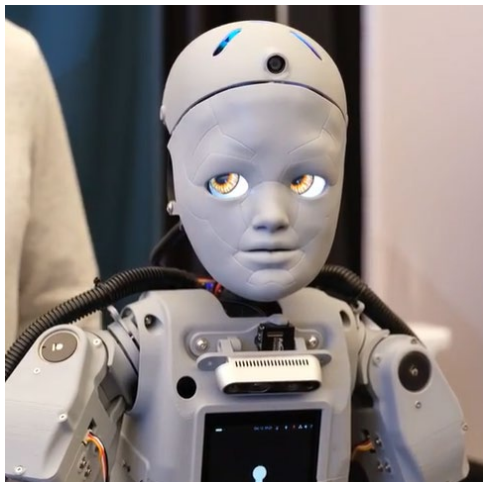
May 19, 2026



**Investors Warn That
Humanoid Robots Are
the Next Financial
Bubble**

*Yahoo Finance*²

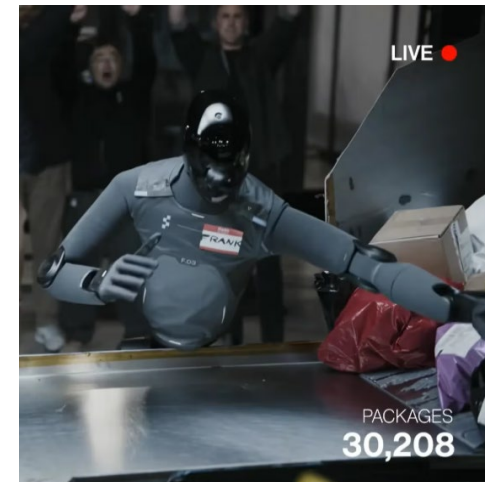
December 19, 2025



**Even the Companies
Making Humanoid
Robots Think They're
Overhyped**

*Wall Street journal*³

Dec 25, 2025



**Figure AI sorts packages
on livestream: Reached
its goal of running the
robot for eight hours
with "zero failures"**

*Business insider*⁴

May 12, 2026

Humanoids are entering warehouses driven by steep cost reductions and expanding capabilities

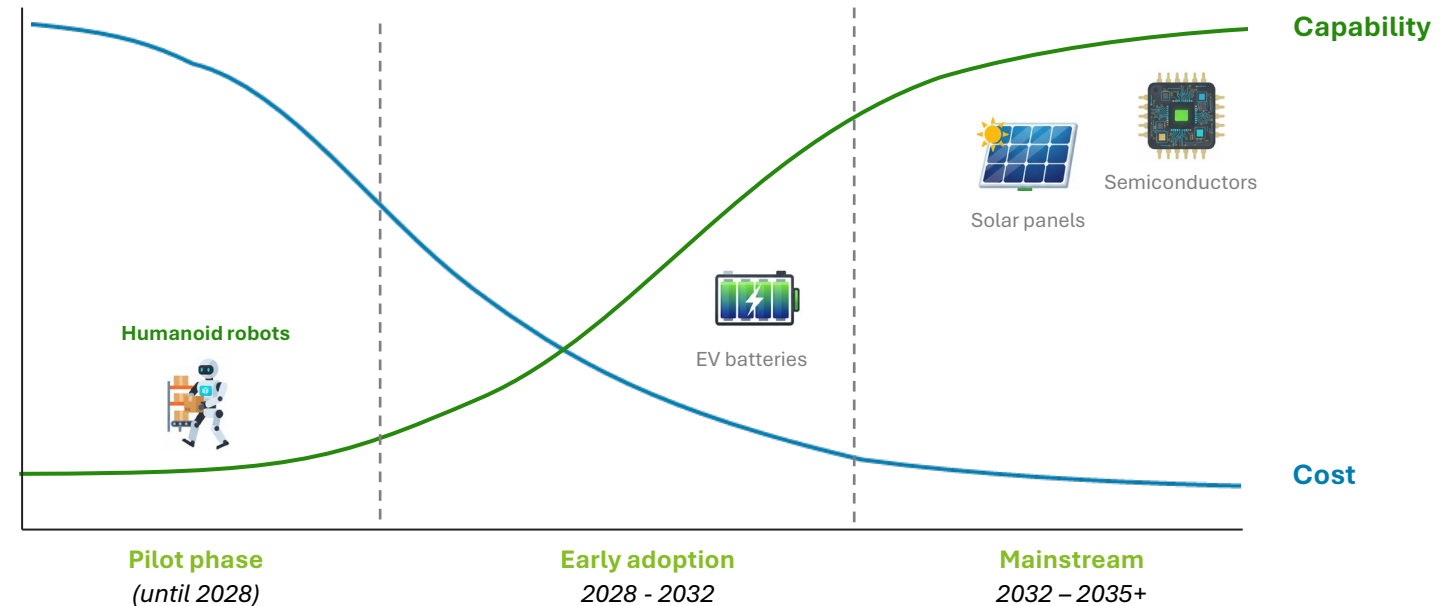
As humanoid capabilities advance and costs decline, when does adding humanoids to your workforce make economic sense?

The Exponential Opportunity

The economics of humanoid robots are shifting dramatically. **Humanoid capabilities are advancing exponentially** through AI breakthroughs, simulation-based learning, and computer vision. The Bank of America Institute projects mass adoption of general-purpose humanoids from around 2035, a timeline consistent with the exponential gains seen in semiconductors and EV batteries⁵.

Simultaneously, **costs are declining exponentially**. Manufacturing scale, component competition, and global investments from Tesla, Boston Dynamics, NVIDIA, and Amazon drive costs down. Goldman Sachs reports humanoid manufacturing costs dropped 40% between 2023 and 2024⁶. The Bank of America Institute projects material costs will fall from \$35,000 to \$13,000-\$17,000 by the next decade⁷.

As shown in the figure, the coming years will remain dominated by pilots and early deployments. By 2032, we believe humanoid robots will be mainstream — available at substantially lower cost and with far more extensive capabilities.



This outlook raises the following questions, which we address in this booklet

What is the **expected payback** for humanoids now and in the future?

When should companies **start** to invest in humanoids?

Which commercial model best fits which situation?

While initial humanoid integration costs exist, they rapidly diminish per robot as your fleet grows

A significant investment is required to start with humanoids in your warehouse

Scaling humanoid robots across a warehouse requires far more than purchasing hardware. Turning machines into a productive system requires additional investment to make them reliable, safe and value-generating in your specific warehouse context.

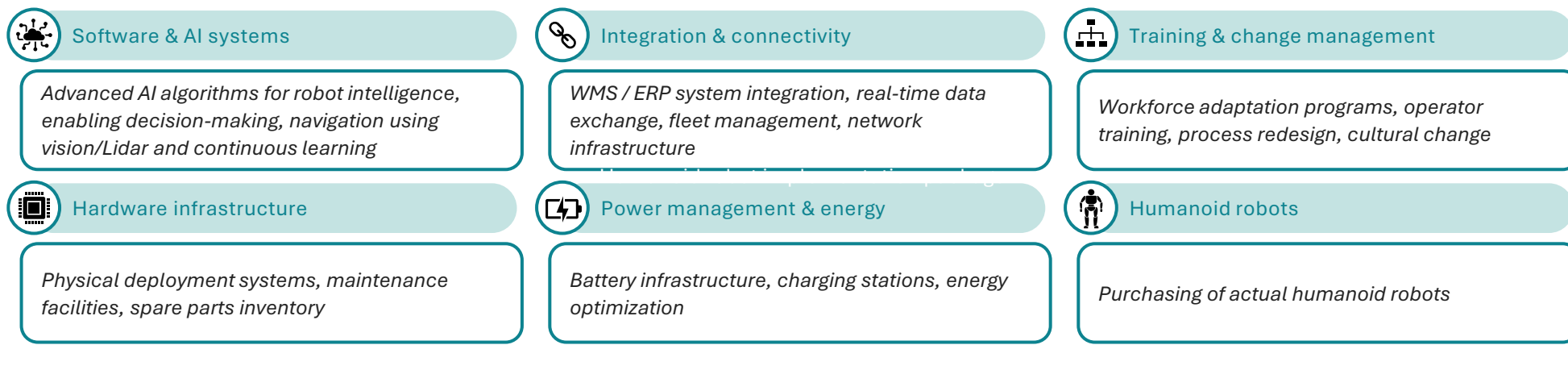
That means **integrating robots with your IT and process landscape**, adapting the **physical environment**, establishing **new operational routines and support**, and **training people** to operate and maintain the fleet. For the business case these are not optional extras but **essential enablers**: include them in TCO, validate assumptions through targeted pilots, and phase spending to de-risk scale-up.

However, the business case becomes more compelling at scale

A company should expect **approximately five to eight months to deploy a stable fleet of about five humanoid robots** for bounded tasks⁸. This period covers robot build and training, a single-robot pilot with performance tuning, and subsequent expansion to the small fleet. The exact timeline is strongly influenced by the organization's IT and site readiness: availability of open WMS/MES APIs, full network coverage, adequate floor flatness and lighting, and planned charging infrastructure materially accelerate delivery; deficiencies in any of these areas will extend the schedule.

Although initial implementation costs for humanoid robots can be substantial, these expenses are predominantly fixed. **At scale, the fixed project spend is diluted across the fleet.** As a result, the per-robot implementation cost can drop materially as the number of units increases, improving unit economics and accelerating payback.

Humanoid robot implementation package



Total set-up & implementation cost for a fleet of five humanoid robots are estimated at:

€800K – €2M

€160K – €400k per robot

Although the initial fleet of 5 robots today has a 6-year payback period, every incremental humanoid robot on top already achieves payback periods of ~2 years

	Payback period	=	Set-up costs	+	Robot cost	÷	Labor savings	-	OPEX
Initial fleet (5 robots)	~6 years	=	~€1M	+	~ €450K	÷	~€300K	-	~€50K
Incremental robot when scaling	~2 years	=			~ €90K	÷	~€60K	-	~€10K

Cost rationale

Robot cost	€50-130K	Labor saving	€45-75k	OPEX	€ 5-15K
- Current humanoid robot pricing for industrial warehouse deployment in 2025 ranges from \$60,000 to \$100,000 per unit for upper-body commercial models and \$100,000 to \$150,000 for full-body humanoid robots⁹ - This range reflects the early-stage production volumes		- Current Dutch warehouse labor costs are estimated at €75K per year per FTE (incl. social security and benefits)¹⁰ - Assuming two-shifts per working day - Current humanoid robots achieve approximately 30-50% of human productivity¹¹ due to slower execution of complex tasks, charging downtime, and inability to handle exceptions or problem solving		Maintenance: Premium robots include maintenance contracts costing ~10% of the purchase price annually Energy: It is expected that humanoid electricity consumption is similar to AMRs and industrial arms (1kWh / operational hour)¹² Insurance: Industrial equipment insurance typically costs 1-3% of asset value annually, based on insurer, coverage, safety systems, and risk profile¹³	

This analysis intentionally omits difficult-to-quantify strategic benefits, which would materially strengthen the case. These include: addressing labor scarcity, reducing employee turnover and training expenses, enhancing workplace safety, increasing operational flexibility, and enabling advanced data optimization. Together, these drivers elevate a standard payback to a truly compelling investment.

The payback period of your future humanoids is expected to decrease significantly in the next years, due to reduction in purchasing price and an increased productivity

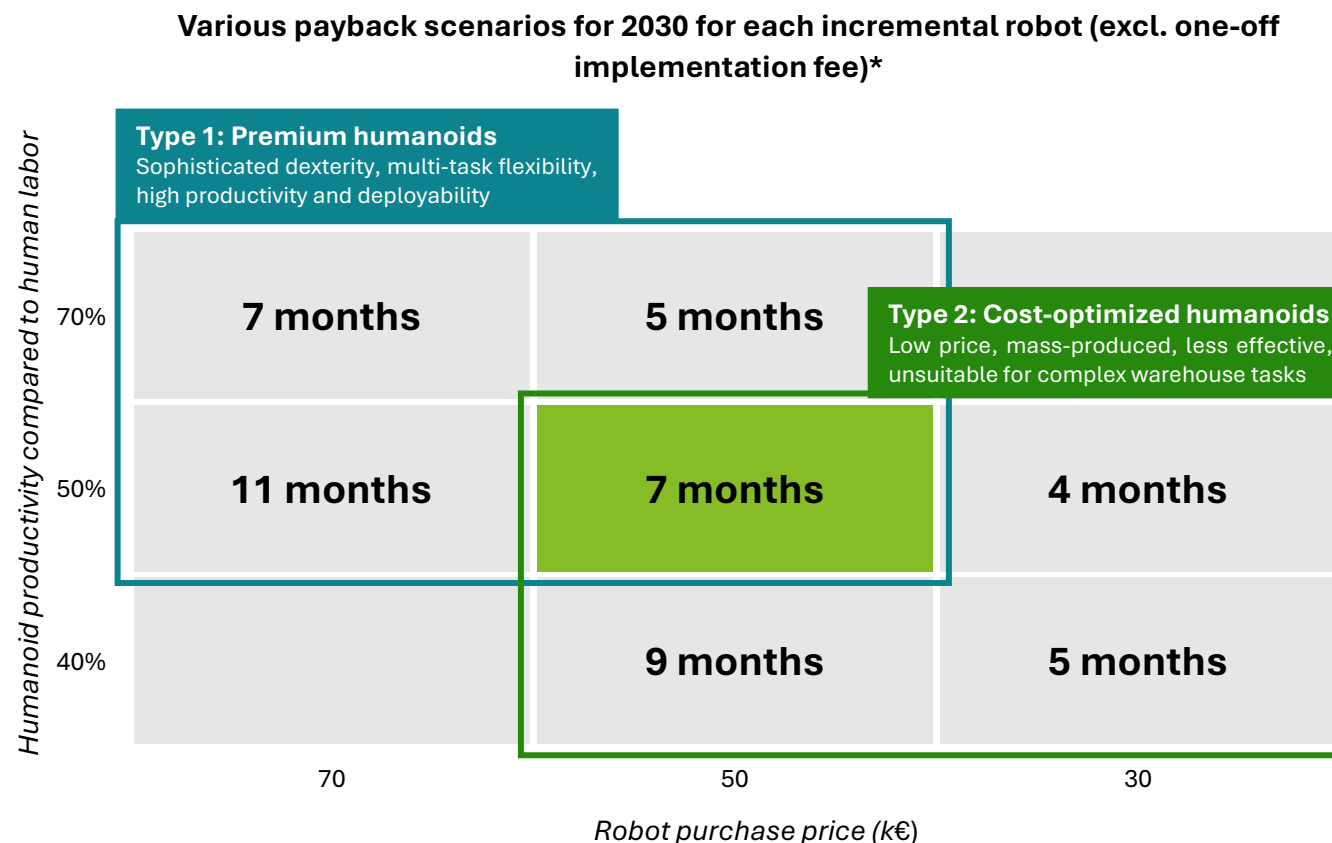
Evolvement of the humanoid business case

The future humanoid business case is mainly impacted by two main drivers: **robot purchase price** and **labors savings**. Advancing to 2030, we expect dramatic improvements in robot purchase prices driven by manufacturing scale and AI advancements. IDTechEx projects average purchase prices will fall to €35,000 by 2030¹⁴. Simultaneously, **productivity gains will accelerate** through multiple technological breakthroughs where battery improvements are extending operational hours¹⁵ and task capability is advancing through embodied AI, enabling robots to "learn on the job" and continually improve their skills¹⁶.

However, both variables are dependent on the humanoid archetype, as we expect the future humanoid market to demonstrate significant variations in price, quality and capabilities. For simplicity, we distinguish two types. **(1) Premium Humanoids** offer advanced dexterity and multi-task flexibility for complex warehouse environments, justified by substantial labor savings through superior productivity. **(2) Cost-Optimized Humanoids** are low-cost, mass-produced models ideal for simple, repetitive tasks, but are expected to achieve limited productivity gains and remain unsuitable for complex warehouse manipulation. We expect these two archetypes will follow divergent paths through 2030, where type 1 will for now never achieve ultra-low pricing, while type 2 robots will never match type 1 productivity levels. This explains the varied payback scenarios in the matrix.

Our prediction for 2030

While the market will feature both robot types, a typical investment will be a balance of these two. We therefore base our prediction on a scenario that blends these two extremes to reflect average market conditions. This leads to an **expected average payback period of each incremental robot of around 7 months by 2030**, a forecast supported by converging projections from Goldman Sachs⁶ and IDTechEx¹⁴.



*OPEX = 11% of robot purchase price + €1,500 for energy usage, labor costs= € 88,000 based on average annual increase of 4%¹⁷

To capture benefits of humanoids when payback period drops, you should start thinking about your strategy today; as it will take time to build the foundation

Humanoid economics are on an exponential curve - but implementation is not.

While we believe payback periods will compress below 1 year by 2030, the foundational work required to deploy them successfully cannot be rushed. Orchestration capabilities to optimize humanoids within current automation and human resources, integration with your WMS, physical infrastructure upgrades, workforce training, and process redesign all demand time and deliberate planning.

For companies where humanoids align with your labor and operational challenges, waiting until 2030 means missing the early-mover advantage. Starting to define your strategy today, through capability assessments, targeted pilots, and phased planning, positions you to move decisively when the technology and economics converge. For others, the economics may never justify the investment. Either way, the decision should be made now, not later.

More insights on required capabilities in booklet 3 – stay tuned!



The next booklet will zoom in on capabilities required to successfully implement humanoids into your warehouse operations



Get in touch

With our experience and expertise, we are committed to helping you navigate the future with confidence



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