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DEVELOPMENT AND PILOT TESTING OF AN INSTRUMENT TO ASSESS DIGITAL MEDIA USE AND IMPACT IN IT-SERVICES SMES

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Abstract
Small and medium enterprises (SMEs) use many digital channels, but they rarely have a single tool to describe how they use these channels and what that use changes for the business. This paper reports the development and pilot testing of such a questionnaire for IT-services SMEs in the Pune region of India. The pilot version had 82 five-point Likert items in four sections: digital media use, digital media impact, enablers and barriers, and an overall assessment. It was answered by 24 eligible respondents, each from a different firm, between April and July 2024. All 24 responses were complete and usable. Seventeen of the 20 reflective dimensions reached a Cronbach's alpha of 0.70 or above (range 0.703 to 0.870). Client relationships ($\alpha = 0.613$) was questionable, and operational outcomes ($\alpha = 0.483$) and constraints ($\alpha = 0.586$) were weak. One item had a corrected item-total correlation below 0.30. Only one of 19 pairs of possibly overlapping items correlated above 0.70, and use items were clearly separated from impact items. Neutral answers were common on financial items, but they were not explained by the respondent's involvement in digital media. Based on this evidence, the operational outcomes dimension was split into cost and efficiency outcomes, four items were replaced, constraints were treated as separate items, and a section on AI-enabled use was added, giving an 89-item version for the main survey. The pilot shows that the instrument is usable and mostly reliable, and it points to the parts that need close checking in the main study.
Keywords: Digital Media, SMEs, IT Services, Questionnaire Development, Pilot Study, Reliability, India.

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1. Introduction

Digital media are now a normal part of how SMEs find and serve clients. Firms use websites, email, messaging platforms, professional networks, search engines and online content, often all at the same time (Fraccastoro et al., 2021; OECD, 2021). What is less clear is how an SME can describe this use in a structured way and judge what it has achieved. Many studies of SMEs focus on one channel, most often social media, and measure a small set of outcomes (Ainin et al., 2015; Tajudeen et al., 2018). Others note that SMEs find it hard to measure the results of their digital activity at all (Ascani & Ancillai, 2026; Hoffman & Fodor, 2010).

IT-services SMEs are a useful setting for this question. They sell mainly to other businesses, their sales depend on trust and personal contact, and their staff are comfortable with digital tools. Pune is one of India's main IT-services centres, with many small and medium firms. A questionnaire built for this context must cover several channels, the purposes and stages of use, the firm's ability to use digital media well, and the outcomes that matter in business-to-business (B2B) selling.

This paper is part of a doctoral study that is developing a framework for assessing the use and impact of digital media in IT-services SMEs. Before the main survey, a draft questionnaire was tested in a pilot study. The paper reports that pilot. It does not test the framework or its hypotheses, which is the work of the main study.

The pilot had four aims, stated here as research questions:

1. **RQ1.** Does the draft questionnaire produce complete and usable answers, and do the pilot respondents match the intended key informants?
2. **RQ2.** How reliable are the reflective dimensions of the questionnaire, and which items are weak?
3. **RQ3.** Do items that might overlap, especially use items and impact items, measure different things, and can respondents answer the financial items?
4. **RQ4.** What changes are needed before the questionnaire is used in the main survey?

The paper makes two contributions. First, it describes a multi-channel instrument that separates what firms do with digital media from what changes as a result, and that includes the firm's own assessment practice. Second, it reports openly how pilot evidence was used to revise the instrument, including the parts that did not work well.

2. Measurement Background

This section covers only what is needed to explain how the questionnaire was built. A full review of the literature is reported separately.

The questionnaire follows a simple chain that appears across the SME literature: some conditions make firms use digital media, use leads first to outcomes on the client side, and these lead in turn to wider business impact. Studies of SME adoption point to technological, organisational and environmental conditions, such as fit with the way the firm works, management support and skills, and pressure from clients and competitors (Ainin et al., 2015; Alhamami et al., 2021; Tajudeen et al., 2018). On the use side, Fraccastoro et al. (2021) show that B2B SMEs combine digital and personal communication across the stages of the sales process. This led to items on the purposes of use, the stages of client acquisition and retention, and integration with personal meetings, not only on which channels are used.

Two further ideas shaped the instrument. First, using digital media is not the same as using them well. Purwanti et al. (2022) treat digital marketing capability as a separate driver of performance, so capability items were written apart from use items. Second, firms differ in how they assess their own digital activity. Hoffman and Fodor (2010) argue for measures based on client behaviour, such as awareness, engagement and word of mouth, and Ascani and Ancillai (2026) review how firms measure social media performance. This led to a short section on assessment practice: objectives, tracking, review and use of results.

On the impact side, the questionnaire separates outcomes seen with clients (visibility, engagement, enquiries) from business impact (client relationships, operations, market reach, financial results and adverse effects). Financial and market items are measured as perceptions, because many employees do not have access to actual figures (Dwivedi et al., 2021; Ellyawati & Kusumatriawan, 2024). Table 1 summarises the sections and their main sources.

Table 1: Structure of the Pilot Questionnaire (Version 0.1) and Main Sources

Section	Dimensions (number of items)	Items	Main sources
B. Digital media use	Channels (9), purposes (5), stages (4), integration (3), capability (4), assessment practice (6)	B1–B31	Fraccastoro et al. (2021); Nuseir (2018); Purwanti et al. (2022); Ascani & Ancillai (2026)
C. Digital media impact	Visibility and credibility (3), engagement and word of mouth (3), lead generation (3), client relationships (3), operational outcomes (4), market reach (3), financial outcomes (4), costs and adverse effects (5)	C1–C28	Ainin et al. (2015); Aviva et al. (2023); Hoffman & Fodor (2010); Kawira et al. (2019); Nuseir (2018)
D. Enablers, barriers and context	Fit (4), readiness (4), external pressure (3), constraints (3), relationship orientation (3), pace of market change (3)	D1–D20	Ainin et al. (2015); Alhamami et al. (2021); Tajudeen et al. (2018); Purwanti et al. (2022)
E. Overall assessment	Contribution, effective use, benefits versus costs	E1–E3	Ainin et al. (2015); Nuseir (2018); Purwanti et al. (2022)

Note. All items used a five-point scale (1 = *strongly disagree*, 5 = *strongly agree*). The questionnaire also had three screening items (S1–S3) and nine profile items (A1–A9).

3. Method

3.1 Instrument

The pilot questionnaire (version 0.1) had 82 Likert items (Table 1). Respondents answered about their current organisation and about the last 12 months. Digital media were defined as the internet-based channels the firm uses to talk to prospective and existing clients. Items were worded in different directions so that respondents would read each one carefully. Items on adverse effects, constraints and relationship orientation were not reverse-coded, so a higher score on those dimensions means more of that condition.

The nine channel items (B1–B9) ask about different channels, and using one channel does not imply using another. They were therefore treated as a channel profile, not as a reflective scale, and no reliability statistics were computed for them. The other 73 items formed 20 reflective dimensions.

AI-enabled use was deliberately left out of version 0.1, to be added after the pilot. Before data collection, the design notes listed item pairs that might overlap and items that needed expert checking (for example, the vague phrase "a meaningful share" in C8). These notes guided the pilot analysis.

3.2 Participants

The target respondents were employees of IT-services SMEs in the Pune region who could act as key informants for their firm. Three screening items checked that the firm's main business was IT services (S1), that it employed fewer than 250 people (S2) and that its office was in the Pune region (S3). Pilot respondents were selected using stratified sampling technique from the data received through online sources. Each of the 24 respondents came from a different firm.

Guidance on pilot sample size varies. Hertzog (2008) examines pilot samples of 10 to 40 per group, and Johanson and Brooks (2010) suggest about 30 for initial scale development. A sample of 24 is inside this range but below 30, so the results here are treated as indicative.

3.3 Procedure

The questionnaire was given online using Google forms between 3 April and 26 July 2024. Respondents first read a participant information sheet and gave consent. Taking part was voluntary, and the questionnaire did not ask for names or firm names. Respondents are identified in this paper only by codes P_R_01 to P_R_24. The questionnaire took about 15 to 20 minutes.

3.4 Analysis

The analysis followed the plan written into the pilot questionnaire. It was done in Excel and then recalculated independently from the raw responses in Python. Both gave the same results.

1. **Screening.** Responses were checked for consent, eligibility, missing answers, duplicates and straight-lining (a respondent's standard deviation across the 82 items below 0.50).
2. **Profile and channels.** Frequencies were computed for the profile items, and the mean and percentage agreeing (4 or 5) for each channel item.
3. **Item analysis.** For each of the 73 reflective items: the mean, standard deviation, share of neutral, lowest and highest answers, the corrected item-total correlation (CITC), and alpha if the item were deleted. An item was flagged if its CITC was below 0.30 (Nunnally, 1978), if deleting it raised alpha by more than 0.02, or if 50% or more of respondents chose the neutral answer.
4. **Reliability.** Cronbach's (1951) alpha was computed for each reflective dimension. Values of 0.70 or above were taken as acceptable (Nunnally, 1978). Values from 0.60 to 0.69 were treated as questionable but tolerable at the pilot stage (Hair et al., 2022), and values below 0.60 called for revision.
5. **Overlap check.** Pearson correlations were computed for the 19 item pairs listed in the design notes. A correlation of 0.85 or above was read as redundancy, and 0.70 to 0.84 as a sign to check the wording.
6. **Financial-item check.** The share of neutral answers on the four financial items was compared between respondents with low involvement in digital media (A6 = 1 or 2) and high involvement (A6 = 3 or 4).

Factor analysis and tests of common method bias were not run, because they need far more cases than a pilot gives. They are planned for the main study.

4. Results

4.1 Screening and Respondent Profile (RQ1)

All 24 responses passed screening. Every respondent gave consent and met the three eligibility conditions. None of the 1,968 Likert answers (24 respondents × 82 items) was missing, and there were no duplicates. No respondent straight-lined: the lowest standard deviation of one person's 82 answers was 0.73, above the cut-off of 0.50.

Table 2 shows that the respondents broadly matched the intended key informants. The firms covered all three size bands, and 21 of the 24 served mainly other businesses, which supports the B2B framing of the study. Eleven respondents (45.8%) were founders, directors or senior managers. Four respondents (16.7%), however, said they were not involved in their firm's digital media activities.

Table 2: Profile of Pilot Respondents (n = 24)

Characteristic	Category	n	%
Firm size	Micro (fewer than 10 employees)	5	20.8
	Small (10–49)	11	45.8
	Medium (50–249)	8	33.3
Location	Pune city	16	66.7
	Suburban Pune region	8	33.3
Age	25–34 years	11	45.8
	35–44 years	9	37.5
	45–54 years	4	16.7
Total work experience	Up to 5 years	7	29.2
	6–10 years	8	33.3
	More than 10 years	9	37.5
Role level	Founder, owner or director	6	25.0
	Senior management	5	20.8
	Middle management or team lead	8	33.3
	Individual contributor	5	20.8
Main function	General management	7	29.2
	Marketing	6	25.0
	Sales or business development	5	20.8
	Delivery, engineering or projects	4	16.7
	Account management or client support	2	8.3
Involvement in digital media	Not involved	4	16.7
	Occasionally involved	5	20.8
	Regularly involved	10	41.7
	Primarily responsible	5	20.8
Main clients	Other businesses	21	87.5
	Both businesses and consumers	3	12.5
Client location	Mainly within India	13	54.2
	Mainly outside India	8	33.3
	Both about equally	3	12.5

Note. Some categories are merged for space. No respondent was aged under 25 or over 54.

4.2 Channel Profile

Pilot firms relied most on direct and professional channels: email (100% agreeing), messaging platforms (96%), the website (88%) and LinkedIn (83%). Mass-reach channels were used much less, with online advertising at 25%. No respondent agreed that the firm regularly used mobile or web applications to communicate with clients, and 54% gave a neutral answer to this item.

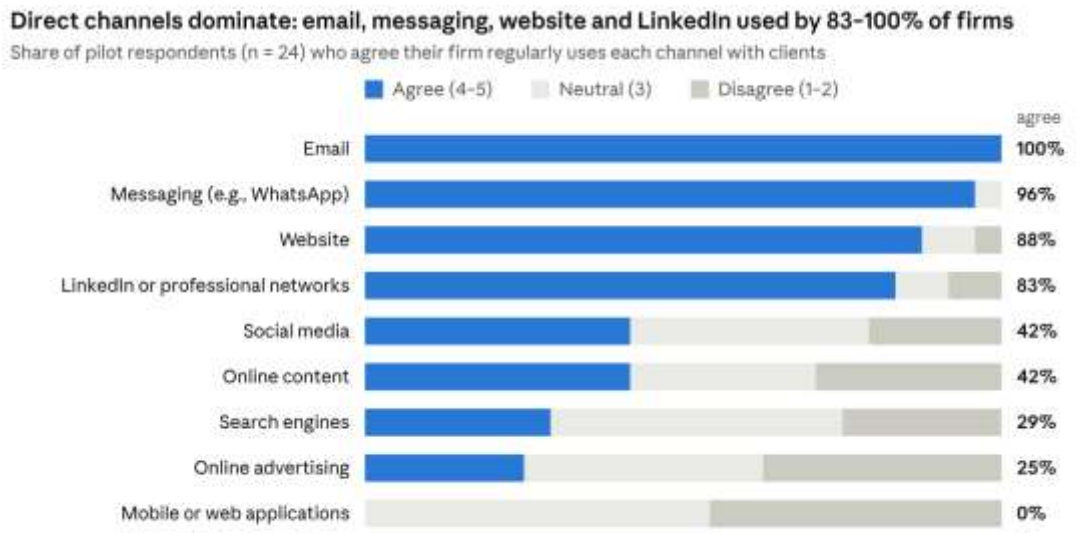


Figure 1: Use of Digital Media Channels by Pilot Firms
Pilot data, items B1–B9, n = 24 (April–July 2024)

This pattern fits a B2B service setting, where firms deal with clients one to one. The many neutral answers on mobile or web applications support a concern raised in the design notes: respondents may have read this item as the firm's own software products rather than a channel to clients.

4.3 Item Analysis (RQ2)

Only one of the 73 reflective items failed the item-total test. C15 ("Digital media have made it easier for us to obtain business-relevant information") had a CITC of 0.10. Four items would have raised the alpha of their dimension slightly if deleted (Table 3). In each case the rise was small (0.022 to 0.032), and the item still correlated above 0.40 with the rest of its dimension.

Table 3: Items Flagged by the Item-Total and Alpha-if-Deleted Rules

Item	Statement (short)	CITC	Alpha if deleted	Dimension alpha
C15	Easier access to business-relevant information	0.10	0.549	0.483
D20	Competitive situation changes rapidly	0.49	0.770	0.742
B19	Combine digital media with personal meetings	0.44	0.735	0.703
D15	Clients prefer personal meetings	0.46	0.763	0.739
D1	Digital media fit the way we work	0.42	0.801	0.779

Note. CITC = corrected item-total correlation. C15 is the only item below the 0.30 cut-off.

No item showed a floor or ceiling problem. The highest share of lowest answers was 17% (C24, increased price competition), and the highest share of top answers was 29% (B24, tailoring communication). Neutral answers were more common. Fifteen items drew a neutral answer from half or more of the respondents, and most of them were impact items. The highest neutral shares were on C21 (helped win new clients, 67%), C20 (contributed to revenue, 62%), C8 (a meaningful share of new opportunities, 58%) and C25 (considerable staff time, 58%).

4.4 Reliability of Dimensions (RQ2)

Seventeen of the 20 reflective dimensions reached the 0.70 threshold, with alpha values from 0.703 to 0.870 (Table 4). Three dimensions were below it.

Table 4: Reliability of Reflective Dimensions in the Pilot (n = 24)

Dimension	Items	k	Cronbach's alpha	Mean (1–5)	Lowest CITC
B-II Purposes of use	B10–B14	5	0.847	3.58	0.53
B-III Use across client stages	B15–B18	4	0.784	3.54	0.46
B-IV Integration with other communication	B19–B21	3	0.703	3.58	0.44
B-V Digital media capability	B22–B25	4	0.861	3.69	0.67
B-VI Assessment practice	B26–B31	6	0.870	3.09	0.58
C-I Visibility and credibility	C1–C3	3	0.843	3.47	0.67
C-II Engagement and word of mouth	C4–C6	3	0.757	3.10	0.53
C-III Lead generation	C7–C9	3	0.827	3.21	0.64
C-IV Client relationships	C10–C12	3	0.613	3.38	0.38
C-V Operational outcomes	C13–C16	4	0.483	3.23	0.10
C-VI Market reach	C17–C19	3	0.729	3.46	0.53
C-VII Financial outcomes	C20–C23	4	0.817	3.01	0.51
C-VIII Costs and adverse effects	C24–C28	5	0.724	2.88	0.38
D-I Fit with the organisation	D1–D4	4	0.779	3.61	0.42
D-II Organisational readiness	D5–D8	4	0.870	3.51	0.60
D-III External pressure	D9–D11	3	0.732	3.60	0.50
D-IV Constraints	D12–D14	3	0.586	2.69	0.32
D-V Relationship orientation	D15–D17	3	0.739	3.17	0.46
D-VI Pace of market change	D18–D20	3	0.742	3.65	0.49
E Overall assessment	E1–E3	3	0.835	3.36	0.69

Note. k = number of items; CITC = corrected item-total correlation. The channel items B1–B9 are not included because they form a channel profile, not a reflective scale.

The three weak dimensions failed for different reasons:

- **Operational outcomes (α = 0.483).** The four items did not form one scale. C15 (information) hardly correlated with C14 (cost of serving clients, r = .01) or C16 (efficiency, r = −.03), and the two cost items correlated only modestly with each other (C13 with C14, r = .28). The dimension mixed two ideas: cost saving and efficiency.
- **Constraints (α = 0.586).** Inter-item correlations ranged from .24 to .42. Data security, poor connectivity and lack of time are separate problems, and a firm can face one without the others.
- **Client relationships (α = 0.613).** Inter-item correlations ranged from .27 to .42, and two of the three items drew many neutral answers (C10, 50%; C12, 46%).

4.5 Overlap between Items (RQ3)

Only one of the 19 pairs checked correlated above 0.70: C20 (revenue increase) and C21 (helped win new clients), r = .71. No pair reached the 0.85 redundancy level. The next highest pairs were within the same dimension: C7 and C8 (enquiries and share of new opportunities, r = .67) and C1 and C2 (clients find us and increased awareness, r = .62).

The pairs that set a use item against a related impact item correlated weakly, from .13 to .41 (for example, B11 day-to-day communication with C10 improved communication, r = .27; B12 client support with C12 improved service, r = .13). Respondents seem to have separated what their firm does with digital media from what changed as a result, as the design intended. The overall item on effective use (E2) correlated only moderately with the four capability items (.31 to .38), so it is not a copy of them. As expected, managing key clients face-to-face (D17) correlated negatively with using digital media to maintain relationships (B18, r = −.35) and with combining digital and personal contact (B19, r = −.49).

4.6 Financial Items and Respondent Involvement (RQ3)

Neutral answers on the financial items were common, but they did not follow a clear pattern by involvement (Table 5). Respondents with low involvement were more often neutral on two items and less often on the other two.

Table 5: Neutral Answers on Financial Items by Involvement in Digital Media

Item	Statement	Neutral, all (n = 24)	Neutral, low involvement (n = 9)	Neutral, high involvement (n = 15)	Mean
C20	Contributed to revenue increase	62.5%	66.7%	60.0%	3.04
C21	Helped win new clients	66.7%	55.6%	73.3%	3.00
C22	Improved profitability	37.5%	11.1%	53.3%	2.92
C23	Increased market share	41.7%	55.6%	33.3%	3.08

Note. Low involvement = not or occasionally involved (A6 = 1 or 2); high involvement = regularly involved or primarily responsible (A6 = 3 or 4).

5. Revisions to the Questionnaire (RQ4)

The questionnaire grew from 82 to 89 Likert items. Four pilot items were removed, eleven were added, and the remaining 78 kept their wording. Table 6 lists each change and the evidence behind it.

Table 6: Changes Made After the Pilot (Version 0.1 to Version 1.0)

No.	Change	Pilot evidence	Reason
1	Operational outcomes split into cost outcomes (C13–C15) and efficiency outcomes (C16–C18), with two new items: reduced cost of acquiring new clients, and reduced time to respond to client requests	α = 0.483; C15 CITC = 0.10; C15 and efficiency item r = −.03	The dimension mixed cost saving and efficiency; each new dimension has three items

2	B18 "maintain relationships with existing clients" replaced by "follow up with clients after a project is delivered"	No statistical redundancy (r with C11 = .29)	Overlapped in meaning with retention, an impact item; the new item names a clear post-delivery stage
3	B25 "build ongoing relationships" removed from capability	No statistical redundancy (r with C11 = .41); capability alpha without B25 = 0.802	Same overlap with retention; capability keeps three focused items
4	C2 "increased awareness" replaced by "potential clients review our website or LinkedIn content before their first meeting with us"	r with C1 = .62; alpha without C2 = 0.750	Awareness and being found were close in meaning; the new item captures a typical B2B behaviour.
5	C8 "a meaningful share of new opportunities" replaced by "digital media help us reach decision-makers in client organisations"	58% neutral; r with C7 = .67	Vague wording, as the design notes warned; reaching decision-makers is central to B2B selling
6	AI-enabled use section added (B31–B34), with one AI efficiency item (C19) and one AI skills constraint (D15)	Not tested in the pilot	Planned post-pilot addition, also recommended by the experts
7	Constraints and adverse effects reported item by item and as indices, not as reflective scales	Constraints α = 0.586; inter-item r .24–.42	The items describe separate problems
8	Items renumbered; time estimate changed to about 20 minutes; A8 options simplified	—	Follows from the changes above

Two points about these changes need to be stated clearly. First, the pilot correlations did not show statistical redundancy for B18, B25, C2 or C8. Changes 2 to 5 rest on the meaning of the items, which the design notes had flagged before the pilot, and on the needs of the B2B context. Second, the financial items and the items flagged only for neutral answers were kept unchanged. The financial check gave no reason to add a "don't know" option, so the five-point scale was kept.

6. Discussion

The pilot shows that the questionnaire can be answered completely by IT-services SME staff and that most of it measures its dimensions reliably. Each research question can be answered from the evidence.

Usable answers and suitable informants (RQ1). All 24 responses were complete, with no straight-lining. The respondents were mostly senior and experienced, and almost all worked for B2B firms. This supports the plan to use key informants. At the same time, one in six respondents was not involved in digital media. The main study should therefore record involvement and check its results with and without these respondents.

Reliability and weak items (RQ2). Most dimensions reached the usual 0.70 level, which is a good result for a first version with three-item scales. The weak dimensions are informative. Operational

outcomes and constraints did not fail because of poor wording but because their items described different things. Cost saving and efficiency are related ideas, but a firm can gain one without the other. In the same way, a firm can face security concerns without connectivity problems. Splitting the first and treating the second as separate items is a better fit to what the items mean. Client relationships remained close to the 0.60 boundary and was kept unchanged, so it needs attention in the main study.

Distinct items and financial answers (RQ3). The low correlations between use items and their related impact items suggest that respondents could separate "what we do" from "what changed". This matters, because a tool that blurs the two would make any link between use and impact look stronger than it is. The many neutral answers on the financial items were not explained by low involvement. A neutral answer here may mean that respondents saw no clear financial change, not that they did not know. This fits the view that financial effects of digital media are hard to see and hard to attribute (Hoffman & Fodor, 2010; Kawira et al., 2019). Even so, perceived financial impact should be read with care.

Changes before the main survey (RQ4). The pilot led to targeted changes rather than a rebuild. Only one item was weak on statistics alone, and no item was removed for small drops in alpha, because such drops can be due to chance in a sample of 24. Some changes rest on meaning rather than numbers, and this is reported openly so that readers can judge them.

The channel profile also gives a first picture of practice. Firms leaned on email, messaging, the website and LinkedIn, and used advertising and mobile applications little. This is consistent with the integrated, relationship-based use of digital tools that Fraccastoro et al. (2021) describe for B2B SMEs. Because the pilot sample was small and not randomly drawn, this is a description of the pilot group only, not a finding about IT-services SMEs in general.

7. Limitations and Next Steps

The pilot results are indicative, not conclusive, for five reasons.

- **Small sample.** With 24 respondents, alpha values have wide margins of error. A dimension near 0.70 could fall on either side of the threshold in another sample.
- **No factor analysis.** Whether items load on their intended dimensions, and whether the dimensions are distinct, could not be tested. Common method bias was also not tested statistically, although the design used anonymity, separate sections for use and impact, and mixed item directions.
- **One respondent per firm.** The pilot did not test the planned design of two to three key informants per firm.
- **New items not tested statistically.** The eleven items added after the pilot, including the AI-enabled use section, were checked only in the mini re-pilot.
- **Non-random selection.** Pilot respondents were UDAYAM and NASCOM, not drawn from a sampling frame. Their answers describe how the instrument behaves, not the population.

The next step is the main survey with version 1.0. It is planned as a two-stage design: firms drawn by stratified random sampling across micro, small and medium size bands, and two to three key informants selected in each firm. The main study will test the measurement model and the framework's hypotheses with partial least squares structural equation modelling (PLS-SEM). Based on the pilot, it will give particular attention to three areas: the client relationships, cost and efficiency dimensions; the new AI-enabled use items; and whether winning new clients belongs with lead generation or with financial outcomes. The pilot responses will not be combined with the main survey data.

8. Conclusion

This paper reported the pilot test of a questionnaire that assesses how IT-services SMEs use digital media and what that use changes for them. With 24 respondents from 24 firms, the questionnaire produced complete answers, and 17 of its 20 reflective dimensions reached acceptable reliability. Respondents separated use from impact, and their neutral answers on financial items were not simply due to lack of knowledge. The two dimensions that failed did so because they combined different ideas, and they were restructured. Four items were replaced on grounds of meaning, and an AI-enabled use section was added. The result is an 89-item version ready for the main survey. For other researchers, the pilot gives a tested starting point for measuring multi-channel digital media use and impact in B2B service SMEs. It also shows the value of reporting the weak parts of an instrument, not only the strong ones.

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