

Supplementary Information

A hybrid PLS-SEM and convolutional neural network analysis of artificial intelligence adoption intention in SMEs

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Table S1. Construct and indicator inventory.

Construct	Block	Items	Indicators	Scale
Perceived usefulness (PU)	Technology	5	PU1, PU2, PU3, PU4, PU5	1–5 agreement
Perceived ease of use (PEOU)	Technology	4	PEOU1, PEOU2, PEOU3, PEOU4	1–5 agreement
Relative advantage (RA)	Technology	5	RA1, RA2, RA3, RA4, RA5	1–5 agreement
Compatibility (COMP)	Technology	4	COMP1, COMP2, COMP3, COMP4	1–5 agreement
Complexity (CPLX)	Technology	4	CPLX1, CPLX2, CPLX3, CPLX4	1–5 agreement, reverse-keyed
Top management support (TMS)	Organisation	5	TMS1, TMS2, TMS3, TMS4, TMS5	1–5 agreement
Digital literacy (DL)	Organisation	5	DL1, DL2, DL3, DL4, DL5	1–5 agreement
Financial readiness (FR)	Organisation	4	FR1, FR2, FR3, FR4	1–5 agreement
Innovation culture (IC)	Organisation	4	IC1, IC2, IC3, IC4	1–5 agreement
Government support (GS)	Environment	4	GS1, GS2, GS3, GS4	1–5 agreement
Competitive pressure (CP)	Environment	4	CP1, CP2, CP3, CP4	1–5 agreement
Vendor and infrastructure support (VIS)	Environment	4	VIS1, VIS2, VIS3, VIS4	1–5 agreement
Trust in AI (TR)	Behavioural	5	TR1, TR2, TR3, TR4, TR5	1–5 agreement
AI awareness (AIA)	Behavioural	6	AIA1, AIA2, AIA3, AIA4, AIA5, AIA6	1–5 agreement
AI adoption intention (AAI)	Behavioural	5	AAI1, AAI2, AAI3, AAI4, AAI5	1–5 agreement

68 reflective indicators across 15 constructs. Complexity is reverse-keyed.

Table S2. McNemar post-hoc contrasts of awareness between all pairs of functional categories.

Category A	Category B	n_{01}	n_{10}	χ^2	p	p_{Bonf}	Sig.
Content creation	Chatbots and customer interaction	268	58	133.991	<0.001	<0.001	yes
Content creation	Marketing automation	273	52	148.923	<0.001	<0.001	yes
Content creation	Scheduling and project management	283	57	148.897	<0.001	<0.001	yes
Content creation	Customer relationship management	280	54	151.572	<0.001	<0.001	yes
Content creation	Meeting management	298	45	185.143	<0.001	<0.001	yes
Content creation	Social media management	279	46	165.612	<0.001	<0.001	yes
Content creation	Email personalisation	301	44	189.959	<0.001	<0.001	yes
Content creation	Accounting and financial management	305	48	185.654	<0.001	<0.001	yes
Design and app builders	Scheduling and project management	272	62	130.781	<0.001	<0.001	yes
Content creation	Human resources and recruitment	319	50	194.645	<0.001	<0.001	yes
Design and app builders	Chatbots and customer interaction	262	68	112.876	<0.001	<0.001	yes
Design and app builders	Marketing automation	278	73	118.564	<0.001	<0.001	yes
Design and app builders	Social media management	276	59	139.272	<0.001	<0.001	yes
Design and app builders	Customer relationship management	271	61	131.569	<0.001	<0.001	yes
Design and app builders	Meeting management	290	53	162.379	<0.001	<0.001	yes
Design and app builders	Email personalisation	298	57	162.254	<0.001	<0.001	yes
Design and app builders	Human resources and recruitment	311	58	172.098	<0.001	<0.001	yes
Design and app builders	Accounting and financial management	295	54	165.043	<0.001	<0.001	yes
Chatbots and customer interaction	Human resources and recruitment	214	155	9.117	0.003	0.139	no
Chatbots and customer interaction	Accounting and financial management	186	139	6.511	0.011	0.590	no
Chatbots and customer interaction	Email personalisation	193	146	6.242	0.012	0.686	no
Marketing automation	Human resources and recruitment	204	156	6.136	0.013	0.728	no
Chatbots and customer interaction	Scheduling and project management	186	170	0.632	0.427	1.000	no
Content creation	Design and app builders	114	98	1.061	0.303	1.000	no
Chatbots and customer interaction	Meeting management	189	146	5.266	0.022	1.000	no
Chatbots and customer interaction	Social media management	176	153	1.471	0.225	1.000	no
Chatbots and customer interaction	Customer relationship management	178	162	0.662	0.416	1.000	no
Marketing automation	Scheduling and project management	178	173	0.046	0.831	1.000	no
Marketing automation	Customer relationship management	174	169	0.047	0.829	1.000	no
Marketing automation	Social media management	174	162	0.36	0.548	1.000	no
Marketing automation	Meeting management	187	155	2.81	0.094	1.000	no
Chatbots and customer interaction	Marketing automation	162	151	0.319	0.572	1.000	no
Marketing automation	Email personalisation	195	159	3.46	0.063	1.000	no
Marketing automation	Accounting and financial management	193	157	3.5	0.061	1.000	no
Scheduling and project management	Customer relationship management	175	175	0.003	0.957	1.000	no
Scheduling and project management	Social media management	176	169	0.104	0.747	1.000	no
Scheduling and project management	Meeting management	192	165	1.894	0.169	1.000	no
Scheduling and project management	Email personalisation	199	168	2.452	0.117	1.000	no
Scheduling and project management	Accounting and financial management	195	164	2.507	0.113	1.000	no
Scheduling and project management	Human resources and recruitment	204	161	4.833	0.028	1.000	no
Customer relationship management	Social media management	173	166	0.106	0.745	1.000	no
Customer relationship management	Meeting management	192	165	1.894	0.169	1.000	no
Customer relationship management	Email personalisation	186	155	2.639	0.104	1.000	no
Customer relationship management	Accounting and financial management	188	157	2.609	0.106	1.000	no
Customer relationship management	Human resources and recruitment	211	168	4.654	0.031	1.000	no
Social media management	Meeting management	183	163	1.043	0.307	1.000	no
Social media management	Email personalisation	191	167	1.478	0.224	1.000	no
Social media management	Accounting and financial management	184	160	1.538	0.215	1.000	no
Social media management	Human resources and recruitment	194	158	3.48	0.062	1.000	no
Meeting management	Email personalisation	163	159	0.028	0.867	1.000	no
Meeting management	Accounting and financial management	185	181	0.025	0.875	1.000	no
Meeting management	Human resources and recruitment	183	167	0.643	0.423	1.000	no
Email personalisation	Accounting and financial management	184	184	0.003	0.958	1.000	no
Email personalisation	Human resources and recruitment	197	185	0.317	0.574	1.000	no
Accounting and financial management	Human resources and recruitment	193	181	0.324	0.569	1.000	no

All 55 pairwise contrasts. n_{01} and n_{10} are discordant pair counts; continuity-corrected χ^2 with 1 df. Bonferroni factor 55.

Table S3. Outer loadings for all 68 indicators.

Construct	Label	Indicator	Loading	Note
PU	Perceived usefulness	PU1	0.6934	below 0.70
PU	Perceived usefulness	PU2	0.7781	
PU	Perceived usefulness	PU3	0.8871	
PU	Perceived usefulness	PU4	0.9354	
PU	Perceived usefulness	PU5	0.9368	
PEOU	Perceived ease of use	PEOU1	0.8157	below 0.70
PEOU	Perceived ease of use	PEOU2	0.8157	
PEOU	Perceived ease of use	PEOU3	0.8029	
PEOU	Perceived ease of use	PEOU4	0.8178	
RA	Relative advantage	RA1	0.6321	
RA	Relative advantage	RA2	0.8041	
RA	Relative advantage	RA3	0.8881	
RA	Relative advantage	RA4	0.9292	
RA	Relative advantage	RA5	0.9303	
COMP	Compatibility	COMP1	0.7843	
COMP	Compatibility	COMP2	0.8197	below 0.70
COMP	Compatibility	COMP3	0.792	
COMP	Compatibility	COMP4	0.7978	
CPLX	Complexity	CPLX1	0.7809	
CPLX	Complexity	CPLX2	0.7776	
CPLX	Complexity	CPLX3	0.7913	
CPLX	Complexity	CPLX4	0.7917	
TMS	Top management support	TMS1	0.6904	
TMS	Top management support	TMS2	0.8028	
TMS	Top management support	TMS3	0.9014	
TMS	Top management support	TMS4	0.9364	
TMS	Top management support	TMS5	0.9388	
DL	Digital literacy	DL1	0.7103	below 0.70
DL	Digital literacy	DL2	0.8312	
DL	Digital literacy	DL3	0.922	
DL	Digital literacy	DL4	0.939	
DL	Digital literacy	DL5	0.939	
FR	Financial readiness	FR1	0.7929	
FR	Financial readiness	FR2	0.8088	
FR	Financial readiness	FR3	0.8183	
FR	Financial readiness	FR4	0.8096	
IC	Innovation culture	IC1	0.6249	
IC	Innovation culture	IC2	0.8078	below 0.70
IC	Innovation culture	IC3	0.9134	
IC	Innovation culture	IC4	0.94	
GS	Government support	GS1	0.7941	
GS	Government support	GS2	0.7859	
GS	Government support	GS3	0.8221	
GS	Government support	GS4	0.8002	
CP	Competitive pressure	CP1	0.7077	
CP	Competitive pressure	CP2	0.8016	
CP	Competitive pressure	CP3	0.8826	
CP	Competitive pressure	CP4	0.9268	below 0.70
VIS	Vendor and infrastructure support	VIS1	0.639	
VIS	Vendor and infrastructure support	VIS2	0.7906	
VIS	Vendor and infrastructure support	VIS3	0.8928	
VIS	Vendor and infrastructure support	VIS4	0.9265	
TR	Trust in AI	TR1	0.6768	
TR	Trust in AI	TR2	0.8078	
TR	Trust in AI	TR3	0.897	
TR	Trust in AI	TR4	0.9332	
TR	Trust in AI	TR5	0.9319	
AIA	AI awareness	AIA1	0.7491	below 0.70
AIA	AI awareness	AIA2	0.8149	
AIA	AI awareness	AIA3	0.8998	
AIA	AI awareness	AIA4	0.9396	
AIA	AI awareness	AIA5	0.9459	
AIA	AI awareness	AIA6	0.9432	
AAI	AI adoption intention	AAI1	0.7353	
AAI	AI adoption intention	AAI2	0.83	
AAI	AI adoption intention	AAI3	0.9116	
AAI	AI adoption intention	AAI4	0.9336	
AAI	AI adoption intention	AAI5	0.9299	

Six indicators load below 0.70 and were retained; dropping them changes no structural coefficient by more than 0.009 (Table ??).

Table S4. Hyperparameter search for the item-tensor CNN.

	LR	Dropout	WD	f_1	f_2	Patience	Val RMSE	SD	Epochs
	0.0003	0.3	0.0001	32	64	40	0.6240	0.0073	46
	0.0003	0.3	0.001	32	64	40	0.6240	0.0066	45
	0.001	0.3	0.0001	32	64	40	0.6278	0.0062	44
	0.001	0.3	0.001	32	64	40	0.6289	0.0054	44
	0.0003	0.1	0.0001	32	64	40	0.6313	0.0065	44
	0.0003	0.1	0.001	32	64	40	0.6317	0.0077	44
	0.001	0.3	0.0001	64	96	40	0.6347	0.0053	44
	0.001	0.1	0.001	64	96	40	0.6348	0.0131	43
	0.001	0.3	0.001	64	96	40	0.6349	0.0050	43
	0.001	0.1	0.0001	64	96	40	0.6367	0.0153	43
	0.001	0.1	0.0001	32	64	40	0.6373	0.0013	44
	0.0003	0.3	0.001	64	96	40	0.6393	0.0020	46
	0.0003	0.3	0.0001	64	96	40	0.6400	0.0026	45
	0.001	0.1	0.001	32	64	40	0.6403	0.0041	44
	0.0003	0.1	0.0001	64	96	40	0.6403	0.0082	45
	0.0003	0.1	0.001	64	96	40	0.6413	0.0100	45

16 configurations, three seeds each, scored by mean validation RMSE on a partition disjoint from the test partition. Rows are ordered best to worst; the first row is the configuration used.

Table S5. Heterotrait–monotrait (HTMT) ratios.

	PU	PEOU	RA	COMP	CPLX	TMS	DL	FR	IC	GS	CP	VIS	TR	AIA	AAI
PU		0.49	0.763	0.503	0.41	0.296	0.281	0.277	0.289	0.287	0.316	0.262	0.429	0.549	0.466
PEOU	0.49		0.488	0.523	0.406	0.304	0.226	0.292	0.294	0.271	0.294	0.326	0.445	0.505	0.398
RA	0.763	0.488		0.562	0.43	0.286	0.275	0.273	0.287	0.28	0.301	0.275	0.428	0.546	0.453
COMP	0.503	0.523	0.562		0.436	0.266	0.287	0.256	0.278	0.289	0.282	0.299	0.461	0.507	0.399
CPLX	0.41	0.406	0.43	0.436		0.247	0.246	0.218	0.224	0.312	0.289	0.285	0.368	0.435	0.357
TMS	0.296	0.304	0.286	0.266	0.247		0.51	0.455	0.487	0.245	0.305	0.222	0.402	0.526	0.411
DL	0.281	0.226	0.275	0.287	0.246	0.51		0.485	0.47	0.299	0.319	0.287	0.404	0.538	0.425
FR	0.277	0.292	0.273	0.256	0.218	0.455	0.485		0.505	0.262	0.27	0.284	0.419	0.486	0.413
IC	0.289	0.294	0.287	0.278	0.224	0.487	0.47	0.505		0.291	0.299	0.298	0.427	0.512	0.442
GS	0.287	0.271	0.28	0.289	0.312	0.245	0.299	0.262	0.291		0.484	0.5	0.385	0.453	0.36
CP	0.316	0.294	0.301	0.282	0.289	0.305	0.319	0.27	0.299	0.484		0.517	0.433	0.476	0.397
VIS	0.262	0.326	0.275	0.299	0.285	0.222	0.287	0.284	0.298	0.5	0.517		0.425	0.465	0.387
TR	0.429	0.445	0.428	0.461	0.368	0.402	0.404	0.419	0.427	0.385	0.433	0.425		0.625	0.561
AIA	0.549	0.505	0.546	0.507	0.435	0.526	0.538	0.486	0.512	0.453	0.476	0.465	0.625		0.779
AAI	0.466	0.398	0.453	0.399	0.357	0.411	0.425	0.413	0.442	0.36	0.397	0.387	0.561	0.779	

All values below the conservative 0.85 threshold; maximum 0.779.

Table S6. Fornell–Larcker criterion.

	PU	PEOU	RA	COMP	CPLX	TMS	DL	FR	IC	GS	CP	VIS	TR	AIA	AAI
PU	0.852	0.428	0.702	0.438	-0.35	0.274	0.26	0.244	0.267	0.25	0.282	0.238	0.397	0.518	0.432
PEOU	0.428	0.813	0.424	0.429	-0.329	0.263	0.198	0.24	0.25	0.223	0.25	0.276	0.387	0.449	0.348
RA	0.702	0.424	0.844	0.482	-0.362	0.264	0.253	0.236	0.262	0.24	0.271	0.248	0.39	0.51	0.415
COMP	0.438	0.429	0.482	0.799	-0.349	0.23	0.248	0.209	0.236	0.235	0.236	0.256	0.398	0.447	0.345
CPLX	-0.35	-0.329	-0.362	-0.349	0.785	-0.213	-0.212	-0.175	-0.191	-0.25	-0.239	-0.237	-0.314	-0.379	-0.306
TMS	0.274	0.263	0.264	0.23	-0.213	0.859	0.473	0.399	0.441	0.216	0.27	0.198	0.37	0.494	0.384
DL	0.26	0.198	0.253	0.248	-0.212	0.473	0.873	0.426	0.432	0.26	0.286	0.259	0.371	0.509	0.396
FR	0.244	0.24	0.236	0.209	-0.175	0.399	0.426	0.807	0.433	0.214	0.226	0.24	0.365	0.429	0.362
IC	0.267	0.25	0.262	0.236	-0.191	0.441	0.432	0.433	0.831	0.249	0.264	0.267	0.393	0.476	0.405
GS	0.25	0.223	0.24	0.235	-0.25	0.216	0.26	0.214	0.249	0.801	0.41	0.424	0.336	0.4	0.312
CP	0.282	0.25	0.271	0.236	-0.239	0.27	0.286	0.226	0.264	0.41	0.834	0.452	0.386	0.437	0.357
VIS	0.238	0.276	0.248	0.256	-0.237	0.198	0.259	0.24	0.267	0.424	0.452	0.82	0.381	0.425	0.348
TR	0.397	0.387	0.39	0.398	-0.314	0.37	0.371	0.365	0.393	0.336	0.386	0.381	0.855	0.583	0.517
AIA	0.518	0.449	0.51	0.447	-0.379	0.494	0.509	0.429	0.476	0.4	0.437	0.425	0.583	0.885	0.731
AAI	0.432	0.348	0.415	0.345	-0.306	0.384	0.396	0.362	0.405	0.312	0.357	0.348	0.517	0.731	0.871

Diagonal entries are $\sqrt{\text{AVE}}$; off-diagonal entries are construct-score correlations. No violations.

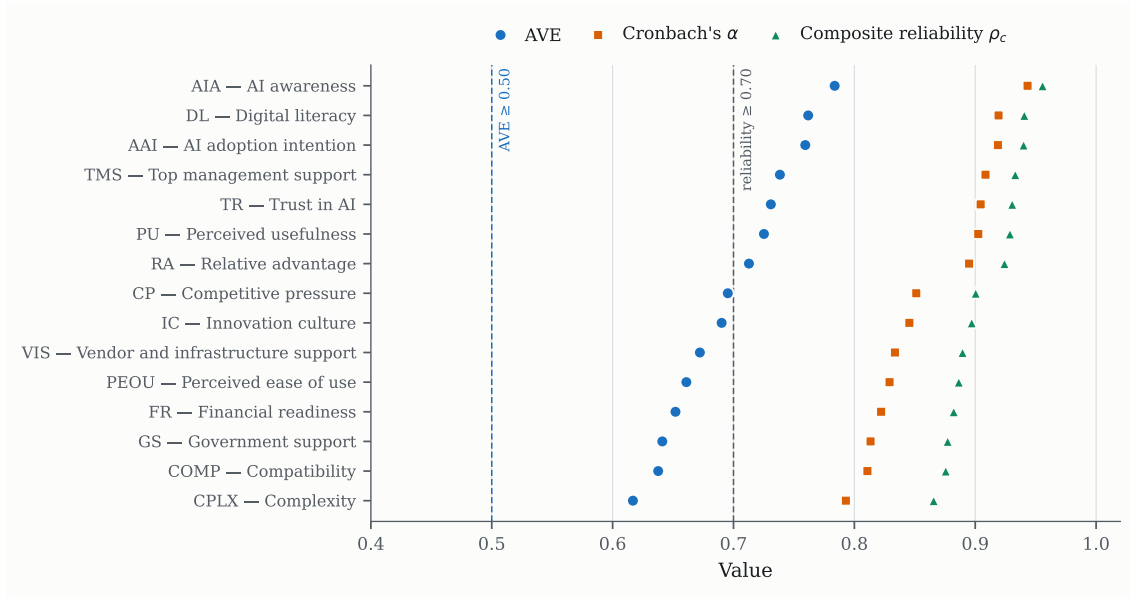


Figure S1. Measurement quality by construct. Average variance extracted, Cronbach's α and composite reliability ρ_c for all 15 constructs, ordered by AVE. Dashed rules mark the $\text{AVE} \geq 0.50$ and $\text{reliability} \geq 0.70$ thresholds. Every construct clears both.