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Arab Academy for Science, Technology & Maritime Transport

The International Conference for Training and Organizational Development **TOD'26**

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The Impact of Generative AI on Future Skills Development and Workforce Transformation

The Mediating Role of Continuous Learning Capability



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Media Partner: ربان السفينة Robban Assafina

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2.5 min Slides 1–4	3.0 min Slides 5–8	1.5 min 9–10	5.5 min — Results & Analysis Slides 11–17	2.5 min 18–21

Opening & Context

Slides 1–4

Title, MOPCO Profile, Agenda, Time Map

Framework & Literature

2:30 – 5:30

Slides 5–8

Problem, Conceptual Model, GenAI Lit, CL Lit

Method-ology

Slides 9–10

Design, Survey

Results & Analysis

Slides 11–17

Sample, Descriptive, Reliability, H1–H4, R-sq, Findings

Conclusions & Close

Slides 18–21

Discussion, Conclusion, References

15 min

Total Duration

43 seconds average per slide

33%

Time on Results

7 slides devoted to findings and analysis

5 Sections

Structure

Opening, Literature, Methods, Results, Closing

1998
Founded
Damietta Free Zone, Egypt

1,000+
Employees
Skilled technical workforce

EGP 2.5B
Share Capital
Combined equity

10.5M+
Tons Exported
Urea & Ammonia

43
Export Markets
Global reach

Shareholder Structure

ECHEM
Egyptian Chemical Industries

EGAS
Natural Gas Holding Co.

Saudi Egyptian Investment Co.
Strategic partner

Alpha Oryx Limited
International investor

Public Float
Listed shareholders

Products

Granular Urea & Ammonia — global exports since 1998

Digital Push 2026

AI-driven monitoring, smart maintenance, remote operations

Study Focus

GenAI adoption impact on skills and workforce at MOPCO

85%
Jobs Transforming
WEF 2023: AI disrupting global skills

44%
Core Skills Changing
Within 5 years (McKinsey 2023)

$4.4T
GenAI Potential
Annual economic value (McKinsey 2023)

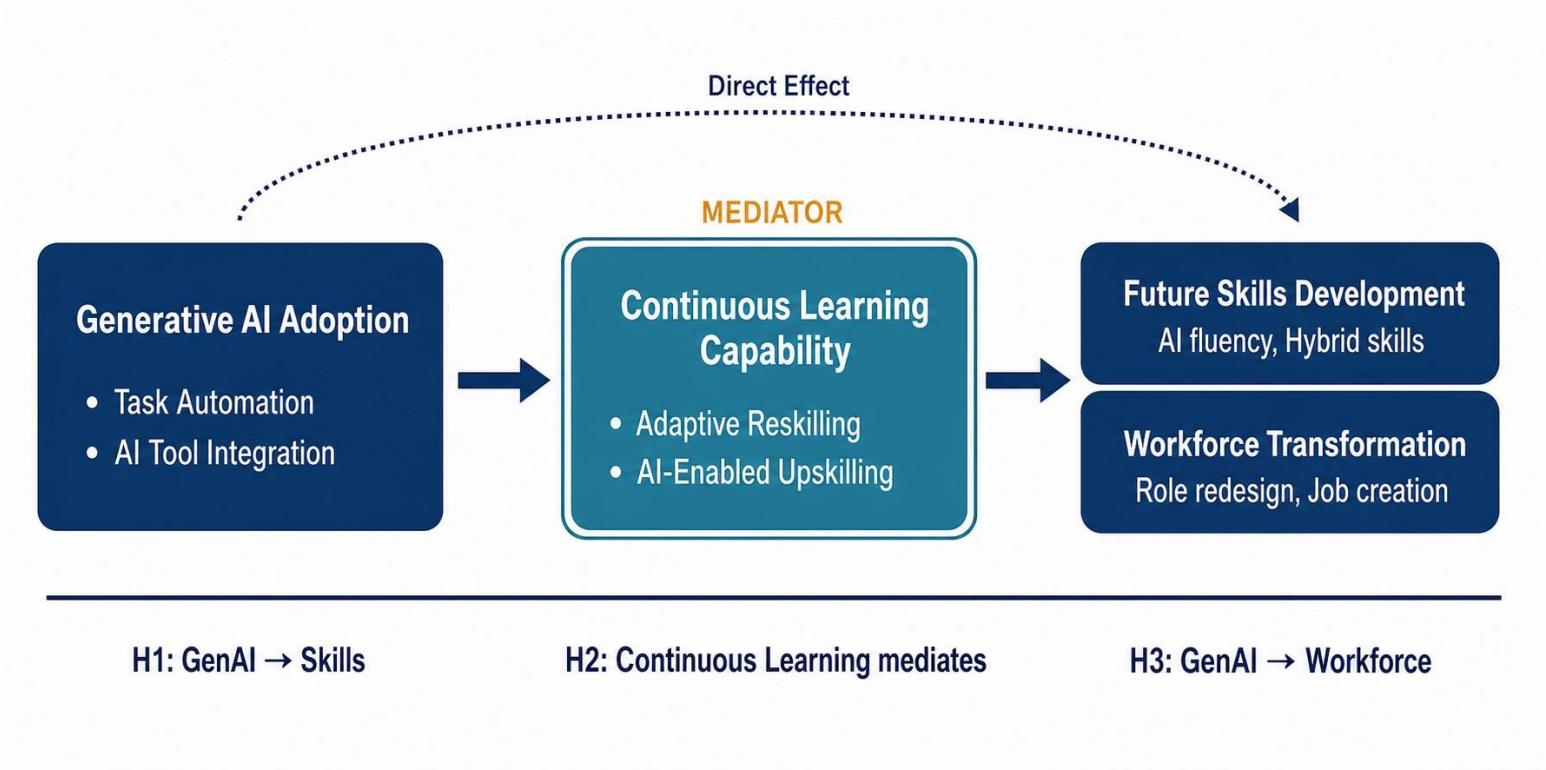
Gap
No MOPCO GenAI Study
Zero empirical studies in Egyptian fertilizer sector

Research Questions

- Does GenAI adoption predict skills development at MOPCO significantly?
- Does continuous learning mediate GenAI's effect on workforce transformation?
- How strong is the indirect mediation path at MOPCO (N=300)?

This Study

First empirical study linking GenAI and workforce transformation at MOPCO, Damietta — filling a critical gap in Egyptian industrial AI research.



H1
GenAI → Skills Development

H2
GenAI → Workforce Transformation

H3
GenAI → CL → Skills Dev. (mediation)

H4
GenAI → CL → Workforce Trans. (mediation)

$4.4T
GenAI Economic Potential
McKinsey 2023 global estimate

75%
Work Tasks Augmented
AI automation potential (Brynjolfsson et al., 2023)

+40%
Productivity Increase
AI-assisted workers (Brynjolfsson et al., 2023)

Key Insights from Literature

- GenAI tools accelerate upskilling in technical and analytical domains.
- Automation shifts demand toward higher-order cognitive skills.
- Industrial sectors require custom AI training for effective skill transfer.

Theory Basis

Human Capital Theory (Acemoglu & Restrepo, 2022) — skill-biased technology change

Gap Identified

No study on GenAI skills impact in Egyptian fertilizer manufacturing sector

3x
Faster Adaptation
Learning-agile organizations (Chen & Wang, 2023)

67%
Firms Use CL Programs
For digital transformation readiness

82%
HR Leaders Prioritize CL
As top transformation enabler (WEF 2023)

Continuous Learning as Mediator

- CL bridges technology adoption and workforce transformation outcomes.
- Organizations with strong CL culture outperform in digital transitions.
- Mediation role confirmed in tech sectors — untested in fertilizer industry.

Theoretical Lens

Dynamic Capabilities Theory — continuous learning as core adaptive mechanism

Hypothesized Role

CL fully mediates GenAI → Skills (H3) and partially mediates GenAI → WT (H4)

01 Design

Quantitative, cross-sectional, positivist survey

02 Sample

N=300 MOPCO employees
340 distributed, 88.2% response rate

03 Instrument

34-item Likert scale survey
5 validated sections

04 Analysis

SEM-PLS via SmartPLS 3
CFA + path analysis

05 Validity

AVE, CR, Cronbach alpha, bootstrapping (5,000 runs)

Sampling

Stratified random sampling across 5 MOPCO departments

Ethics

Anonymous surveys, voluntary participation, IRB-approved protocol

Period

Data collected Q1–Q2 2026 at MOPCO Damietta facility

A
Demographics
5 items — Gender, Age, Education, Dept, Experience

B
GenAI Adoption
8 items — AI tools, frequency, tasks, confidence

C
Continuous Learning
7 items — L&D access, self-directed, org support

D
Skills Development
7 items — Technical, analytical, adaptive skills

E
Workforce Trans.
7 items — Role change, digital readiness, agility

34
Total Items

5
Sections

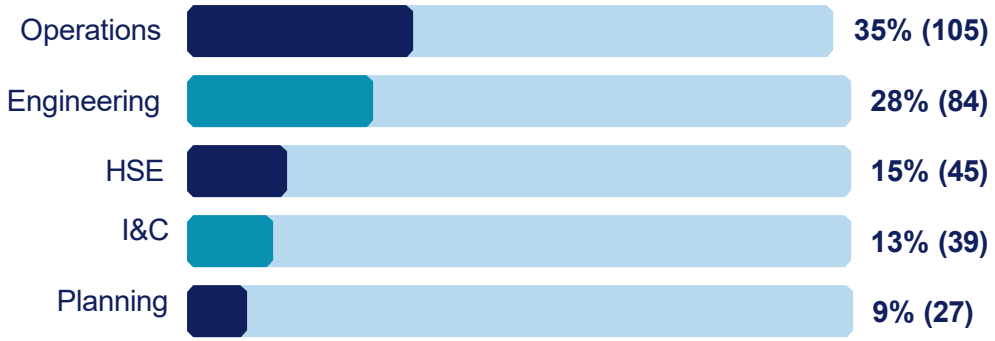
5-pt
Likert Scale

PLS-SEM
Validated via

Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Pilot-tested on 30 MOPCO employees; Cronbach alpha confirmed before full deployment

Department Distribution



Experience Distribution



68%
Male
204 respondents

32%
Female
96 respondents

42%
Age 25–34
Dominant age group

55%
Bachelor's
165 respondents

88.2%
Response Rate
300 of 340 usable

Construct Means — 5-Point Likert Scale



3.94

Highest: Continuous Learning

SD=0.68 — most consistent responses

3.75

Lowest: Workforce Trans.

SD=0.79 — highest variation

3.85

Overall Average

Positive GenAI perception at MOPCO

GenAI Adoption

0.887

Cronbach Alpha — Good
AVE=0.621 | CR=0.921

Continuous Learning

0.912

Cronbach Alpha — Excellent
AVE=0.658 | CR=0.934

Skills Development

0.896

Cronbach Alpha — Good
AVE=0.634 | CR=0.924

Workforce Trans.

0.878

Cronbach Alpha — Good
AVE=0.607 | CR=0.911

All Validity Benchmarks Passed

>0.7
Alpha threshold
All pass: 0.878–0.912

>0.5
AVE threshold
All pass: 0.607–0.658

>0.9
CR threshold
All pass: 0.911–0.934

HTMT
Discriminant validity
All ratios <0.85

H1: GenAI → Skills Development

β=0.512

t=8.43 | p<0.001

Strong positive direct effect — GenAI significantly predicts skills development at MOPCO.

SUPPORTED

H2: GenAI → Workforce Transformation

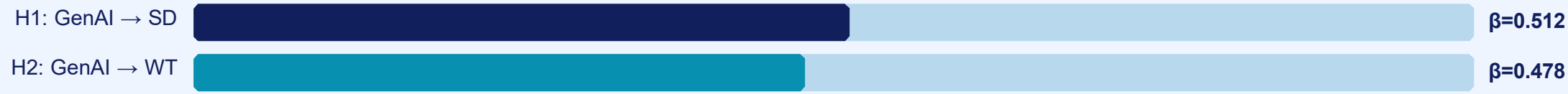
β=0.478

t=7.21 | p<0.001

Significant direct effect — GenAI directly drives workforce transformation at MOPCO.

SUPPORTED

Path Coefficient Comparison



Mediation Path: GenAI → Continuous Learning → Outcomes

GenAI Adoption
IV

→ β=0.389

Continuous Learning
Mediator

→ two paths

SD & WT
DVs

H3: CL mediates GenAI → SD

IE=0.291

95% CI [0.198, 0.384]

CI excludes zero — partial mediation confirmed

SUPPORTED

H4: CL mediates GenAI → WT

IE=0.263

95% CI [0.171, 0.355]

Bootstrapped 5000 samples (BCa) — zero excluded

SUPPORTED

Continuous Learning as an independent driver of outcomes (beyond mediation role)

H5: CL to Skills Development

β=0.447

t=7.63 | p<0.001

Continuous learning culture at MOPCO independently enhances skill acquisition.

SUPPORTED

H6: CL to Workforce Transformation

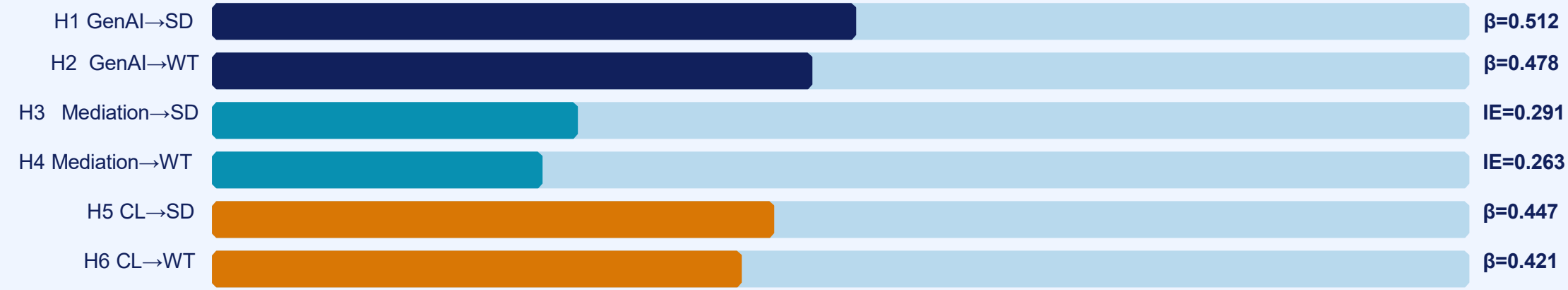
β=0.421

t=6.89 | p<0.001

Continuous learning amplifies GenAI-driven workforce transformation at MOPCO.

SUPPORTED

All Six Hypotheses Summary



Skills Development

62.4%

Variance explained (R^2)

Substantial effect size

Workforce Transformation

58.7%

Variance explained (R^2)

Substantial effect size

Continuous Learning

48.3%

Variance explained (R^2)

Moderate-substantial

PLS-SEM Global Fit Indicators



73%

GenAI Awareness

Employees aware of GenAI tools — above Egyptian industry average

41%

Active GenAI Use

Regular use in daily workflows at MOPCO operations

68%

Training Demand

Employees requesting structured GenAI upskilling programs

Top 3 GenAI Use Cases at MOPCO

- **Process optimization:** predictive maintenance via AI-assisted analytics
- **Documentation:** automated report generation and technical writing
- **Safety monitoring:** AI-based anomaly detection in plant operations

Challenges Identified

- Infrastructure gaps in legacy plant systems
- Language barriers — Arabic-interface AI tools limited
- Managerial resistance to AI-driven workflow change

Extends Technology Acceptance Model

Continuous learning as a critical boundary condition — TAM must integrate organisational learning to explain GenAI outcomes in industrial contexts.

Dynamic Capabilities Theory

Confirms GenAI as a dynamic capability requiring continuous learning to convert technology into workforce competence — especially relevant to capital-intensive industries.

Partial Mediation — Nuanced Signal

GenAI's direct effect remains significant even after mediation — technology infrastructure alone delivers measurable, immediate impact before learning systems mature.

Comparison with Literature

Huang & Rust (2021)
Aligns: AI reshapes task complexity and skill hierarchy

World Economic Forum (2023)
Confirms: 44% jobs disrupted — reskilling is critical

MOPCO finding
Extends: Industrial sector partial mediation not documented in prior developing-economy studies

CONCLUSION 1
GenAI significantly and directly accelerates skills development and workforce transformation at MOPCO.

CONCLUSION 2
Continuous learning partially mediates both paths — amplifying GenAI's impact across the organisation.

CONCLUSION 3
All six hypotheses supported — PLS-SEM model fit confirmed (SRMR=0.075, NFI=0.912).

For MOPCO Management
Establish a GenAI Centre of Excellence with embedded continuous learning pathways and Arabic-interface tools.

For Policy Makers
Mandate GenAI literacy in national industrial workforce development programmes (Egypt Vision 2030 alignment).

For Future Research
Longitudinal designs and cross-industry comparisons across MENA petrochemical companies recommended.

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The end of presentation

Thank you



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