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From access to accounts, retention, output completion, and migrating capability gaps in a three-phase hybrid incubation program for women micro-entrepreneurs

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ABSTRACT

Hybrid incubation programs are increasingly used to support women micro-entrepreneurs, yet limited evidence exists on how participant retention, output completion, and learning barriers evolve throughout incubation. This study examines the three-phase Mekaarpreneur incubation program in East Java, Indonesia, which supported women participating in the PNM Mekaar microfinance scheme through twelve alternating offline and online sessions and a Demo Day from August to November 2025. Using a longitudinal embedded single-case study design, program records were analyzed through descriptive analysis of attendance and output data, complemented by directed content analysis of session reports and the Demo Day assessment rubric. Attendance declined from 57 to 16 participants. The offline–online attendance gap narrowed from 21.1 percentage points in Phase I to 0.9 and 0 points thereafter. Retained participants completed 97.1% of Phase II outputs. Reported barriers shifted from device access to digital-use skills, followed by financial, analytical, and pitching capabilities. These findings highlight the need for early retention strategies and subsequent curricula and assessment rubrics aligned with capabilities needed to translate learning into tangible business outcomes.

Keywords business incubation; participant retention; hybrid training; digital divide; women micro-entrepreneurs

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1. Introduction

Micro, small, and medium enterprises (MSMEs) account for the vast majority of business units and employment in Indonesia, and women operate a large share of the micro enterprises within this sector(Fitriasari & Firmansyah, 2026); (Hasibuan et al., 2024); (Tambunan, 2019) These enterprises not only serve as a source of income for households but also contribute to local economic development, poverty reduction, and community welfare. For many women, engaging in microenterprise activities provides opportunities to achieve greater economic independence while balancing family responsibilities. However, women-owned microenterprises often face various challenges, including limited access to capital, inadequate managerial capabilities, restricted market access, and difficulties in adopting digital technologies. For many of these women, running a micro business is a strategy to supplement household income rather than a deliberate career choice (Awalia et al., 2026); (Milyan et al., 2025). Their businesses are therefore often managed informally, without written plans, market analysis, or a structured business model. Studies published in this journal show that women entrepreneurs' capabilities, shaped by motivation, discrimination, and demographic factors, determine whether they

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can take part in the digital economy (Awalia et al., 2026) , and that innovation capability, including digital marketing, underpins the marketing performance of micro enterprises (Mardatillah, 2025); (Sudirjo et al., 2023). Building these managerial and digital capabilities is thus a central concern of MSME development policy.

Evidence regarding the effectiveness of these programs remains inconclusive. Business training provided to microfinance clients has been shown to improve their knowledge and business practices, although its impact on revenue is often limited (Karlan & Valdivia, 2006). Similarly, critical reviews and meta-analyses of business training and entrepreneurship programs in developing countries indicate that program outcomes are influenced by factors such as training design, intensity, and participant uptake (Getachew & Elantheraiyan, 2023);(Yin et al., 2025). One recurring explanation for these mixed results is the challenge of sustaining participant engagement. Women's time constraints and household responsibilities can hinder regular attendance (Putri et al., 2025);(Heriani et al., 2024), while the shift toward remote learning following the COVID-19 pandemic has introduced additional digital barriers. For instance, business training delivered through Zoom to microentrepreneurs in Mexico improved business practices in the short term, but these gains dissipated within six months (Li, 2022). In Ethiopia, only 22% of women entrepreneurs assigned to app-based training completed it, compared with 71% of those assigned to in-person training (Abidin et al., 2025). The relevance of training content is another important consideration, as marketing and financial management skills appear to improve business profits through different mechanisms (Abidin et al., 2025). Furthermore, simple rules of thumb for distinguishing household finances from business finances have been found to produce better outcomes than conventional accounting instruction (Permana et al., 2025).

Business incubation provides a more comprehensive alternative to standalone training by integrating structured learning curricula with mentoring, networking opportunities, and participant selection mechanisms (Judijanto, 2024); (Diawati & Sugesti, 2023). However, existing incubation research has primarily focused on technology based start ups. Although previous studies have emphasized the need for context-specific investigations into how incubation processes unfold in different settings (Fithri et al., 2025), limited attention has been given to women micro-entrepreneurs participating in microfinance-based incubation programs. This situation highlights three research gaps. First, program evaluations generally rely on a single observation point or pre–post comparisons, making it difficult to identify the specific stages of a multi-phase incubation program at which participant attrition occurs. Second, comparisons between online and offline delivery methods typically involve different participant groups or observations conducted at a single point in time. Consequently, it remains unclear whether the participation gap associated with online delivery persists after a cohort has become more established. Third, limited evidence is available on whether the challenges encountered by participants change as the curriculum progresses from business planning to promotion and financial management, or whether the final assessment criteria are adequately aligned with the content and skills delivered throughout the program.

An earlier study examining the first phase of the same incubation program in East Java revealed that offline sessions recorded higher attendance than online sessions. It also found that the completion of business-planning outputs was closely associated with attendance at the sessions in which those outputs were assigned. However, the analysis covered only four sessions and did not capture subsequent developments within the participant cohort. The present study builds on this earlier work by examining the entire incubation cycle, comprising twelve sessions across three phases and a final Demo Day. Specifically, this study addresses four research questions: (1) at which stages of the incubation cycle participant attrition occurred; (2) how the attendance gap between offline and online sessions changed as the cohort became more established; (3) the extent to which participants who remained in the program completed the required outputs; and (4) how the challenges reported by facilitators evolved across the different phases and the extent to which the curriculum was aligned with the assessment criteria applied during Demo Day.

This study makes two key contributions. From a theoretical perspective, it conceptualizes participation in women's entrepreneurship incubation as a staged retention process and introduces the concept of

obstacle migration. This concept describes how participants' challenges shift from limitations in digital access to difficulties in using digital technologies, and subsequently to gaps in the capabilities required to translate digital activities into tangible business outcomes. From a practical perspective, the study offers evidence to help microfinance institutions and business incubator operators determine where retention efforts should be prioritized, identify which sessions can be delivered online without substantially affecting participation, and ensure that training curricula are appropriately aligned with evaluation rubrics.

1.1. Theory

1.1.1. Incubation as a staged process of selection and support

Business incubators generate value through two primary mechanisms: selecting participating businesses and providing them with business support services (Crefioza et al., 2022). (Almeida et al., 2025) identify two distinct approaches to participant selection: the picking-the-winners strategy, in which incubators screen and select candidates at the entry stage, and the survival-of-the-fittest strategy, which allows participants to enter more openly before their progress is determined by market conditions or the incubation process itself. Multi-phase incubation programs can incorporate elements of both approaches. Although entry may be relatively open, progression from one phase to another can function as a selection mechanism, either through formally established requirements or through participants' voluntary withdrawal. From this perspective, a decline in participant numbers does not necessarily represent a program failure; rather, it may reflect a process through which incubators concentrate their resources on participants who continue throughout the program. However, whether this process supports the program's broader social objectives depends on which participants leave and the reasons behind their departure. Therefore, understanding when and why attrition occurs throughout the incubation cycle is essential for evaluating the effectiveness and inclusiveness of an incubation program (Riza et al., 2023). Furthermore, incubation programs for micro-enterprises differ from those designed for technology-based ventures. Instead of emphasizing physical infrastructure or venture capital, they often rely on accessible business planning tools, such as SWOT analysis and the Business Model Canvas(Setyawanto et al., 2023), alongside practical mentoring tailored to the specific circumstances and needs of participating entrepreneurs (Handayani et al., 2026).

Building on these perspectives, participant retention should be understood not merely as a measure of attendance but also as an indicator of how well an incubation program accommodates the needs and circumstances of its participants. In programs targeting women micro-entrepreneurs, continued participation may be influenced by the relevance of learning materials, the accessibility of delivery methods, the intensity of mentoring, and participants' competing business and household responsibilities. Consequently, examining participant retention across different program phases can help identify when support mechanisms need to be strengthened and whether the program structure remains appropriate as participants progress. This perspective is particularly relevant to hybrid incubation programs, where the combination of online and offline learning may offer flexibility while also introducing different participation challenges. By examining retention patterns alongside output completion and the obstacles encountered by participants, incubators can gain a more comprehensive understanding of how their selection processes and support mechanisms interact throughout the incubation cycle. Such an approach can inform the design of more adaptive and inclusive incubation programs that balance the efficient allocation of resources with the objective of strengthening women's entrepreneurial capabilities.

1.1.2. Participation, retention, and engagement

Theories of persistence in education explain dropout as the outcome of a participant's academic and social integration into a program, with the early period being decisive (Shaikh & Asif, 2022). Engagement research adds that behavioral engagement, namely attendance, task completion, and participation, is both an indicator and a driver of learning. Applied to entrepreneurship training, these ideas suggest that attrition should be front-loaded: participants who cannot reconcile the program with household and

business demands, or who cannot access its delivery channels, exit early, whereas those who remain become progressively more committed. Evidence that low take-up and attendance dilute training effects and that completion rather than initial enrollment distinguishes in-person from digital training is consistent with this view.

1.1.3. From access to use to outcomes: Levels of the digital divide

The digital divide is increasingly recognized as a multidimensional phenomenon comprising three interconnected levels. The first level relates to material access, including the availability of digital devices, internet data, and technological compatibility. The second concerns individuals' digital skills and patterns of technology use, while the third focuses on their ability to translate digital engagement into meaningful and measurable outcomes (Hakim et al., 2023). These dimensions are cumulative and interdependent. Limited access to adequate devices can restrict opportunities to develop digital competencies, while insufficient skills may further reduce the benefits individuals derive from digital technologies. Evidence from Indonesia indicates that women's lower levels of digital literacy are largely associated with disparities in access to mobile phones, educational opportunities, and income (Deselia, 2024). For micro-entrepreneurs, however, the ability to transform digital engagement into tangible business outcomes also depends on complementary entrepreneurial capabilities, particularly financial literacy. Without adequate financial knowledge, digital promotion and online sales may not necessarily translate into improved profitability (Deselia, 2024). Accordingly, the nature of the barriers experienced by participants is expected to evolve as they progress through the stages of a business incubation curriculum.

This perspective highlights the importance of designing business incubation programs that respond to participants' changing needs rather than treating digital capability as a single, uniform competency. At the initial stage, interventions may need to prioritize access to digital resources and the development of foundational digital skills. As participants become more familiar with digital technologies, the emphasis can gradually shift toward their effective application in business activities, including digital marketing, customer engagement, and online transaction management. At more advanced stages, support should focus on strengthening complementary business capabilities, such as financial management, performance evaluation, and data-informed decision-making, to ensure that digital activities generate sustainable economic value. Consequently, the effectiveness of an incubation curriculum may depend not only on the digital competencies it develops but also on its ability to address the specific barriers that emerge at each stage of participants' entrepreneurial development.

1.1.4. Alignment between curriculum and evaluation

In program evaluation, the product component focuses on determining the extent to which the intended outcomes have been achieved. Similarly, the principle of constructive alignment in instructional design emphasizes the importance of ensuring consistency between intended learning outcomes, learning activities, and assessment criteria (Rahayu et al., 2026). In a business incubation program that concludes with a pitching competition, the judging rubric implicitly establishes the outcomes that participants are expected to demonstrate. When criteria with substantial weight in the assessment are not adequately addressed in the curriculum, the competition may favor participants' pre-existing advantages rather than the learning they have acquired throughout the program. Conversely, when competencies that receive considerable attention during the curriculum are assigned relatively little weight in the final assessment, participants may receive insufficient signals regarding their significance.

These considerations underscore the importance of aligning the incubation curriculum, learning outcomes, and final assessment framework. The judging rubric should reflect the competencies that participants are expected to develop throughout the incubation process, including business model development, market validation, financial management, digital marketing, and the ability to communicate business value through pitching. Each assessment criterion should be supported by relevant learning activities and opportunities for practical application, enabling participants to demonstrate measurable progress rather than merely showcase their initial capabilities. Furthermore, evaluating participants' development through baseline and final assessments can help distinguish the

competencies they possessed before entering the program from those acquired during incubation. Such alignment can strengthen the fairness and validity of program evaluation while providing a more meaningful basis for assessing the extent to which the incubation curriculum contributes to participants' entrepreneurial development

1.2. Research propositions

Because this is a longitudinal case study based on aggregated program records, we formulate working propositions rather than statistical hypotheses. Each proposition is derived from the perspectives reviewed above, and its theoretical and empirical rationale is stated immediately before it. The propositions are summarized in Figure 1.

The first proposition follows from persistence theory and the logic of incubator selection. Persistence models locate the highest risk of dropout in the early period, before participants have integrated a program into their routines (Shaikh & Asif, 2022; Tinto, 1975), and multi-phase incubators may use phase boundaries as checkpoints at which participants reconsider whether to continue or are screened by the organizer (Almeida et al., 2025; Bergek & Norrman, 2008). For women micro-entrepreneurs, whose participation competes with household and business duties (Heriani et al., 2024; Putri et al., 2025), the opportunity cost of attending is felt most sharply in the first weeks, when the benefits of the program are still uncertain. Losses are therefore expected to cluster in the first phase and at the boundaries between phases, and attendance is expected to stabilize once a committed core has formed.

P1: Attrition is concentrated in the first phase and at phase transitions, while attendance within later phases is stable.

The second proposition draws on the first level of the digital divide. Remote delivery excludes participants who lack compatible devices, adequate data, or the basic skills needed to join a video platform (van Deursen & van Dijk, 2019), and experimental evidence shows markedly lower completion of app-based than of in-person business training among women entrepreneurs (Cassidy et al., 2024). If these barriers operate mainly at entry, participants who cannot overcome them will leave early, and those who remain will be able to join online and offline sessions on similar terms. In a hybrid program that alternates delivery modes for the same cohort, the offline–online attendance gap should therefore be largest in the first phase and narrow as the cohort consolidates.

P2: The offline–online attendance gap narrows as the cohort consolidates across phases.

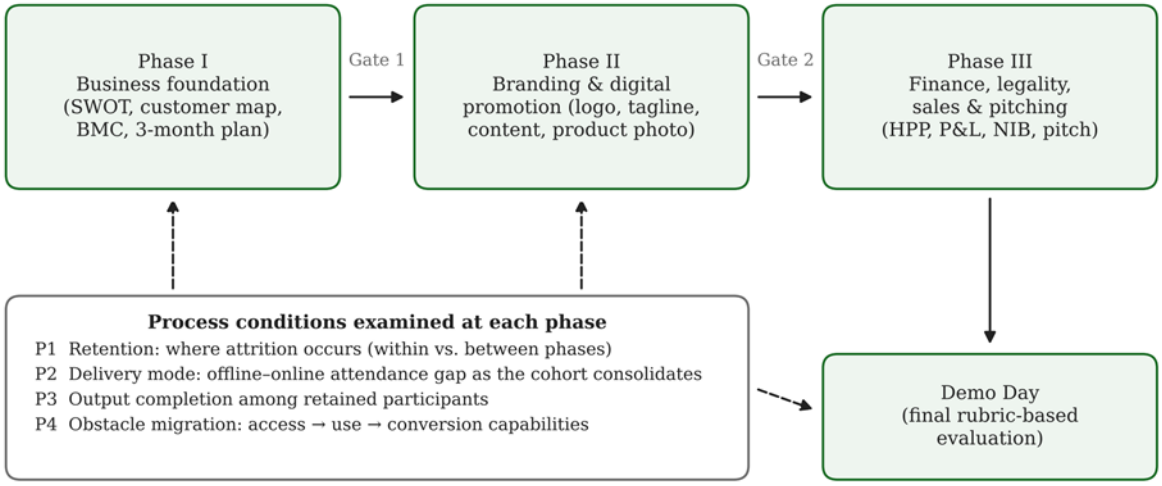
The third proposition rests on the link between behavioral engagement and task completion. Engagement research treats attendance and the completion of assigned work as mutually reinforcing facets of behavioral engagement (Fredricks et al., 2004), and incubation research emphasizes that value is created through close, hands-on interaction between incubator staff and participants (Bergek & Norrman, 2008; Máté et al., 2025). When outputs are produced during sessions with mentor assistance, participants who continue to attend should also complete the outputs required of them. Near-complete output production is therefore expected among retained participants in later phases, where the cohort is smaller and the mentor-to-participant ratio is more favorable.

P3: Retained participants complete nearly all outputs required in later phases.

The fourth proposition extends the cumulative logic of the three-level digital divide to the sequence of an incubation curriculum. Material access is a precondition for developing digital skills, and skills are a precondition for converting digital engagement into tangible outcomes (van Deursen & Helsper, 2015; van Deursen & van Dijk, 2019). For micro-entrepreneurs, such conversion also requires complementary business capabilities: marketing training raises profits mainly through higher sales, whereas finance training does so through lower costs and better records (Anderson et al., 2018), and simple record-keeping routines are needed before profitability can be judged (Drexler et al., 2014). As the curriculum moves from business foundations to digital promotion and then to finance and pitching, the obstacles reported should therefore shift from access to use and then to conversion capabilities.

P4: Reported obstacles migrate from material access to digital-use skills and then to conversion capabilities such as financial management, sales analysis, and pitching.

Figure 1 Conceptual framework and working propositions



2. Research Method

2.1. Research design

This study employed a qualitative-dominant, descriptive–explanatory case study design with longitudinal and embedded characteristics (Yin, 2018). The case comprised one complete cycle of the Mekaarpreneur incubation program in East Java, observed from the opening session on 6 August 2025 through the Demo Day held on 7 November 2025. The longitudinal nature of the design enabled the researchers to follow the same cohort across thirteen consecutive events. This approach facilitated the identification of when attendance patterns changed and when specific obstacles first emerged, rather than limiting the analysis to a comparison between the beginning and the end of the program. The embedded structure allowed multiple units of analysis to be examined individually and subsequently integrated. These units included the cohort as a whole, the three program phases, the thirteen events (twelve training sessions and one Demo Day), the twelve problem sections contained in the session reports, the 42 curriculum topics, and the seven criteria specified in the Demo Day assessment rubric.

Three considerations informed the selection of a single-case study design. First, the program constituted a bounded intervention with a clearly defined cohort, implementation schedule, curriculum, and set of outputs, thereby establishing explicit case boundaries. Second, the research questions focused on identifying where participant attrition occurred, examining how differences between delivery modes developed over time, and understanding how the nature of the obstacles changed throughout the program. These questions concern how and when phenomena unfold within a contemporary program over which the researchers had no experimental control, making a case study an appropriate methodological choice. Third, the study sought analytical rather than statistical generalization. Accordingly, the findings were related to theoretical propositions derived from incubation, persistence, and digital-divide theory (Figure 1), rather than generalized statistically to the broader population of women micro-entrepreneurs. An experimental or quasi-experimental design was not feasible because all participants received the same intervention and no comparison group was available.

A convergent mixed-methods approach was adopted within the case study (Creswell & Plano Clark, 2018). The quantitative component examined attendance records, program outputs, and curriculum documentation using descriptive statistics. Meanwhile, the qualitative component employed directed content analysis to examine the narrative sections describing problems in the session reports. Both components were conducted in parallel and subsequently integrated during the interpretation stage. This integration involved matching the combined findings against propositions P1–P4. The overall research process is presented in Figure 2, while the operational definitions and measurements of the constructs are provided in Table 1.

2.2. Case and participants

The program was organized by PT Permodalan Nasional Madani (PNM) through its Business Capacity Development Program (Program Pengembangan Kapasitas Usaha) in collaboration with Institut Teknologi dan Bisnis Asia Malang and its business incubator. Participants were women micro-entrepreneurs who are clients of PNM's Membina Ekonomi Keluarga Sejahtera (Mekaar) group-lending scheme in East Java. The initial cohort was defined as the 57 participants present at the opening session on 6 August 2025, and this number serves as the base for cohort-level percentages. Sessions were held weekly on Wednesdays from 08.30 or 08.50 to 15.00 Western Indonesia Time, combining workshops by two resource persons with small-group mentoring. Phase III participants are referred to in the program's data files as the top sixteen, which indicates that entry to the final phase was restricted to a group curated by the program organizer rather than determined by voluntary continuation, the reports do not state the selection criteria.

2.3. Data sources

The study relied on secondary records produced during implementation: (1) three phase reports covering August, September, and October–November 2025, each recording the venue, date, delivery mode, number of participants, mentors, resource persons, topics, results, and problems of every session; (2) the output recapitulations contained in the Phase I and Phase II reports; (3) the Demo Day assessment rubric and jury composition in the Phase III report; and (4) photographic documentation. Attendance and output data for Phase I were analyzed in an earlier and are reused here only as the starting point of the longitudinal trajectory as the starting point of the longitudinal trajectory.

2.4. Measures and analysis

Attendance at session s was expressed relative to the initial cohort, and stability within phase p was measured with the coefficient of variation of session attendance:

$$A_s = n_s / N_0 \times 100\% \quad (1)$$

$$CV_p = \sigma_p / \mu_p \times 100\% \quad (2)$$

where n_s is the number of participants present and μ_p and σ_p are the mean and population standard deviation of attendance in phase p. The delivery-mode gap in each phase was calculated as the difference between mean offline and mean online attendance, expressed in participants and in percentage points of the initial cohort. Net losses between consecutive events were decomposed into within-phase and between-phase losses. Output completion was calculated relative to the participant base of the phase in which the output was required:

$$C_j = O_j / B_p \times 100\% \quad (3)$$

where O_j is the number of participants who produced output j and B_p is the phase base (57 for Phase I and 30 for Phase II). Wilson 95% confidence intervals are reported for proportions to convey their precision. Inferential tests comparing offline and online sessions were not applied because the records are aggregated by session and cannot be linked to individual participants.

Qualitative data from the problem sections of the twelve session reports were analyzed with directed content analysis. An initial coding frame derived from the three levels of the digital divide (access, use, outcomes) was applied, and categories not captured by the frame, such as communication confidence and time constraints, were coded inductively. Each coded segment was tagged with its session number so that the distribution of themes across phases could be displayed in a matrix. Finally, the 42 topics in the curriculum were classified into six domains and mapped onto the seven Demo Day rubric criteria to assess constructive alignment.

2.5. Trustworthiness and ethics

Trustworthiness was supported by triangulating narrative reports with attendance figures, output recapitulations, and photographic documentation. The coding frame and the resulting theme matrix were reviewed by all authors, and differences in interpretation were resolved by discussion. The first author was part of the implementation team; this insider position is acknowledged as a potential source of bias and was counterbalanced by analyzing only documented records. The study used aggregated program data without participant identities, and the program organizer granted permission to use the records for research and publication.

3. Result

3.1. Program design across phases

Table 2 summarizes the design of the three phases. Each phase consisted of four weekly sessions, two offline and two online, although the reasons differed: Session 5 had been planned as an offline session but was moved online at short notice when face-to-face delivery became impossible. The curriculum moved from business foundations in Phase I (mindset, goals, SWOT, market segmentation, competitor analysis, the Business Model Canvas, and a three-month action plan) to branding and digital promotion in Phase II (positioning, names, logos, taglines, storytelling with artificial intelligence, Facebook pages, copywriting, smartphone product photography, and daily content) and finally to financial management, operations, legality, sales, and investor readiness in Phase III (cost of goods and pricing, profit and loss, cash and debt management, stock and forecasting, halal certification, business registration, marketplace selling, pitch decks, and pitching simulation). The mentor team remained the same ten people throughout Phases I and II and was reduced to four in Phase III, so the mentor-to-participant ratio was most favorable in Phase II.

Table 1 Design of the three incubation phases

Phase	Sessions and dates	Mode (offline/online)	Topics (n; per session)	Mentors (ratio to mean attendance)	Outputs recorded
I. Business foundation	S1–S4; 6–27 Aug 2025	2 / 2	13; 3.25	10 (1:4.7)	SWOT, customer mapping, BMC, three-month action plan
II. Branding and digital promotion	S5–S8; 3–24 Sep 2025	2 / 2*	11; 2.75	10 (1:3.0)	Eight branding and promotion outputs (Table 4)
III. Finance, legality, sales, and pitching	S9–S12; 1–22 Oct 2025; Demo Day 7 Nov 2025	2 / 2; Demo Day offline	18; 4.50	4 (1:4.0)	Cost and pricing, legality (not quantified); Demo Day pitch

Source: Phase I–III program reports (2025), processed by the authors. *Session 5 was planned offline and moved online at short notice. BMC = Business Model Canvas. Ratio = mentors to mean session attendance in the phase.

Topic density rose sharply in Phase III, from 2.75 topics per session in Phase II to 4.50. The report for Session 10 notes that, because time was limited, the session concentrated on halal certification while materials on stock management, forecasting, and business registration were distributed as digital documents for self-study.

3.2. Retention trajectory and delivery mode

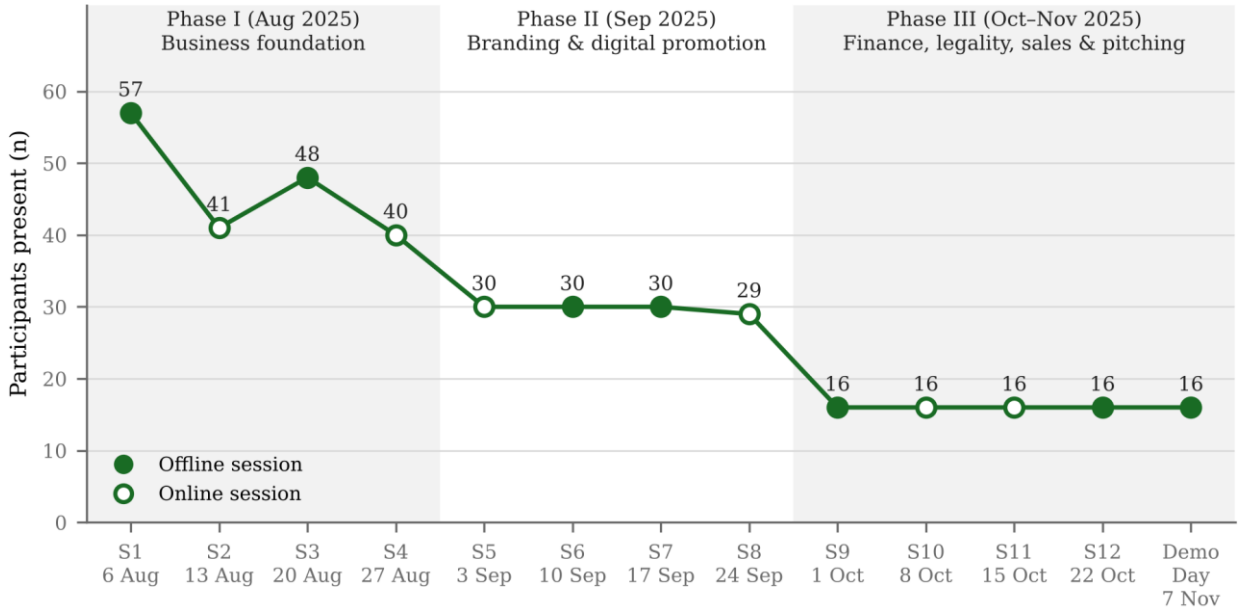
Attendance across the thirteen events is shown in Table 2 and Figure 2. The cohort declined from 57 participants at the opening session to 16 at the Demo Day, a cumulative retention of 28.1%. The trajectory, however, was not a steady decline. In Phase I attendance moved in a saw-tooth pattern, dropping to 41 at the first online session, recovering to 48 when delivery returned offline, and falling to 40 at the second online session. In Phase II attendance was 30, 30, 30, and 29, and in Phase III it was 16 at every session and at the Demo Day.

Table 2 Participant attendance by event and delivery mode

Event	Date (2025)	Mode	Present (n)	Share of initial cohort (%)	95% CI (Wilson)
S1 (kick-off)	6 Aug	Offline	57	100.0	93.7–100.0
S2	13 Aug	Online	41	71.9	59.2–81.9
S3	20 Aug	Offline	48	84.2	72.6–91.5
S4	27 Aug	Online	40	70.2	57.3–80.5
S5	3 Sep	Online*	30	52.6	39.9–65.0
S6	10 Sep	Offline	30	52.6	39.9–65.0
S7	17 Sep	Offline	30	52.6	39.9–65.0
S8	24 Sep	Online	29	50.9	38.3–63.4
S9	1 Oct	Offline	16	28.1	18.1–40.8
S10	8 Oct	Online	16	28.1	18.1–40.8
S11	15 Oct	Online	16	28.1	18.1–40.8
S12	22 Oct	Offline	16	28.1	18.1–40.8
Demo Day	7 Nov	Offline	16	28.1	18.1–40.8

Source: Attendance figures in the Phase I–III program reports (2025), processed by the authors. $N_0 = 57$. CI = confidence interval. *Planned offline.

Figure 2 Attendance trajectory across the incubation cycle



Source: Phase I–III program reports (2025), processed by the authors. Filled markers denote offline sessions; hollow markers denote online sessions.

Table 3 summarizes the trajectory by phase. Within-phase variability fell from a coefficient of variation of 14.6% in Phase I to 1.5% in Phase II and 0% in Phase III. The net loss of 41 participants between the opening session and the Demo Day had two different sources, which must be distinguished. Voluntary attrition accounted for 28 participants (68.3% of the net loss): 18 losses within phases, almost entirely confined to Phase I (17 of 18), and 10 at the transition between Sessions 4 and 5, for which the records indicate no selection step. The remaining 13 (31.7%), between Sessions 8 and 9, reflect administrative curation rather than participant attrition: entry to Phase III was restricted to a top-16 group selected by the organizer, so that 16 of the 29 participants present in the last Phase II session (55.2%) continued. The single largest drop between consecutive events, 16 participants, occurred at the first online session. confined to Phase I (17 of 18). The single largest drop between consecutive events, 16 participants, occurred at the first online session. These patterns support P1 with respect to voluntary attrition, which was concentrated in the first phase and at the transition to the second phase, after which attendance within phases was stable. The reduction at entry to Phase III results from program selection and therefore provides no evidence for or against P1.

Table 3 Attendance stability and delivery-mode gap by phase

Phase	Mean attendance (n)	Share of N_0 (%)	CV (%)	Offline mean (n)	Online mean (n)	Gap (pp of N_0)
I	46.5	81.6	14.6	52.5	40.5	21.1
II	29.8	52.2	1.5	30.0	29.5	0.9
III	16.0	28.1	0.0	16.0	16.0	0.0

Source: Calculated by the authors from Table 2. CV = coefficient of variation (population standard deviation divided by the mean); pp = percentage points; N_0 = 57. Phase III excludes the Demo Day.

The delivery-mode gap followed the same pattern. In Phase I offline sessions averaged 52.5 participants and online sessions 40.5, a gap of 12 participants or 21.1 percentage points. In Phase II the gap was half a participant (0.9 points), and in Phase III there was no gap. The unplanned switch of Session 5 to online delivery did not reduce attendance relative to the offline Sessions 6 and 7. These results support P2. Because the records are aggregated, they cannot show whether the same individuals were present at every session, but the identical counts in Phase III and the near-identical counts in Phase II indicate a stable core group.

3.3. Output completion

Table 4 reports output completion. In Phase I, completion relative to the initial cohort ranged from 73.7% for customer mapping, the only output assigned in an online session, to 100% for the SWOT analysis, with a mean of 85.5%. In Phase II, relative to the phase base of 30 participants, completion of the eight branding and promotion outputs ranged from 93.3% for the logo and social-media content to 100% for the product story, copywriting, and product photographs, with 233 of a possible 240 outputs submitted (97.1%). No output in Phase II was missing for more than two participants. These results support P3. The Phase III report lists cost-of-goods and pricing calculations and business legality as tracked aspects but does not give counts, so Phase III completion could not be quantified.

Table 4 Output completion by phase

Output	Phase	Produced (n)	Phase base (n)	Completion (%)	95% CI (Wilson)
SWOT analysis	I	57	57	100.0	93.7–100.0
Customer mapping	I	42	57	73.7	61.0–83.4
Business Model Canvas	I	48	57	84.2	72.6–91.5
Three-month action plan	I	48	57	84.2	72.6–91.5
Product story and novelty	II	30	30	100.0	88.6–100.0
Product logo	II	28	30	93.3	78.7–98.2
Tagline	II	29	30	96.7	83.3–99.4
Branding and positioning	II	29	30	96.7	83.3–99.4
Copywriting	II	30	30	100.0	88.6–100.0
Content pillars	II	29	30	96.7	83.3–99.4
Product photographs	II	30	30	100.0	88.6–100.0
Social-media content	II	28	30	93.3	78.7–98.2
Phase I total / mean	I	195	228	85.5	–
Phase II total / mean	II	233	240	97.1	–

Source: Output recapitulations in the Phase I and Phase II program reports (2025), processed by the authors. Phase bases: 57 = initial cohort; 30 = Phase II participants.

3.4. Migration of obstacles across phases

Directed content analysis of the twelve problem sections produced six themes, whose distribution across phases is shown in Table 5. In Phase I the dominant obstacles concerned material access and basic platform use: some participants' phones could not run Zoom or Google Classroom, some could not upload assignments despite step-by-step guidance, and some did not complete the online attendance link. Conceptual heterogeneity was also reported, especially difficulty in distinguishing short- and long-term goals and stating them measurably. No access problems were reported after Phase I.

In Phase II the obstacles shifted to the skilled use of digital tools for promotion. Participants were still learning to write prompts for AI-assisted storytelling, many were unfamiliar with Facebook as a promotional channel because they sold mainly through WhatsApp, and they needed more practice with the camera grid, light and contrast adjustment, and background removal. Sustaining a consistent daily content plan was reported as the main difficulty. Financial problems first appeared in Session 8: transactions were not recorded regularly and personal and business money were commonly mixed.

In Phase III the obstacles concerned the capabilities needed to convert business activity into measurable results. Participants found it hard to calculate the cost of goods sold because they did not separate fixed and variable costs; incomplete transaction records made profit-and-loss and cash-flow analysis inaccurate; due dates for debts and receivables were not tracked; marketplace product descriptions and promotional pricing were set incorrectly; sales data were rarely analyzed; financial projections in pitch decks were weak; and several participants lacked confidence when pitching. A delivery constraint, too many topics for the available time, also emerged. This sequence supports P4.

Table 5 Distribution of reported obstacles across phases

Theme (level)	Phase I (S1–S4)	Phase II (S5–S8)	Phase III (S9–S12)
Material access (first level)	Phones incompatible with Zoom or Google Classroom (S1–S4)	Short-notice switch to online delivery (S5)	Not reported
Digital-use skills (second level)	Assignment upload and attendance link difficulties (S1–S4)	AI prompting, Facebook use, photo editing, content scheduling (S6–S8)	Marketplace descriptions and promotional pricing (S11)
Financial capability (conversion)	Not reported	Irregular records; mixing personal and business money (S8)	Cost of goods, fixed vs. variable costs, profit and loss, cash flow, debt and receivables (S9)
Analytical and planning capability (conversion)	Measurable short- and long-term goals (S1)	Not reported	Sales data analysis (S11); financial projections in pitch decks (S12)
Communication and confidence	Not reported	Logo criteria; storytelling structure (S5–S6)	Pitching confidence; explaining the business model (S12)
Delivery constraints	Heterogeneous prior knowledge (S1)	Adjustment to online interaction (S5)	Topic overload; materials moved to self-study (S10)

Source: Directed content analysis of the problem sections of the Phase I–III program reports (2025). Levels follow van Deursen and Helsper (2015) and van Deursen and van Dijk (2019).

3.5. Alignment between curriculum and Demo Day criteria

The Demo Day on 7 November 2025 was judged by four jurors using a seven-criterion rubric, supplemented by consideration of participants' development during incubation and their discipline in submitting assignments. Table 6 maps the rubric onto the curriculum. Three criteria with a combined weight of 45%, namely innovation and product creativity, product quality, and social and environmental impact, were not addressed by any dedicated topic; product diversification was touched on only within the market-expansion topic of Session 12. Presentation and pitching carried 20% of the weight but was supported by three topics (7.1% of the curriculum). Conversely, finance, operations, and legality accounted for 11 topics (26.2%) yet mapped onto a single criterion weighted at 10%. Branding and market criteria (25% combined) were well covered by 18 topics. The ten foundation topics of Phase I were not scored directly.

Table 6 Mapping of Demo Day rubric criteria onto curriculum topics

Rubric criterion	Weight (%)	Curriculum topics addressing the criterion (sessions)	Dedicated topics (n)
Innovation and product creativity	20	No dedicated topic; diversification mentioned within market expansion (S12)	0
Product quality (design, function, packaging)	15	No dedicated topic	0
Market value and potential	15	Segmentation, consumer trends, competitor analysis, sales strategy, marketplace, promotion, loyalty, sales evaluation, expansion (S2, S3, S11, S12)	9

Rubric criterion	Weight (%)	Curriculum topics addressing the criterion (sessions)	Dedicated topics (n)
Branding and business identity	10	Positioning, name, logo, tagline, storytelling, Facebook page, copywriting, photography, editing, catalog, daily content (S5–S8)	9
Social and environmental impact	10	No dedicated topic	0
Presentation and pitching	20	Business communication (S4); pitch deck and business plan; pitching simulation (S12)	3
Business feasibility and sustainability	10	Bookkeeping, separation of finances, cost of goods and pricing, profit and loss, cash, debt, stock, forecasting, halal, legality, registration (S8–S10)	11
Not scored directly	–	Mindset, motivation, goals, SWOT, time management, action plan, BMC, case study, reflection (S1–S4, S12)	10

Source: Demo Day rubric and session topics in the Phase I–III program reports (2025), classified by the authors. Total topics = 42.

4. Discussion

4.1. Attrition as a front-loaded filter

The central finding is that losses were concentrated early and at boundaries, after which the cohort became almost perfectly stable. This pattern is what persistence theory predicts: the first weeks determine whether participants integrate a program into their routines, and those who do so become progressively more committed (Cai et al., 2023). It also fits the distinction between picking-the-winners and survival-of-the-fittest selection (Almeida et al., 2025; Bergek & Norrman, 2008). The Mekaarpreneur cycle combined both: an open first phase in which participants sorted themselves, followed by a curated transition into the final phase. The finding qualifies the common practice of reporting a single completion rate. A retention of 28.1% from opening to Demo Day would look weak as a summary statistic, yet the program kept all but one of the participants present at the start of Phase II until the end of that phase and every participant who entered Phase III.

For women micro-entrepreneurs these front-loading matters because the participants who leave early may be those facing the strongest constraints at home or the weakest digital access. The largest single drop coincided with the first online session, which suggests that the first exposure to remote delivery acted as a filter. Incubators that wish to serve the most constrained women therefore need to concentrate retention support in the first phase, for example through device checks before the first online session, follow-up of absentees by mentors, and flexible catch-up options, rather than spreading effort evenly across the cycle.

4.2. Why delivery mode stopped mattering

The disappearance of the offline–online gap after Phase I is the study's most counter-intuitive result. Experimental evidence shows markedly lower completion of app-based than of in-person business training among women entrepreneurs (Cassidy et al., 2024), and gains from training delivered remotely over Zoom have been found to fade quickly (Davies et al., 2024); the first phase of this program likewise showed a gap of more than 20 percentage points. We offer two theoretically informed interpretations of why the gap disappeared. Both are plausible mechanisms rather than empirically established facts, because the aggregated records do not allow individual participants to be followed and no exit interviews were conducted**.** The first is selection: in line with the first-level digital divide, participants who lacked compatible devices or the skills to join Zoom may have been disproportionately lost in Phase I, so that those who remained had already crossed this divide. The absence of any access problems in the Phase II and Phase III reports is consistent with, but does not prove, this reading, and the curation of the Phase III group may also have favored participants who coped well with online delivery. The second is commitment: in line with persistence theory, once participants had invested several weeks and produced tangible outputs, the cost of joining online sessions may have been outweighed by the perceived value of continuing. The short-notice switch of Session 5 to online delivery, which did not reduce attendance, is compatible with a consolidated cohort. Distinguishing between these mechanisms

would require individual-level attendance data and interviews with participants who left. The absence of any access problems in the Phase II and Phase III reports supports this reading. The second is commitment: once participants had invested several weeks and produced tangible outputs, the cost of joining online sessions may have been outweighed by the value of continuing. The short-notice switch of Session 5 to online delivery, which had no effect on attendance, illustrates the robustness of the consolidated cohort.

The implication is not that online delivery is harmless, but that its exclusionary effect operates at entry. Online sessions can be used safely for a consolidated cohort and for inspirational or conceptual content, whereas early sessions, when the cohort is still forming, should be delivered face to face or preceded by explicit access support. This also means that comparisons of online and offline delivery that are made among survivors will understate the true cost of online delivery for the population originally targeted.

4.3. High completion among retained participants

The near-complete production of branding and promotion outputs in Phase II indicates that, for those who stayed, the program functioned as intended. The most favorable mentor ratio of the cycle (1:3.0), hands-on practice with the participants' own products and phones, and the use of Google Drive with mentor assistance after the upload problems of Phase I probably contributed. These conditions reflect the view that incubation adds value through close interaction between incubator staff and participants rather than through content alone (Made et al., 2025). They also echo our earlier finding that outputs in this program were produced within sessions with mentor support. Completion is not quality, however. The reports describe logos that did not meet design criteria and content plans that participant found hard to sustain, so high completion should be read as evidence of engagement and initial application rather than of mastery.

4.4. From access to accounts: The migration of obstacles

The sequence of obstacles across phases closely follows the layered model of the digital divide. Phase I problems were predominantly first-level problems of material access. Phase II problems were second-level problems of skilled use: prompting AI tools, using Facebook instead of relying solely on WhatsApp, editing photographs, and maintaining a content calendar. Phase III problems were third-level problems in the sense, the capabilities required to convert activity into economic results, especially cost calculation, record keeping, cash and debt management, sales analysis, and the presentation of financial projections. The appearance of financial problems already in Session 8, immediately after the promotion topics, suggests that participants could produce marketing outputs without yet being able to judge whether additional sales would be profitable.

This migration has two implications. First, the binding constraint for women micro-entrepreneurs is not static. Programs that focus on digital marketing, which is the dominant emphasis of recent MSME support (Husna et al., 2025), may remove one constraint only to reveal the next. Second, the order of the curriculum matters. Prior experimental evidence shows that marketing training raises profits mainly by increasing sales, whereas finance training does so mainly by reducing costs and improving records (Anderson et al., 2018); both pathways are needed, and the finance pathway depends on accurate records. Introducing simple rules of thumb for separating personal and business money and for daily recording earlier in the cycle, an approach that has proved more effective than standard accounting instruction among microfinance clients (Drexler et al., 2014), could allow Phase III to build on established records rather than starting from them. Financial literacy may also be a precondition for the effective use of digital financial services by women entrepreneurs depends on accurate records. Introducing simple rules of thumb for separating personal and business money and for daily recording earlier in the cycle, an approach that has proved more effective than standard accounting instruction among microfinance clients, could allow Phase III to build on established records rather than starting from them. Financial literacy is also a precondition for the effective use of digital financial services by women entrepreneurs.

4.5. Curriculum–evaluation alignment

The mapping of the Demo Day rubric reveals a partial misalignment. Nearly half of the rubric weight rewarded product innovation, product quality, and social impact, none of which was addressed by a dedicated topic, while the financial and operational content that occupied a quarter of the curriculum, and that the reports identify as the main remaining weakness, carried only 10% of the weight. Under constructive alignment, such a mismatch means that the competition partly rewards what participants brought to the program rather than what they learned. From a product-evaluation perspective, it also means that Demo Day scores cannot be used on their own to judge the effectiveness of the curriculum (Daniel Stfllebream & Coryn, 2014). The misalignment is easily corrected, either by adding sessions on product development, packaging, and social value or by giving greater weight to financial feasibility and documented progress during incubation, the latter already being considered informally by the jury.

4.6. Theoretical and practical implications

Theoretically, the study shows that participation in women's entrepreneurship incubation is better understood as a staged retention process than as a single take-up decision. Linking persistence theory and incubator selection strategies explains why attrition is concentrated early and why delivery mode loses its effect once a cohort has consolidated. The concept of obstacle migration extends the layered digital-divide framework from individual internet use to the sequencing of entrepreneurial capabilities, suggesting that incubation curricula should be designed to anticipate the next binding constraint rather than to address only the current one. For incubation research, which has focused on technology start-ups (Submission, 2017), the study provides a situated account of how incubation works for microfinance-based women entrepreneurs.

Practically, five design principles follow for PNM and other operators of women's micro-enterprise incubation. Retention support should be concentrated in the first phase, with face-to-face delivery or explicit device and platform support before the first online session. Online delivery can be used more freely once the cohort has consolidated. Simple financial routines should be introduced alongside, not after, digital promotion. Topic density in the final phase should be reduced so that financial and legal content is practiced rather than distributed for self-study. Finally, the Demo Day rubric should be aligned with the curriculum, and a shared individual-level tracking sheet for attendance, outputs, and mentor scores should be maintained across phases.

5. Conclusion

This study traced a complete three-phase hybrid incubation cycle for women micro-entrepreneurs who are microfinance clients in East Java. Attendance fell from 57 to 16 participants, but the loss was concentrated in the first phase and at the two-phase transitions, after which attendance was almost invariant. The offline–online attendance gap, which exceeded 21 percentage points in the first phase, disappeared once the cohort had consolidated, and retained participants completed 97.1% of the branding and digital-promotion outputs required in the second phase. The obstacles reported by facilitators migrated from device access to digital-use skills and then to the financial, analytical, and pitching capabilities needed to convert business activity into results, while the final Demo Day rubric placed heavy weight on criteria that the curriculum did not explicitly address. Incubation for women micro-entrepreneurs should therefore concentrate retention efforts at the start, sequence financial routines earlier, and align evaluation with what is taught.

The study has several limitations. The data are secondary and aggregated by session, so individual trajectories and the reasons for exit could not be observed, and the relationship between delivery mode and attendance is associative. The transition into the final phase involved a curated group whose selection criteria were not documented, so voluntary exit and program selection cannot be fully separated. Output quality, Demo Day scores, and changes in sales or profits were not analyzed, and the first author was part of the implementation team. Future research should collect individual-level panel data on attendance, outputs, and business performance, interview participants who left in the first phase, assess output quality with rubrics, and use a comparison group of Mekaar clients who did not

join incubation to estimate impact. Replicating the analysis in other provinces would show whether the patterns of front-loaded attrition and obstacle migration are general features of hybrid incubation for women micro-entrepreneurs.

Author contributions

First Author: Conceptualization, data curation, formal analysis, investigation, methodology, project administration, visualization, and writing – original draft. Second Author: Conceptualization, methodology, supervision, and writing – review & editing. Third Author: Methodology, validation, supervision, and writing – review & editing. Fourth Author: Validation, supervision, and writing – review & editing.

Conflict of interest

The authors declare no competing financial interests that could have appeared to influence the work.

Publication ethics

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee.

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