Supplementary Material

Bridging FinOps Practice and Machine Learning Research:
A Systematic Review of Cloud Cost Optimization

Mateen Ali Anjum
Phono Technologies Inc., Toronto, ON, Canada
mateen@phonotech.ca

Table S1: Complete List of Included Studies

This table lists all 79 studies included in the systematic review (75 academic studies and 4 grey literature sources), along with their classification by source type, quality assessment, FinOps phase mapping, and research question relevance. One additional methodology reference (Tyndall, 2010) used for grey literature assessment is listed separately. Quality assessment used the JBI checklist for academic papers (H = High, score 7–10; M = Moderate, score 5–6) and the AACODS framework for grey literature.

#	First Author	Year	Venue	Type	Qual.	FinOps Phase	RQ	DOI / Identifier
Academic Studies (75)								
1	Nawrocki & Smendowski	2025	J. Grid Computing	Academic	H	Inform, Optimize, Operate	1	10.1007/s10723-024-09792-0
2	Nawrocki & Smendowski	2024	J. Computational Science	Academic	H	Inform, Optimize	1	10.1016/j.jocs.2024.102292
3	Deochake	2024	SSRN	Academic	M	Inform, Optimize, Operate	1, 2	10.2139/ssrn.5071987
4	Kanumuri & Zeier	2024	Cloud FinOps (Apress)	Academic	M	Inform, Optimize	1	10.1007/979-8-8688-0388-8_6
5	Osypanka & Nawrocki	2022	IEEE Trans. Cloud Computing	Academic	H	Optimize	1	10.1109/tcc.2020.3015769
6	Lim et al.	2021	Int. J. Forecasting	Academic	H	Inform	1	10.1016/j.ijforecast.2021.03.012
7	Salinas et al.	2020	Int. J. Forecasting	Academic	H	Inform	1	10.1016/j.ijforecast.2019.07.001
8	Bi et al.	2024	IEEE IoT Journal	Academic	H	Inform	1	10.1109/jiot.2024.3395610
9	Chen, Zaharia & Zou	2023	arXiv (Stanford)	Academic	M	Optimize	1, 2	arXiv:2305.05176
10	Vo et al. (IBM)	2025	arXiv	Academic	M	Operate	2, 4	arXiv:2510.25914
11	Shekhar et al.	2024	arXiv	Academic	M	Optimize	2	arXiv:2402.01742
12	Liu et al.	2023	EMNLP Findings	Academic	H	Optimize	2	10.18653/v1/2023.findings-emnlp.655
13	Dasin	2025	SSRN	Academic	M	Optimize	2	10.2139/ssrn.5624150
14	Kodi	2025	ICCSAIML	Academic	M	Inform, Optimize	1	10.56472/iccsaiml25-116
15	Yakkanti	2025	Eur. J. Computer Science IT	Academic	M	Inform, Operate	1, 4	10.37745/ejcsit.2013/vol13n111729
16	Schuler, Jamil & Kuhl	2021	IEEE/ACM CCGrid	Academic	H	Operate	1	10.1109/ccgrid51090.2021.00098
17	Chrysopoulos et al.	2023	IEEE CLOUD	Academic	H	Operate	1	10.1109/cloud60044.2023.00012
18	Buchaca et al.	2020	IEEE CLOUD	Academic	H	Operate	1	10.1109/cloud49709.2020.00070
19	Xiao & Hu	2022	APNOMS	Academic	H	Operate	1, 3	10.23919/apnoms56106.2022.9919994
20	Jian et al.	2024	Software: Practice & Experience	Academic	H	Operate	1	10.1002/spe.3284
21	Lipari et al.	2025	IEEE IPDPS Workshops	Academic	H	Operate	1	10.1109/ipdpsw66978.2025.00169
22	Xu et al.	2022	ACM Trans. Embedded Computing	Academic	H	Inform	1	10.1145/3524114
23	Luo et al.	2022	ACM SoCC	Academic	H	Inform, Operate	1	10.1145/3542929.3563477
24	Tuli, Casale & Jennings	2023	IEEE Trans. Network & Service Mgmt	Academic	H	Operate	1, 3	10.1109/tnsm.2023.3268250
25	Dogani et al.	2022	J. Grid Computing	Academic	H	Operate	1	10.1007/s10723-022-09634-x
26	Hang et al.	2024	IEEE ICDE	Academic	H	Inform, Operate	1	10.1109/icde60146.2024.00308
27	Jain & Rekha	2024	IJSREM	Academic	M	Inform	1	10.55041/ijsrem35775
28	Hossain et al.	2024	J. Cloud Computing	Academic	H	Inform	1	10.1186/s13677-024-00699-5
29	Mitropoulou et al.	2024	J. Grid Computing	Academic	H	Inform	1	10.1007/s10723-023-09727-1
30	Islam et al. (IBM)	2021	IEEE/ACM ICSE-SEIP	Academic	H	Inform	1, 4	10.1109/ICSE-SEIP52600.2021.00024

Continued on next page

#	First Author	Year	Venue	Type	Qual.	FinOps Phase	RQ	DOI / Identifier
31	Nezamdoust et al.	2023	J. Supercomputing	Academic	H	Inform	1	10.1007/s11227-022-04970-x
32	Chin et al.	2023	J. Student Research	Academic	M	Optimize	1	10.47611/jsrhs.v11i3.3362
33	Alharthi et al.	2024	Sensors (MDPI)	Academic	M	Operate	1	10.3390/s24175551
34	Bi et al.	2022	IEEE Trans. Services Computing	Academic	H	Inform	1	10.1109/TSC.2022.3178094
35	Osypanka & Nawrocki	2022	J. Supercomputing	Academic	H	Optimize	1	10.1007/s11227-022-04498-y
36	Ong et al.	2024	arXiv	Academic	M	Optimize	2	arXiv:2406.18665
37	Zhang et al.	2024	ACM Computing Surveys	Academic	H	Operate	2	10.1145/3746635
38	Rao et al.	2024	ACM Conference	Academic	H	Optimize	2	10.1145/3660605.3660941
39	Poltronieri et al.	2021	CNSM	Academic	H	Operate	1	10.23919/CNSM52442.2021.9615519
40	Malul et al.	2024	arXiv	Academic	M	Operate	2	arXiv:2405.19954
41	Kon et al.	2024	NeurIPS Datasets & Benchmarks	Academic	H	Operate	2	NeurIPS 2024
42	Ouhame, Hadi & Ullah	2021	Neural Computing & Applications	Academic	H	Inform	1	10.1007/s00521-021-05770-9
43	Anuganti	2024	CSEIT	Academic	M	Operate	1, 3	10.32628/cseit24102152
44	Hu et al.	2024	arXiv	Academic	M	Optimize	2	arXiv:2403.12031
45	Al-Asaly et al.	2022	Neural Computing & Applications	Academic	H	Inform	1	10.1007/s00521-021-06665-5
46	Ahamed et al.	2023	Electronics (MDPI)	Academic	M	Inform	1	10.3390/electronics12030650
47	Khandelwal & Khandelwal	2024	Int. J. Cloud Computing	Academic	M	Inform	1	10.1504/ijcc.2024.136289
48	Bora et al.	2025	IEEE CLOUD	Academic	H	Inform, Operate	1	10.1109/CLOUD67622.2025.00058
49	Naganandhini & Shanthi	2025	PeerJ Computer Science	Academic	H	Inform	1	10.7717/peerj-cs.2713
50	Wang et al.	2024	ACM CIKM	Academic	H	Inform	1	10.1145/3627673.3680072
51	Lu et al.	2025	IEEE Trans. Cloud Computing	Academic	H	Inform	1, 3	10.1109/TCC.2025.3628344
52	Abdel Khaleq & Ra	2023	Cluster Computing	Academic	H	Operate	1	10.1007/s10586-023-03999-8
53	Mishra et al.	2024	IEEE CLOUD	Academic	H	Operate	1	10.1109/cloud62652.2024.00033
54	Zafeiropoulos et al.	2022	Simulation Modelling Practice & Theory	Academic	H	Operate	1	10.1016/j.simpat.2021.102461
55	Zhou et al.	2024	Artificial Intelligence Review	Academic	H	Operate	1, 4	10.1007/s10462-024-10756-9
56	Rubak & Taheri	2023	ACM UCC	Academic	H	Operate	1	10.1145/3603166.3632165
57	Mondal et al.	2023	Mathematics (MDPI)	Academic	M	Inform, Operate	1, 4	10.3390/math11122675
58	Shim et al.	2023	IEEE SysCon	Academic	M	Operate	1	10.1109/syscon53073.2023.10131106
59	Akoto & Salman	2022	IEEE Cloud Summit	Academic	H	Inform	1	10.1109/cloudsummit54781.2022.00013
60	Gao et al.	2020	Mathematical Problems in Engineering	Academic	M	Inform	1	10.1155/2020/6343705
61	Al-Ghuwairi et al.	2023	J. Cloud Computing	Academic	H	Inform	1	10.1186/s13677-023-00491-x
62	Dinh & Park	2020	IEEE FMEC	Academic	H	Inform	1, 4	10.1109/fmec49853.2020.9144972
63	Ta & Park	2022	IEEE ICOIN	Academic	H	Inform	1	10.1109/icoin53446.2022.9687229
64	Mohammadshahi et al.	2024	arXiv	Academic	M	Optimize	2	arXiv:2401.13979

Continued on next page

#	First Author	Year	Venue	Type	Qual.	FinOps Phase	RQ	DOI / Identifier
65	Jiang et al.	2023	arXiv	Academic	M	Optimize	2	arXiv:2310.05736
66	Bang et al.	2023	ACL NLP-OSS	Academic	H	Optimize	2	ACL 2023
67	Gill et al.	2025	IEEE IPDPS	Academic	H	Optimize	2	10.1109/ipdps64566.2025.00117
68	Zhou et al.	2024	arXiv	Academic	M	Optimize	2	arXiv:2404.14294
69	Zhang et al.	2024	IEEE APSEC	Academic	H	Operate	2	10.1109/apsec65559.2024.00051
70	Zha et al.	2024	Electronics (MDPI)	Academic	M	Operate	2	10.3390/electronics13224425
71	Kurra	2025	World J. Adv. Eng. Tech. Sciences	Academic	M	Inform, Optimize	1, 3	10.30574/wjaets.2025.15.1.0218
72	Ayachit & Attar	2025	IEEE ASIANCON	Academic	H	Inform	1, 3	10.1109/ASIANCON66527.2025.11280711
73	Vadrevu et al.	2025	IEEE ICDICI	Academic	H	Inform	1, 3	10.1109/ICDICI66477.2025.11135182
74	Abdallah et al.	2024	IEEE Access	Academic	H	Inform	1	10.1109/ACCESS.2024.3390844
75	Page et al.	2021	BMJ	Academic	H	Methodology	—	10.1136/bmj.n71
Grey Literature Sources (4)								
G1	FinOps Foundation	2025	FinOps Foundation Report	Grey Lit.	H†	Inform, Operate	4	finops.org/insights/state-of-finops-2025
G2	FinOps Foundation	2024	FinOps Foundation Report	Grey Lit.	H†	Inform, Optimize, Operate	3, 4	finops.org/insights/state-of-finops-2024
G3	Flexera	2025	Flexera Industry Report	Grey Lit.	H†	Inform	3, 4	flexera.com/state-of-the-cloud
G4	Storment & Fuller	2023	O'Reilly Media (Book)	Grey Lit.	H†	Inform, Optimize, Operate	1	ISBN: 978-1492054627
Additional References (not counted in 79 included studies)								
—	Tyndall	2010	Flinders University	Methodology	—	—	—	Grey literature assessment tool

Notes:

- H = High quality (JBI score 7–10 for academic papers). M = Moderate quality (JBI score 5–6).
- † Grey literature assessed using AACODS framework (Authority, Accuracy, Coverage, Objectivity, Date, Significance); all four sources scored 5/6 or 6/6 criteria.
- FinOps phases: **Inform** (cost visibility, forecasting, anomaly detection), **Optimize** (rate optimization, workload optimization, LLM cost reduction), **Operate** (automation, policy enforcement, RL-based scaling).
- Some papers span multiple FinOps phases and address multiple research questions. Phase assignments reflect the primary and secondary contributions of each study.
- Quality counts: 50 high-quality academic papers, 25 moderate-quality academic papers.
- Three moderate-quality papers published in non-indexed venues (studies 27, 32, 43) are flagged in Section 4.1 of the main text; their findings are corroborated by higher-quality sources.

Summary Statistics

Category	Count
Total included studies	79
Academic studies	75
Grey literature sources	4
Quality Assessment (Academic)	
High quality (JBI 7–10)	50
Moderate quality (JBI 5–6)	25
FinOps Phase Coverage	
Inform phase	42 unique papers
Optimize phase	33 unique papers
Operate phase	24 unique papers
Multi-phase papers	24
Research Question Coverage	
RQ1 (Capability Mapping)	62 papers
RQ2 (LLM/GenAI)	17 papers
RQ3 (Business Metrics)	14 papers
RQ4 (Adoption Barriers)	12 papers
Publication Year Range	2020–2025

Table 2: Summary statistics for the systematic review corpus.