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Co-Creation Based Product Innovation: A Case Study of Seratnusa Using the Agile Scrum Approach

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ABSTRACT*: Seratnusa is a sustainability-based enterprise that transforms banana pseudostem waste into fashion and home decor products and has been featured at Paris Fashion Week 2025. Despite this commercial success, product development at Seratnusa has so far relied entirely on the owner's internal perspective, without structured customer involvement, creating a risk that new products may not match market needs and limiting opportunities to expand the craftsmen ecosystem beyond the existing bag and home decor lines. This study aimed to develop a customer-driven product through a sustainable development system, to conduct customer co-creation while measuring customer acceptance, using the Net Promoter Score (NPS) as a proxy for loyalty, and to design a reusable framework for future product development at Seratnusa. A mixed-methods case study design was applied, combining the Agile Scrum framework for iterative product development, thematic analysis for qualitative data from interviews and sprint reviews, and NPS testing with ten independent customers at the end of each iteration. Agile Scrum was selected over Design Thinking, Lean Startup, and Stage-Gate approaches because its iterative, sprint-based structure suits the time and resource constraints of a small enterprise, and its sprint review mechanism inherently operationalizes repeated co-creation with customers. Through two Minimum Viable Product (MVP) cycles, a multifunctional storage product made from banana pseudostem fiber, the Sustainable Everyday Kit, was developed with active customer participation at every sprint stage. The NPS score rose from -40 in MVP 1 to +30 in MVP 2, an increase of 70 points, driven mainly by improvements in workmanship consistency, finishing quality, and material handling identified through sprint retrospectives. Based on these findings, a nine-stage sustainable product development framework and a four-month implementation roadmap were formulated for Seratnusa. This study provides case-study evidence that integrating co-creation with Agile Scrum is associated with improved product market fit and customer acceptance for small, craft based, sustainability oriented enterprises.*

Keywords: *Agile Scrum; Co-creation; Net Promoter Score; Product Innovation; Sustainability*

1. INTRODUCTION

Business competition is increasingly intense, requiring business actors, including micro, small, and medium enterprises (MSMEs), to continuously innovate and create high-quality new products supported by sustainable business systems. One significant opportunity for innovation lies in the utilization of organic waste, a resource that remains largely underexploited. National waste management data indicate that Indonesia generates approximately 69.9 million tons of waste annually, dominated by food waste (41.60%) and plastic waste (18.71%), with households contributing the largest share (44.47%) (Kementerian Lingkungan Hidup dan Kehutanan, 2023), encouraging various initiatives to transform organic waste into economically valuable products. In line with the principles of the circular economy and the Reduce, Reuse, Recycle (3R) approach, small enterprises that process solid organic waste into functional consumer goods have emerged as an important pathway toward more sustainable production and consumption patterns.

One example of such an enterprise is Seratnusa, a sustainability-based business located in Bandung, West Java, that processes banana pseudostem waste into fashion and home décor products. Seratnusa has empowered more than 30 female craftswomen and has been featured at Paris Fashion Week 2025, demonstrating that solid organic waste can be transformed into functional, market-ready products (Asfar et al., 2023), consistent with the growing interest in plant-based leather alternatives such as banana pseudostem fiber as an eco-friendly material for sustainable fashion (Minh & Ngan, 2021). Prior studies on Indonesian agroindustrial MSMEs have similarly shown that structured production-process improvement and market-oriented strategies can strengthen the competitiveness of small enterprises processing local raw materials, for instance through downtime analysis in packaging processes (Rahmawan et al., 2021), economic risk mitigation in organic production (Putri, 2022), marketing-mix optimization for local frozen-food products (Nurfadila et al., 2024), and consumer-segment identification for e-commerce-based agro-food products (Ma'rifat et al., 2025). However, none of these studies specifically examined how structured customer co-creation, combined with an agile iterative development framework, can be used to design new craft-based products from agricultural waste.

Despite Seratnusa's commercial success, all of its product development has so far been based purely on the business owner's own ideas, without any structured co-creation with customers or target markets. Co-creation itself is defined as an interactive process involving at least two parties collaborating to generate mutual value (Frow et al., 2015), and engaging customers as active participants rather than passive subjects allows companies to realign their products with actual market expectations (Harkison, 2018). Customer engagement in the value co-creation process has become a critical foundation of competitive advantage in modern business (Prahalad & Ramaswamy, 2004), and customers who participate intensively in the innovation process tend to generate new products that are more closely aligned with market needs than those developed with low customer participation. Understanding the underlying "job" that customers are trying to accomplish, rather than merely developing new features, has likewise been shown to be central to successful innovation (Christensen et al., 2016). The absence of co-creation at Seratnusa therefore risks a mismatch between the products offered and actual customer needs, and constrains the expansion of its craftsmen ecosystem, which currently focuses only on bags and home décor items. This condition reflects a traditional business model in which the company positions itself as the sole creator of value, rather than treating customers as active partners in innovation. Brand trust and perceived integrity have also been found to shape how customers evaluate ethically positioned products, such as those built around

sustainability narratives, further underscoring the importance of transparent and participatory product development (Bachtiar, 2025).

To address this problem, a systematic, customer-oriented approach is required to design new products that fit the needs of the target market. The Agile Scrum framework was selected as the primary development method over alternative approaches such as Design Thinking, Lean Startup, and Stage-Gate New Product Development, based on three considerations. First, its iterative, sprint-based structure is better suited to an MSME such as Seratnusa, which operates under significant time and resource constraints, allowing incremental product refinement without the lengthy upfront exploration phase typical of Design Thinking or the linear, procedure-heavy decision gates typical of Stage-Gate. Second, the sprint review mechanism inherently operationalizes co-creation, since customers are directly and repeatedly involved in the production cycle at every iteration, unlike Lean Startup, which tends to focus on validating a single business assumption through one Minimum Viable Product without a repeated collaborative cycle with customers. Third, Agile Scrum has been shown to be adaptable beyond software development contexts, as demonstrated by a Scrum-based framework for new product development in the non-software industry (Cano et al., 2021), supporting its relevance for craft-based MSME settings such as Seratnusa. This study therefore applies the Agile Scrum approach as an iterative and collaborative product development framework, combined with the Net Promoter Score (NPS) to measure the level of customer acceptance and loyalty toward the developed product. This research also contributes to the achievement of the Sustainable Development Goals (SDGs), particularly SDG 8 (Decent Work and Economic Growth) through the creation of decent work opportunities for craftsmen, SDG 9 (Industry, Innovation, and Infrastructure) through the development of sustainable creative product innovation, and SDG 12 (Responsible Consumption and Production) through the transformation of organic waste into environmentally friendly products. The novelty of this study lies in the integration of co-creation, Agile Scrum, and NPS within a single iterative case-study framework applied to a craft-based, waste-to-value MSME, an approach that has rarely been documented in the agroindustrial technology literature. This integration generated new knowledge in at least two repects. First, it shows concretely how the Scrum sprint review can function as a recurring co-creation mechanism rather than a one off consultation, so that customer input is embedded in every iteration instead of being collected only at the start or end of development. Second, it demonstrates how NPS can be used as a sprint level feedback instrument, linking specific, iteration by iteration product attributes (e.g., workmanship consistency, finishing quality, material handling) to a measurable shift in customer response, which produces a transferable, evidence based framework for customer driven product development in small, craft based, waste utilizing enterprise. This study is guided the following research questions: (1) how can a functional product be developed based on customer needs through a sustainable system, so that Seratnusa can involve new craftsmen with a different product focus; (2) how does customer co-creation, carried out through the Agile Scrum sprint cycle, relate to changes in customer acceptance as measured by NPS; and (3) what sustainable system can be designed for future product development at Seratnusa, together with a healthy working team. Accordingly, this study aims to: (1) develop a functional product based on customer needs through a sustainable system, so that Seratnusa can involve new craftsmen with a different product focus; (2) conduct co-creation with customers and measure customer acceptance using NPS as a proxy indicator; and (3) design a sustainable system for future product development, together with a healthy working team, for Seratnusa.

2. MATERIALS AND METHODS

This study used a mixed-methods case study design, referring to the Research Onion framework, which encompasses the research philosophy, theory-development approach, methodological choice, research strategy, time horizon, and data collection and analysis techniques (Saunders et al., 2023). This study adopted a pragmatist philosophy, focusing on solving Seratnusa's real business problem through co-creation-based product innovation to generate directly applicable solutions. An abductive approach was used, combining co-creation, Agile Scrum, and product-development theory with empirical findings obtained throughout the research process, with each sprint generating new insights used as the basis for refining the next prototype. The methodological choice was an embedded mixed-methods design, in which quantitative NPS data were embedded within, and interpreted through, the primarily qualitative Agile Scrum development process (Creswell & Clark, 2007) qualitative data were obtained through observation, interviews, co-creation, and sprint evaluation, while quantitative data were obtained through NPS testing. The research strategy applied was action research, in which the researcher was directly involved in problem identification, solution design, prototype development, stakeholder evaluation, and product refinement at every sprint. A longitudinal time horizon was applied through iterative Minimum Viable Product (MVP) testing, in which each test was based on the improvements or feedback obtained from the previous stage.

The object of this study was co-creation-based product innovation at Seratnusa, located in Bandung, West Java. The subjects consisted of the business owner, a production coordinator, craftsmen, external tailors, and customers as key informants. Table 1 presents the inclusion and exclusion criteria used to select each category of participant.

Table 1. Inclusion and Exclusion Criteria of Research Participants

Category	Inclusion Criteria	Exclusion Critria
Owner	Comprehensive knowledge of business, production, and product innovation processes	Unwilling to be interviewed
Coordinator	Involved and active for at least 6 months, understands the production flow	Not involved or inactive for at least 6 months
Craftsman	Active, understands basic product making and has varied experience	Inactive and unwilling to participate in the interview process
Customer	Middle up market segment, willing to give feedback and participate in co-creation	Never purchased the product, unwilling to be interviewed
External tailor	At least 1 year of sewing experience with bag/pouch/organizeer products, active during the study, willing to give input on design and material	Never worked on similar products, cannot provide required information or complete the prototype

Data were collected through in-depth interviews lasting approximately 45–60 minutes, field observation over five working days with strong documentation, and secondary data in the form of field observation documents and company activity reports. Research instruments consisted of interview guidelines, observation sheets, field documentation, the Miro digital collaboration board for structuring the research framework, and Microsoft Office for data processing and report writing.

Product development was carried out using the Agile Scrum method, with a Scrum team consisting of a Product Owner (the Seratnusa business owner), a Scrum Master (the principal researcher), and a Development Team (craftsmen and tailors), following the role definitions established in the official Scrum Guide (Schwaber & Sutherland, 2020). It should be acknowledged that the researcher held a dual role as both Scrum Master, facilitating the entire sprint process, and data collector, recording and analyzing the results of observations, interviews, and NPS testing. This dual position carries a potential risk of bias, including unconscious steering of discussions while facilitating sprints and interpretation bias when analyzing self-collected data. To minimize this risk, three strategies were applied: member checking with the business owner at the end of every sprint to validate the researcher's interpretation of discussion results; data source triangulation, comparing observation results, interviews, and NPS scores so that findings did not rely solely on the facilitator's subjective notes; and transparent documentation of the entire sprint process (photographs, sprint notes, and discussion recordings) to allow verification by other parties. The Scrum Events applied in this study are summarized in Table 2.

Table 2. Description for Scrum Events

Scrum Event	Description	Duration
Sprint Planning	Discussion to determine and plan the sprint backlog	10 – 15 minutes
Daily Stand-up	Recurring short discussion on progress, obstacles, and upcoming tasks	10 – 15 minutes
Sprint	Execution stage of the process according to the agreed sprint backlog	1 week
Sprint Review	End of sprint discussion with the development team and customers to determine features to be improved	60–90 minutes, held at the end of the sprint
Sprint Retrospective	Discussion on additional improvement items and evaluation of errors in the last sprint	45–60 minutes, held at the end of the sprint

Product development was carried out through two MVP iterations (MVP 1 and MVP 2), each concluded with product testing using NPS. A third iteration (MVP 3) had originally been planned but could not be completed due to the time constraints of the academic research schedule; the results of MVP 1 and MVP 2 were therefore used as the basis for a continued-development recommendation. This delimitation means that the findings of this single case study are not intended for direct generalization to other MSMEs, but rather as a contextual contribution and a reference point for similar craft-based enterprises. Qualitative data were analyzed using thematic analysis following the six steps of (Braun & Clarke, 2006) data familiarization, initial coding, theme searching, theme review, theme naming, and report writing. In this study, these six steps were not carried out as a separate, stand-alone coding exercise, but were embedded within each stage of the Agile Scrum process that served as the main research framework; for instance, data familiarization occurred during initial observation and user-story interviews, initial coding during product backlog compilation, and theme naming during the formulation of the MVP 3 development recommendation. Data validity was ensured through two techniques: data source triangulation, comparing information from in-depth interviews with the business owner, field observations, and customer feedback at

each MVP testing stage; and member checking, confirming findings and prototypes with the business owner and customers at every sprint review.

For the quantitative component, purposive sampling was applied, in which ten customers were selected for each MVP testing round based on relevance to the target market. This sample size was chosen for three reasons. First, this study used a mixed-methods approach in which NPS served as a quantitative measurement instrument combined with qualitative thematic analysis, so statistical generalization to a wider population was not the primary objective. Second, this approach is consistent with the principle of product testing in an agile context, where testing with five to ten users has been shown to be sufficient to identify the majority of usability and product-fit issues in an iterative, qualitative-leaning process (Faulkner, 2003) (Sauro & Lewis, 2016). Third, the use of ten respondents per sprint review also reflected the limited customer base of Seratnusa as a growing MSME. Importantly, the ten respondents evaluating each MVP were an independent sample rather than a repeated panel, which allowed each MVP to be assessed without prior-exposure (learning) effects, so that the change in NPS score between MVP 1 and MVP 2 reflects an objective improvement in product quality rather than respondent bias. Customers rated the product on a 0–10 scale, with scores of 0–6 classified as detractors, 7–8 as passives, and 9–10 as promoters. The NPS score was calculated using Equation (1):

$$\text{NPS } \% promoters - \% detractors \quad (1)$$

To avoid ambiguity in measurement, the three main constructs of this study, co-creation, product innovation, and customer loyalty, were operationally defined as shown in Table 3.

Table 3. Operational Definitions of Key Constructs

Construct	Operational Definition	Indicator	Measurement
Co-Creation	An interactive process involving the business owner and customers collaboratively to create added values, operationalized through the DART model	Dialogue, Access, Risk assessment, Transparency	Participatory obsrvation and interviews during user story, sprint review, and sprint retrospective, analyzed with thematic analysis
Product Innovation	The ability to create new products that adapt to changes in market needs and preferences	Products attributes improved in each iteration knitting neatness, finishing, material thickness, color/pattern variation	Comparison of product attributes between MVPs based on customer feedback at sprint review, analyzed with thematic analysis
Customer Loyalty	Customer tendency to recommend the product to others, measured using Net Promoter Score (NPS) as a proxy	NPS score percentage of promoters, passives, detractors	0 – 10 scale rating from 10 respondents per MVP, score calculate as %promoters - %detractors

NPS was selected as a proxy for customer loyalty because of its ease of implementation within the sprint review context: it requires only a single, simple 0–10 scale question, making it repeatable at every iteration without burdening testing time or respondents. Its actionable nature means results can be immediately interpreted into

the improvement backlog for the following sprint (Koladycz et al., 2018). It must nonetheless be acknowledged that NPS fundamentally measures the tendency toward recommendation (word-of-mouth intention) rather than actual repeat-purchase behavior; accordingly, the NPS scores in this study are interpreted as a leading indicator of loyalty, customers' intentions and positive attitudes, rather than direct evidence of actual loyal behavior, which is acknowledged as a measurement limitation when interpreting the results.

3. RESULTS AND DISCUSSION

3.1. Customer Insight and Product Backlog Formulation

Observation of the business owner revealed that although Seratnusa possesses strong sustainability values and an authentic manual production process, product development has been entirely based on the owner's internal perspective without customer involvement. This finding generated the study's problem statement: how Seratnusa can recruit and build a group of craftsmen focused on product categories beyond its existing bags and home décor lines, through new, co-creation-based product innovation supported by a sustainable system. Observation of three customer personas produced user stories reflecting three distinct orientations: customers who prioritize social value and product storytelling, customers who prioritize product function and sustainability, and customers who prioritize self-confidence and product durability. These three orientations were then translated into a prioritized product backlog, summarized in Table 4.

Table 4. Summary of Product Backlog Priorities Based on Customer Needs

User	Product Backlog Item	Priority
User 1	Quality value (color, neatness, behind the story narrative, long term durability)	High
	Active promotion of eco-friendly goods	Low
User 2	Sustainable, functional product with product transparency and minimal production waste	High
	Durable, simple design, boosts self-confidence, careful material selection	High
User 3	Needs based product, usable anytime, recognized beyond one community segment	High / Medium

As shown in Table 4, the majority of customer needs fell into the high-priority category, particularly those related to function, sustainability, and material quality, which subsequently guided the sprint planning stage. This pattern is consistent with agile product-backlog principles, in which the highest-value items are addressed first to maximize the value delivered in each sprint, and reinforces the Lean Startup principle that understanding and prioritizing customer needs before development begins is key to avoiding wasted resources (Ries, 2011).

3.1.2. Sprint Implementation and Development of the Sustainable Everyday Kit

Based on the product backlog, the Scrum team formulated the Sustainable Everyday Kit, a multifunctional storage product made from banana pseudostem fiber with a compartment system that allows customers to organize small items, complemented by a transparency label based on a QR code containing information on the craftsman, production process, and social-environmental impact. The full product

specification agreed upon during sprint planning is presented in Table 5.

In MVP 1, a prototype was developed and tested with customers through a sprint review, using the Value Proposition Canvas and Customer Journey mapping to assess product fit with customer jobs-to-be-done. Feedback from MVP 1 was then translated into improvements for MVP 2, including compartment size adjustment, strengthening of the closure system, and refinement of the transparency label. Each iteration concluded with a sprint retrospective to evaluate both technical constraints and coordination issues with external craftsmen and tailors, so that the team's working pattern became progressively more effective in the following iteration.

Table 5. *Sustainable Everyday Kit Product SPecification*

Aspect	Detail
Main Function	Daily organizer for storing small items in a structured manner
Main Material	Banana pseudostem fiber
Inner Material	Jute (goni)
Additional Material	Unbleached calico (blacu)
Compartment System	3 card slots, 1 cash slot, additional slot for pens/small items
Additional Feature	QR code label, handle, transparency label
Closure System	Zipper
QR Code Content	Craftsman information, production process, materials, social environmental impact
Dimension	20 x 12 x 2 cm
Production Technique	Manual knitting, machine sewing
Target Market	Sustainability conscious consumers

3.1.3. Change in Net Promoter Score (NPS) from MVP 1 to MVP 2

Customer testing at the end of MVP 1 involved ten independent respondents, whose ratings and NPS categories are presented in Table 6.

Based on Table 6, the calculation resulted in 40% detractors, 60% passives, and 0% promoters, yielding an NPS score of 0% − 40% = -40. yielding an NPS score of 0% − 40% = -40. This negative score indicated that the first prototype had not yet fully met customer expectations; according to (Reichheld & Markey, 2011), a negative NPS signals that a company has more dissatisfied than satisfied customers, which can hinder business growth through negative word-of-mouth. However, within the context of Agile Scrum-based research, this negative result was highly valuable information, consistent with Scrum's inspect-and-adapt principle, in which every evaluation outcome, including unsatisfactory ones, is used as the basis for improvement in the next iteration. Priority improvements identified from MVP 1 feedback included the addition of a bag handle, better care of the banana pseudostem material, more consistent material color, refined knitting technique, and the addition of a binder ring.

Table 6. First Stage Product Testing Results Using NPS (MVP 1)

User	Score	NPS Category
User 1	6	Detractor
User 2	6	Detractor
User 3	6	Detractor
User 4	6	Detractor
User 5	7	Passive
User 6	7	Passive
User 7	7	Passive
User 8	8	Passive
User 9	8	Passive
User 10	8	Passive

The MVP 2 prototype incorporated these improvements and was retested with a new, independent group of ten customers, as shown in Table 7.

Table 7. Second Stage Product Testing Results USing NPS (MVP 2)

User	Score	NPS Category
User 1	8	Passive
User 2	8	Passive
User 3	7	Passive
User 4	6	Detractor
User 5	8	Passive
User 6	9	Promoter
User 7	9	Promoter
User 8	9	Promoter
User 9	9	Promoter
User 10	8	Passive

The MVP 2 results yielded 10% detractors, 50% passives, and 40% promoters, producing an NPS score of 40% − 10% = +30. Following NPS convention, the final score is reported as an integer rather than a percentage (Koladycz et al., 2018). Table 8 summarizes the comparative changes between MVP 1 and MVP 2, both in NPS components and in specific product attributes identified during sprint retrospectives.

Table 8. Comparison of NPS Results and Product Attributes Between MVP 1 and MVP 2

Indicator	MVP 1	MVP 2	Change
Detractor	40%	10%	-30%
Passive	60%	50%	-10%
Promoter	0%	40%	+40%
NPS Score	-40	+30	+70 points
Knitting Consistency	Inconsistent	More consistent	Improved based on feedback
Finishing	Less neat	Neater	Stitching tightened
Cover Thickness	Fairly thick	Thinner	Material thickness reduced
Color Variation	1 color	2 colors	Added 1 variation

The increase in NPS score from -40 (problematic category) to +30 (approaching the good category) within a single research cycle is consistent with the integration of co-

creation and Agile Scrum contributing to improved product acceptance, particularly within the context of Seratnusa as an MSME that had never previously conducted structured co-creation with customers. This interpretation should nonetheless be read with caution: because the MVP 1 and MVP 2 scores were obtained from two different, independent groups of only ten respondents each rather than from a repeated-measures panel or a statistical test, the change in score cannot be taken as proof that the product improvements alone caused the shift, and it may also reflect differences between the two respondent groups. Within this limitation, the rise in promoters from 0% to 40% and the decline in detractors from 40% to 10% indicate a positive signal fin recommendation intention, used here as a proxy for customer loyalty, and a potential for sustained growth (Rhamdani, 2021).

In relation to prior findings, a score of +30 also indicates considerable room for further improvement before reaching the good (30–50) or excellent (50–70) categories, consistent with the finding that average company NPS scores typically range only between 5 and 10 (Keiningham et al., 2007) within this context, achieving +30 in an MSME implementing co-creation for the first time can be considered a relatively strong result, broadly in line with prior evidence that products co-created with customers tend to generate stronger recommendation intention and loyalty signals than those developed without such collaboration (Cossío-Silva et al., 2016). Each item of customer feedback was translated directly into the development backlog realized in the subsequent sprint, and every improvement made in MVP 2 directly addressed weaknesses identified in MVP 1 through the sprint review and retrospective process. While this single case cannot establish statistically that customer-driven development outperforms development based solely on internal assumptions, the close correspondence between the feedback recorded at each sprint retrospective and the specific attributes improved in the following MVP is at least consistent with that expectation.

Recommendation for Continued Sustainable Product Development (MVP 3)

Given that the NPS improvement from -40 to +30 already indicated a marked increase in customer acceptance, and in line with the principle of continuous improvement in Agile Scrum, this study did not proceed to a third MVP iteration but instead compiled a structured recommendation for continued development based on the priority backlog obtained from customer, craftsman, and business-owner evaluation. The main weaknesses identified from the MVP 2 sprint retrospective, namely inconsistent knitting, suboptimal finishing, an overly thick cover, limited color and pattern variety, and insufficiently communicated sustainability value, were translated into the recommendations summarized in Table 9, together with a four-month implementation roadmap in Table 10.

Table 9. Basis for Formulating the MVP 3 Development Recommendation

Finding	Evidence	Recommendation
Customer want more color/pattern	MVP 2 sprint review	Develop new colors and patterns
Sustainability value not clearly perceived	Customer feedback	Develop QR story product
Scrum documentation not standardized	Continuity of the system	Standardize scrum documentation templates
No documented quality control SOP	Reducing product defects	Develop a QC SOP and checklist

Table 10. Four Month Development Roadmap

Periode	Activity	Objective
Month 1	Add color/pattern variation create QR story product	Address customer demand for variation strengthen sustainability communication
Month 2	Develop QC SOP and checklist	Reduce inconsistency and ensure uniform product quality
Month 3	Compile new product backlog standardize scrum documentation	Prepare next sprint preserve product development knowledge
Month 4	MVP 3 sprint implementation customer testing and NPS	Implement priority backlog measure customer acceptance

Beyond product-level recommendations, the collaboration with external craftsmen and tailors who possessed skills outside traditional weaving demonstrated that the Sustainable Everyday Kit development opened a genuine opportunity for Seratnusa to expand its partner-craftsmen ecosystem; formalizing this collaboration as a permanent partnership model is recommended as a strategic follow-up. In addition, sprint review sessions revealed that although customers expressed interest in the product, several were aware that eco-friendly products tend to carry a relatively high price, pointing to an unvalidated gap between perceived value and willingness to pay. It is therefore recommended that Seratnusa validate pricing during the MVP 3 iteration using an approach such as the Van Westendorp Price Sensitivity Meter or a simple willingness-to-pay survey, while further strengthening value communication around the sustainable material and the social impact of female craftsmanship as price justification for customers.

3.1.4. Sustainable Product Development Framework for Seratnusa

The implementation of Agile Scrum throughout this study produced a Sustainable Product Development Framework that can serve as a guideline for Seratnusa in developing new products independently in the future. This framework integrates customer needs, product development processes, quality evaluation, and team learning into a single continuous cycle, comprising nine interconnected stages as summarized in Table 11.

This framework is grounded in the Service-Dominant Logic perspective, which holds that product value is not created unilaterally by the company but through collaboration with customers, who act as a source of innovation by contributing ideas, needs, preferences, and direct product evaluation (Lusch, 2015). Because Seratnusa had previously developed products based solely on the owner's intuition, co-creation became an essential foundation for producing innovation more relevant to its target market and with prior evidence that structured agile methods can be adapted for continuous product and service development in small enterprises (Heimicke et al., 2021) (Sjödin et al., 2020). Beyond product outcomes, the application of Agile Scrum throughout this study also proved effective in shaping a healthier team working pattern, through clear role division, open discussion at every daily stand-up, and periodic evaluation at every sprint retrospective, so that the Seratnusa team became not only more productive in output but also healthier in process and working relationships.

Table 11. Sustainable Product Development Framework for Seratnusa

No	Stage	Brief Description
1	Customer observation (customer insight)	In-depth interviews and discussion with the business owner to explore customer needs and material potential
2	User story development	Formulating customer needs, problems, and expectations into user stories
3	Product backlog compilation	Compiling and prioritizing product requirements together with the business owner (co-creation)
4	Sprint planning	Determining product specification and sprint targets
5	Prototype development (sprint)	Production of the prototype by craftsmen and tailors
6	Customer testing & sprint review	Prototype testing with customers and discussion of features to improve
7	Net Promoter Score (NPS) calculation	Measuring the level of customer acceptance and loyalty
8	Sprint retrospective	Evaluating the team's working process and improving practices for the next sprint
9	New product backlog compilation	Re-compiling the backlog based on evaluation results for the next iteration

4. CONCLUSIONS AND RECOMMENDATIONS

This study concludes that development of the Sustainable Everyday Kit, made from banana pseudostem fiber, was successfully carried out through two Minimum Viable Product iterations that actively involved customers at every sprint stage, while also opening an opportunity for Seratnusa to expand its craftsmen ecosystem through collaboration with external craftsmen and tailors. A third iteration (MVP 3) could not be completed due to the constraints of the academic research schedule; the study instead relied on the strong positive trend observed between MVP 1 and MVP 2 to formulate a structured continued-development recommendation. The integration of co-creation with Agile Scrum was associated with improved product-market fit, indicated by an increase in NPS score from -40 in MVP 1 to +30 in MVP 2, a rise of 70 points that accompanied concrete improvements in workmanship consistency, finishing, and material handling; as this change was observed between two independent groups of ten respondents rather than confirmed statistically, it should be read as an encouraging case-study signal rather than definitive proof of causation. This study further produced a nine-stage Sustainable Product Development Framework, accompanied by a four-month roadmap, that Seratnusa can implement independently, while also demonstrating that Agile Scrum implementation helped build a more collaborative and healthy team working culture. As this study relied on a single case study of Seratnusa, its findings and the resulting framework are not intended for direct generalization to other MSMEs, but rather as a contextual contribution and starting point for adaptation by similar craft-based enterprises. It should also be noted that the researcher's dual role as both Scrum Master and data collector constitutes a methodological limitation that, despite mitigation through member checking, triangulation, and transparent documentation, should be addressed in future research by involving an independent external Scrum facilitator.

For Seratnusa, it is recommended to: implement new color and pattern variations based on customer preferences gathered from the MVP 2 sprint review; develop a QR Story Product attached to each item to communicate sustainability values, including information on materials, production processes, and environmental impact; establish a documented quality-control SOP and checklist for the knitting, sewing, and finishing stages; standardize Scrum documentation using a simple template so that the innovation process can continue independently; and formalize the collaboration with external craftsmen and tailors as a permanent partnership model. For future research, it is recommended to complete the MVP 3 iteration to validate the recommendations formulated in this study, particularly regarding color and pattern development, the QR Story Product, and the quality-control SOP; to expand the testing sample size and time span so that NPS results become more representative of the broader market; to explore the applicability of this sustainable product development framework in other natural-material craft MSMEs in Indonesia to test its generalizability and adaptability; and to separate the roles of Scrum Master and researcher/data collector by involving an independent external facilitator, in order to reduce potential facilitator bias in the co-creation process and strengthen the validity of future findings.

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