

Turn Learning into Strategic Leverage

When scale and cumulative learning actually lower cost — and when growth instead strengthens an incumbent or creates exposure.

Theory session

Advanced

Running case: LumenFleet



Where this session sits

Module 3 acts inside a market where rivals are also choosing

MODULE 1

Foundations of
Defensible Position

MODULE 2

Defensibility Through
Market Architecture

MODULE 3

**Strategic Advantage
Under Rivalry**

SESSIONS IN THIS MODULE

3.1

Turn Learning into Strategic Leverage

When scale and cumulative learning actually compound

YOU ARE HERE

3.2

Model Rival Moves and Countermoves

Anticipating retaliation and entrant adaptation

3.3

Commit Before Competitors Can Adapt

Irreversible actions that alter rivals' expectations

What this session explains

Separating three mechanisms that all look like “getting bigger helps”

01

Scale and learning are different economics

One depends on output per period; the other on cumulative output ever produced.

02

Learning must be proprietary to matter

Knowledge that spills over to rivals lowers everyone's cost and advantages no one.

03

Growth can strengthen the incumbent

Expanding a category you do not control can hand the returns to whoever holds the scarce complement.

04

Repeatability is the precondition

Bespoke deployment produces experience; repeatable deployment produces a learning curve.

Three mechanisms, often conflated

They require different investments and decay differently

WORKING DEFINITION

Scale economies lower unit cost as output per period rises. Learning economies lower it as cumulative output accumulates. Network effects raise value as participants join. Only the second is a function of history rather than size.

1

Scale is reversible

Lose volume and the unit-cost advantage goes with it. It is a position, not an accumulation.

2

Learning is not

Cumulative experience cannot be un-learned by a rival catching up in volume. It is path-dependent — the Session 1.2 mechanism.

3

Only learning compounds quietly

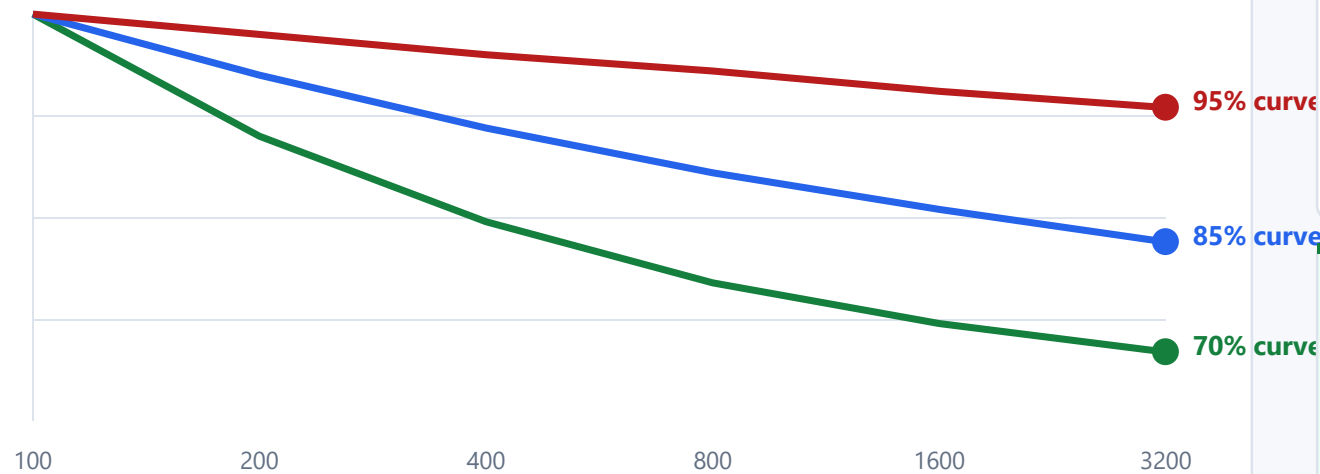
A rival can match your scale by spending. Matching cumulative learning requires having started earlier.

Boston Consulting Group (1970s) on the experience curve; Ghemawat, P. (1985). Building strategy on the experience curve. Harvard Business Review, 63(2).

Unit cost against cumulative volume

An 85% curve means unit cost falls 15% with each doubling of cumulative output

INDEXED UNIT COST BY CUMULATIVE UNITS PRODUCED
UNIT COST (INDEX)



The rate is empirical, not chosen. Measure your own before assuming a steep curve exists.

THE ARITHMETIC

Doublings, not years

Progress depends on cumulative output doubling. Late in life, doublings take far longer, so the curve flattens in calendar time.

THE STRATEGIC IMPLICATION

Volume buys cost position

If the curve is steep, pricing to gain share early can be rational even at a loss.

THE CAUTION

Measure it first

Assuming a steep curve that does not exist justifies destroying margin for nothing.

Scale economies and learning economies

Conflating them leads to the wrong investment

SCALE

Output per period

THE MECHANISM

Fixed costs spread across more units; better bargaining; specialised equipment justified.

HOW A RIVAL MATCHES IT

By reaching the same output rate — purchasable with capital.

HOW IT IS LOST

Immediately, when volume falls. There is no residue.

LEARNING

Cumulative output ever

THE MECHANISM

Accumulated process knowledge, better yields, faster deployment, fewer errors.

HOW A RIVAL MATCHES IT

Only by producing the same cumulative volume — which takes time capital cannot compress.

HOW IT IS LOST

Through spillover: staff turnover, supplier diffusion, published methods.

READING THE CASE CORRECTLY

Amazon's rollout is a learning story, not a scale one. Chargers per site is scale; knowing what the utility connection will require at site 121 is accumulated learning.

Where learning stays proprietary

Knowledge that escapes lowers everyone's costs and advantages nobody

EMBODIED IN EQUIPMENT

Spills fast — your supplier sells the improved machine to everyone.

HELD BY INDIVIDUALS

Spills at the rate people move. Fast in dense labour markets.

IN DOCUMENTED PROCESS

Spills when people leave with the documents, or vendors generalise.

IN ORGANISATIONAL ROUTINE

Slow — tacit, distributed, and hard to articulate even internally.

IN ACCUMULATED DATA

Slowest — a rival must generate the equivalent history themselves.

THE DESIGN QUESTION

Where does yours sit?

Learning embodied in purchasable equipment is not an advantage. It is a cost reduction your rivals also receive.

AMAZON'S POSITION

Routine plus data

A repeatable deployment method and a forecast through 2030 are both hard to lift out and copy.

Dierickx, I. & Cool, K. (1989). Asset stock accumulation. Management Science, 35(12).

Repeatability is what converts activity into a curve

Amazon's rollout as a learning system

FROM DEPLOYMENT TO ADVANTAGE



THE STEP THAT MAKES LEARNING POSSIBLE

Without the first box, 120 sites produce 120 separate experiences. Repeatability is what makes the volume cumulative rather than merely large.

Three ways getting bigger weakens you

Growth is not automatically a source of advantage

GROWTH STRENGTHENS YOU The learning is proprietary, the complements are controlled, and the curve is steep.	GROWTH IS NEUTRAL Cost falls for everyone in the category. You expand the market and share the gains.	GROWTH STRENGTHENS A RIVAL You build demand for a category whose scarce complement someone else owns — Session 2.1's bottom-right quadrant.
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THREE SPECIFIC EXPOSURES CREATED BY SCALE

Exposure	What it looks like
Constraint relocation	Amazon's peak power demand rose ten to twenty times — a constraint that did not exist at small scale.
Commitment rigidity	Assets sized for today's method cannot adapt when the method changes — Session 3.3.
Complement dependence	The larger you grow, the more valuable you are to whoever controls the input you need.

Establishing whether you actually have a learning curve

Four tests, each producing a number rather than a belief

Test	How to run it	What a null result means
Fit the curve	Regress log unit cost on log cumulative output.	No slope means no learning economy — stop pricing as if there is one.
Check the rate	Compare your progress ratio to the sector's.	At sector rate, learning is not differentiating you.
Test for spillover	Are rivals' costs falling at a similar rate?	If yes, the learning is escaping and is not proprietary.
Separate scale from learning	Hold output rate constant and check whether cost still falls.	If not, what you have is scale — reversible, and purchasable by rivals.

THE TEST THAT SETTLES IT

Most claimed learning curves are scale effects or input price movements. The fourth test is the one that separates them, and it is rarely run.

Three ways scale-learning reasoning goes wrong

Each has been used to justify serious losses

Assuming the curve

Looks like Pricing below cost to buy share, on faith.

Why it fails If the progress ratio is near 95%, the volume never repays the margin given.

Fix Fit the curve on your own history first.

Ignoring spillover

Looks like Costs falling nicely, and so are everyone else's.

Why it fails Shared learning is a category improvement, not an advantage.

Fix Move learning into routine and data, away from equipment and individuals.

Scaling a bespoke method

Looks like Every deployment custom-built.

Why it fails Cumulative volume never accumulates into anything; you get experience without a curve.

Fix Standardise before scaling, as Amazon did.

CASE STUDY

Amazon's depot charging rollout

Infrastructure deployed fast enough that each expansion became an input to the next.

Infrastructure as a learning system

Repeatable deployment turned local constraints into network-level knowledge

THE SCALE

Repeatable, not bespoke

THE DEPLOYMENT

Over 17,000 chargers at more than 120 delivery stations in just over two years.

WHAT IT SUPPORTS

More than 13,000 electric delivery vans — the largest private EV charging operator in the US.

WHY SPEED REQUIRED REPEATABILITY

Hardware, construction, utility connections, energy forecasting and vehicle schedules all had to coordinate.

THE LEARNING

Each site informed the next

THE CONSTRAINT SCALE EXPOSED

Expanded charging could push peak power demand to ten or twenty times prior levels.

THE PLANNING RESPONSE

Forecasting extended through 2030 rather than site-by-site.

THE POSTURE

Investment in startups working the bottleneck, rather than waiting for one solution to arrive.

READING THE CASE

Scale did not simply magnify the problem. It created the conditions for learning faster, because repeated deployment turned local constraints into network-level knowledge.

Drawn from the session case pack.

Bringing the theory to LumenFleet

Testing whether growth actually compounds

Question	What you measure	LumenFleet finding
Is there a curve?	Log cost against log cumulative installs.	Progress ratio 0.88 — real, and worth acting on.
Scale or learning?	Cost at constant output rate.	Cost still falls — it is learning, not volume.
Is it proprietary?	Rivals' cost trajectory.	Their curve is flatter. Ours is not escaping yet.
Where does it live?	Equipment, people, routine or data.	Mostly in two senior engineers — a spillover risk.
What does scale expose?	Constraints that appear only at volume.	Grid connection lead times, exactly as Amazon found.
Who owns the complement?	The scarce input growth depends on.	Utility interconnection capacity — not us.

WHAT COMES NEXT

Session 3.2 asks how rivals will respond to the moves this analysis suggests.

What to carry out of this session

1

Scale and learning are different economics.

One tracks output per period and is reversible; the other tracks cumulative history and is not.

2

Measure the progress ratio before pricing on it.

A 95% curve will not repay margin given away to buy volume.

3

Learning that spills over is not an advantage.

Move it into routine and data, away from equipment and individuals.

4

Repeatability converts volume into a curve.

Bespoke delivery produces experience without accumulation.

5

Growth can strengthen someone else.

Expanding a category whose scarce complement you do not control hands them the return.

Sources for this session

Primary references behind each concept

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