

Transforming Technical Knowledge into Management Assets through Low-Tech Assistance for the Gradual Digitalization of the KMR Automotive Workshop

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Abstract

Automotive microenterprises often possess strong technical knowledge, but information about spare-part locations, customer complaints, diagnoses, actions, and recommendations may remain dependent on memory and oral communication. This community engagement program aimed to help Kembang Mulia Racing (KMR) translate this knowledge into visible, traceable managerial information as a foundation for gradual digitalization. Six KMR participants, including the owner, Mr. Zainal, took part in participatory diagnosis, co-design, socialization, training, and simulations using Fast-Moving Spare-Part Box Labels and the Kartu Jejak Kerja (KJK), or Work Trace Card. Evaluation was qualitative, drawing on observation, field notes, discussion, documentation, tool inspection, and participant responses. Initial results showed that the labels provided a shared item-location reference, while the KJK was understood as connecting complaints, diagnoses, material use, quality control, and follow-up. Both tools were found understandable, contextually relevant, and feasible for workplace trials. Consistent adoption and economic effects require follow-up evaluation.

Keywords: technical knowledge, low-tech assistance, automotive microenterprise, organizational memory, gradual digitalization

1. INTRODUCTION

Automotive microenterprises rely not only on tools, machinery, and spare parts but also on experiential knowledge accumulated through recurring mechanical problems, customer complaints, material limitations, and locally adapted solutions. Mechanics learn to interpret symptoms, select components, anticipate repair risks, and adjust procedures to particular vehicles. This knowledge supports service quality and practical problem-solving, yet its value as a management asset depends on whether it remains accessible beyond the individual, conversation, or job that produced it.

For micro and small enterprises, close working relationships facilitate rapid informal knowledge sharing but may also make information dependent on individual memory and oral communication. Knowledge identification, storage, retention, and use remain underexplored in SMEs, particularly across their diverse operational contexts (Durst et al., 2023). SMEs also vary in their ability to integrate knowledge-management tools, showing that system availability does not automatically ensure effective knowledge capture and use (Centobelli et al., 2019).

This problem is pronounced in technical microenterprises. A workshop may repair vehicles effectively while being unable to reconstruct previous work because complaints, diagnoses, parts used, technical reasoning, and recommendations are dispersed across memory, notes, invoices, and conversations. Valuable experience may consequently disappear after a job rather than inform future service, stock planning, costing, quality control, and

customer follow-up. The central problem is therefore not insufficient knowledge, but its limited transformation into shareable, traceable, and reusable information.

Digitalization is often proposed as a solution, although smaller enterprises face financial, skill, awareness, strategic, and organizational constraints (OECD, 2021). SME digitalization depends on employee capabilities and strategic direction as well as technological access (Eller et al., 2020); it should therefore be understood as organizational change rather than merely application acquisition (Herari & Marlina, 2024). SMEs must develop capabilities to reconfigure routines and resources (Li et al., 2018), while digital maturity progresses through awareness, exploration, collaboration, and transformation (Garzoni et al., 2020). Grassroots assistance can help SMEs identify their position and proceed systematically (Kääriäinen et al., 2020). This is relevant in Indonesia, where transformation pathways differ according to business conditions and capacities (Priyono et al., 2020).

When operational information remains fragmented, immediate technology adoption may be premature. Digitalization first requires enterprises to identify essential information, make it visible, assign recording responsibilities, and determine its managerial use. Intermediary assistance can support this transition by strengthening knowledge sharing and digital awareness (Crupi et al., 2020). Low-tech assistance thus offers simple, affordable, and adaptable transitional information infrastructure rather than an alternative to digitalization.

Although studies have examined technology adoption, organizational capabilities, digital maturity, and intermediary support, less attention has been given to the pre-digital conversion of tacit technical knowledge into manageable information. This article examines how low-tech assistance can initiate this transformation at Kembang Mulia Racing (KMR), an automotive microenterprise in West Jakarta. It focuses on spare-part visibility through box labels and work visibility through the Kartu Jejak Kerja (Work Trace Card), positioning knowledge organization, documentation routines, and user ownership as prerequisites for gradual digitalization.

2. METHOD

2.1 Approach and Community Partner

This community engagement program employed a participatory qualitative approach to examine how low-tech management tools could help transform technical knowledge into more visible and traceable managerial information. Rather than measuring short-term intervention effects statistically, the approach focused on understanding the partner's existing work practices, the forms of knowledge embedded in those practices, and the initial process through which the proposed tools were interpreted, negotiated, and initially tested.

The program was conducted in collaboration with Kembang Mulia Racing (KMR), an automotive microenterprise located in Kedoya, West Jakarta, Indonesia. KMR was selected because its daily operations illustrate a condition commonly found in small workshops: strong technical expertise exists, but much of that expertise remains embedded in individual experience, oral communication, spatial memory, and informal routines. The owner and mechanics participated as partners in identifying operational problems, validating the proposed tools, conducting simulations, and providing initial feedback. The unit of analysis was not the individual worker, but the workshop's management practices, particularly the flow of information concerning fast-moving spare parts, technical work, customer needs, and service documentation.

2.2 Participatory Diagnosis and Management Practices

The program began with a participatory diagnosis of KMR's operational and information-management practices. The management team observed how spare parts were stored, identified, retrieved, used, and returned; how customer complaints were communicated; how mechanics documented diagnoses and technical actions; and how service activities were connected to stock records, invoices, and financial spreadsheets.

The diagnosis identified four interconnected gaps. First, information about spare parts remained dependent on the physical position of storage boxes and workers' memory because labeling had not been applied consistently. Second, information about customer complaints, diagnoses, technical actions, and recommendations was not documented within a single traceable workflow. Third, customer information had not yet been developed into a service history that could support future follow-up. Fourth, stock records, invoices, and spreadsheets were not consistently connected as a basis for managerial decision-making.

These findings were discussed with the partner to identify solutions that were operationally relevant, sufficiently simple, and unlikely to impose an excessive administrative burden. The discussion produced a three-phase management improvement roadmap:

1. establishing item visibility through the labeling of fast-moving spare-part boxes;
2. establishing work visibility through the Kartu Jejak Kerja or Work Trace Card (KJK); and
3. gradually developing a lightweight database connecting stock, service, customer, invoice, and managerial information.

This article focuses on the design and initial implementation of the first two phases. The third phase is treated as a prospective stage rather than an achieved outcome.

2.3 Co-Design of the Low-Tech Management Tools

Two management tools were developed: the Fast-Moving Spare-Part Box Labels and the Kartu Jejak Kerja (KJK). The labeling system was designed to make the identity and location of frequently used spare parts visible to multiple users rather than known only by particular workers. Each label contained information adjusted to KMR's operational requirements, including the item name or category and the storage location code. Minimum and maximum stock information could also be incorporated when reliable stock data became available.

The KJK was designed to document the trajectory of a workshop job from the vehicle's receipt to its return to the customer. The card included customer and vehicle identification, reported complaints, initial diagnosis, agreed technical actions, spare parts and materials used, working time, use of specific tools or machinery, difficulties or rework, cost components, quality control, technical recommendations, and follow-up requirements. It also provided space for mechanics to record practical considerations or technical knowledge that might be useful in similar work.

Both tools were discussed and validated with the partner. The terminology, information fields, physical format, and proposed usage procedures were adjusted to the workshop's language and working rhythm. This co-design process was necessary because a management tool may be conceptually comprehensive but remain unused when it is too complicated, unfamiliar, or disconnected from actual working practices. Standard operating procedures and user modules were also prepared to support continued implementation after the core activity.

2.4 Implementation of the Core Activity

The core activity was conducted on August 20, 2026. It consisted of the handover and introduction of the fast-moving spare-part labels, training in the use of the KJK, a simulated card-completion exercise, participatory discussion, and an initial qualitative evaluation.

During the labeling activity, the team explained the purposes of the labels, the storage-location coding system, the placement rules, and the importance of returning items to their designated locations. The owner and mechanics were invited to check whether the item categories, terminology, and proposed locations corresponded with actual workshop practices.

The KJK training began by explaining the relationship between technical documentation, internal communication, customer information, spare-part usage, quality control, and managerial decision-making. The team then demonstrated how each section of the KJK could be completed with an example from a typical workshop job. The owner and mechanics participated in the simulation to determine whether the required information could realistically be obtained during the work process without significantly interrupting technical activities.

The discussion was used to identify unclear fields, terminology that required adjustment, and the most realistic division of responsibilities for completing, verifying, and storing the cards. The implementation was therefore treated as an initial process of contextual testing rather than the final introduction of a fixed management system. The overall program consisted of seven stages: participatory diagnosis, tool design, partner validation, labeling implementation, KJK training and simulation, initial qualitative evaluation, and planned follow-up monitoring.

2.5 Qualitative Indicators of Initial Achievement

Because this article reports the core implementation stage, achievement was assessed qualitatively. The evaluation did not attempt to claim sustained adoption, behavioral change, or operational efficiency immediately after the training. Instead, it examined whether the tools were understandable, contextually appropriate, usable, accepted by the partner, and sufficiently relevant to be tested in actual workshop activities.

Table 1. Qualitative indicators for the initial evaluation

Dimension	Evaluative Focus	Evidence
Comprehensibility	Whether the owner and mechanics understood the purposes and procedures of the labeling system and KJK	Training observations, questions raised, explanations provided by participants, and simulation performance
Contextual fit	Whether the terminology, fields, and procedures corresponded with the workshop's actual language and workflow	Partner feedback, field discussion, and proposed revisions
Practical usability	Whether the tools could potentially be used without substantially interrupting technical work	Observation of the simulation and participant reflections
Initial acceptance	Whether the partner was willing to test the tools in actual workshop activities	Verbal commitment, agreed trial procedures, and initial use
Partner ownership	Whether the owner and mechanics participated in validating and adjusting the tools	Decisions concerning terminology, content, placement, and division of responsibilities
Potential continuity	Whether responsibilities for using, checking, and storing the tools could be identified	Role agreement and follow-up plan
Managerial relevance	Whether participants could connect the recorded information with stock control, service history, quality control, costing, and customer follow-up	Evaluative discussion and examples identified during training

These indicators were interpreted as evidence of initial feasibility rather than proof of long-term effectiveness. For example, participants' ability to complete a simulated KJK indicated that the form was initially understandable, but it did not demonstrate that the card would be completed consistently during actual workshop operations.

To interpret the partner's managerial empowerment without reducing achievement to attendance, tool distribution, or verbal acceptance, the study applied a criterion-referenced qualitative continuum. Managerial empowerment was understood as the workshop's increasing capacity to recognize information-management gaps, operate the agreed tools, maintain documentation routines, and use the resulting information for managerial decisions. The level assigned to KMR represented the highest level supported by convergent evidence from observed practices, participant explanations, management artifacts, and implementation agreements. Because the unit of analysis was the workshop's management practice, the classification represented an organizational condition rather than an individual participant score.

2.6 Data Collection

Qualitative data were collected through field observation, field notes, participatory discussions, training and simulation observations, photographic documentation, and inspection of the tools produced during the activity. The team also documented the owner's and mechanics' comments regarding the clarity, relevance, usability, and limitations of the labeling system and KJK. The principal sources of evidence comprised:

1. observations of existing spare-part storage and service-information practices;
2. field notes recorded during the diagnosis and core activity;
3. partner responses during discussion and simulation;
4. photographs of workshop conditions and tool implementation;
5. completed or simulated KJK forms;
6. revisions proposed by the owner and mechanics; and
7. agreements concerning the responsibilities for using and storing the tools.

Data-source triangulation was conducted by comparing observed practices, participant explanations, photographic evidence, and the management artifacts produced during the activity. This process helped prevent conclusions from being based solely on participants' verbal acceptance of the program.

2.7 Qualitative Data Analysis

The data were analyzed using a descriptive thematic approach. The analysis involved four stages. First, field notes, discussion records, observational evidence, photographs, and management artifacts were organized chronologically by program stage. Second, the data were coded according to recurring issues, including dependence on individual memory, visibility of spare parts, documentation of technical work, usability, contextual fit, user acceptance, partner involvement, and potential continuity. Third, the codes were grouped into broader themes that corresponded with the objectives of the intervention: the externalization of technical knowledge, the visibility of operational information, the appropriateness of low-tech tools, and readiness for gradual digitalization. Finally, the interpretations were compared with the partner's explanations and the available physical evidence. The analysis distinguished among three forms of evidence:

Table 2. Analytical Categories Used to Distinguish the Evidence

Dimension	Evaluative Focus
Existing condition	Practices and information gaps identified before the intervention
Initial implementation	Tools, understandings, agreements, and responses observed during the August 20,

outcome	2026 activity
Prospective outcome	Benefits that may emerge only after sustained use and therefore cannot yet be claimed

This distinction was applied to maintain analytical caution. The existence of labels, for example, was treated as an initial implementation outcome, whereas faster spare-part retrieval could only be discussed as a prospective benefit until supported by follow-up observations. Similarly, successful completion of a KJK simulation demonstrated initial comprehensibility but not sustained adoption.

2.8 Follow-Up Evaluation and Digital Readiness

Follow-up evaluation was designed to examine how the labeling system and KJK would be used under actual workshop conditions. The monitoring would focus on the legibility and placement of labels, the consistency of returning items to their designated locations, the practical experience of completing KJK forms, fields that were frequently omitted or misunderstood, the distribution of recording responsibilities, and adjustments proposed by users.

The assessment of readiness for a lightweight database would remain qualitative and evidence-based. KMR would be considered ready to proceed when the labeling system had become part of routine item management, the KJK was used across different types of workshop jobs, essential information could be recorded without substantially disrupting technical work, recorded information was sufficiently consistent to be trusted, and a responsible person had been identified to review and consolidate the data.

Accordingly, digitalization was not operationalized as the immediate procurement or use of an application. It was understood as an organizational readiness process in which relevant information first had to become visible, recordable, traceable, and meaningful to its users. The labeling system and KJK were therefore positioned as low-tech information infrastructures that could prepare KMR for gradual and context-sensitive digitalization.

3. RESULTS AND DISCUSSION

3.1. Technical Knowledge Embedded in Everyday Workshop Practices

The participatory diagnosis showed that Kembang Mulia Racing (KMR) already possessed substantial technical knowledge developed through the owner's and mechanics' practical experience. This knowledge was visible in their ability to identify spare parts, interpret customer complaints, diagnose mechanical problems, select appropriate materials, determine repair procedures, and recommend further maintenance. The workshop's central challenge was therefore not an absence of technical competence. Rather, much of its knowledge remained embedded in individual memory, oral communication, physical routines, and everyday problem-solving.

Information about the location and category of spare parts, for example, was often understood through familiarity with the workshop environment. Experienced workers knew where particular items were usually stored, while others might need to ask or search through several boxes. This arrangement could function under stable conditions, especially when the same workers were present. However, it also made operational information dependent on particular individuals and limited its accessibility as shared organizational knowledge.

A similar condition was identified in the documentation of workshop jobs. Customer complaints, mechanical diagnoses, technical decisions, spare parts used, and follow-up recommendations were commonly communicated directly among the owner, mechanics, and customers. Although this communication supported immediate problem-solving, the information was not always preserved in a single record that could be consulted after the vehicle had left

the workshop. Consequently, a valuable technical experience could end with the completion of a job rather than becoming part of the workshop's cumulative knowledge.

KMR had already used several forms of business documentation, including invoices, stock information, and financial spreadsheets. Nevertheless, these records were not yet consistently connected to the technical activities from which the data originated. An invoice could show the financial value of a transaction, for instance, but might not fully explain the customer's original complaint, the mechanic's diagnosis, the reasoning behind the selected action, or the recommendations given after the work was completed. The initial findings are summarized in Table 3.

Table 3. Initial qualitative findings on KMR's information-management practices

Operational Area	Initial Condition	Managerial Implication
Spare-part identification	Item identity and location partly depended on workers' memory and familiarity	Information was not equally visible to all users
Spare-part storage	Boxes had not been labeled through a consistent system	Searching for and returning items could vary between workers
Customer complaints	Complaints were primarily communicated orally	Initial service needs were not always preserved as traceable records
Diagnosis and technical action	Mechanical reasoning was embedded in individual experience and direct communication	Technical decisions were difficult to retrieve and use for future learning
Material usage	Spare parts and materials were not always connected to a complete work record	Relationships among technical work, stock usage, and cost were difficult to trace
Customer follow-up	Recommendations were generally delivered during direct interaction	Service recommendations could be lost after the customer left
Business data	Information existed across invoices, stock records, and spreadsheets	Available data had not yet formed an integrated basis for managerial decisions

These findings suggest that KMR's initial management problem should not be reduced to being "not yet digital." Introducing a database or application would not automatically solve the problem if information from daily technical work remained incomplete, fragmented, or dependent on memory. The more fundamental need was to make existing knowledge visible, recordable, and shareable before attempting to digitalize it.

The program therefore approached technical knowledge as an asset that needed to be externalized rather than replaced. The Fast-Moving Spare-Part Box Labels and Kartu Jejak Kerja (KJK) were designed as low-tech mechanisms for translating everyday workshop knowledge into managerial information.

3.2. Fast-Moving Spare-Part Box Labels as a Shared Spatial Information System

LOKASI: A1-01	FAST MOVING
BOX RUMAH ROLLER YAMAHA	
• Rumah Roller 54P • Rumah Roller 2DP • Rumah Roller 2SX • Rumah Roller 5TL • Kipas Rumah Roller 54P • Kipas Rumah Roller 2DP • Kipas Rumah Roller 2SX • Kipas Rumah Roller 5TL	
QR STOK	Satuan: PCS Min Stok: 3 Maks Stok: 10

LOKASI: A1-02	FAST MOVING
BOX RUMAH ROLLER HONDA	
• Rumah Roller K44 • Rumah Roller K35 • Rumah Roller KOJ • Rumah Roller GFM • Rumah Roller KVV • Kipas Rumah Roller K44 • Kipas Rumah Roller KOJ • Kipas Rumah Roller KZR	
QR STOK	Satuan: PCS Min Stok: 3 Maks Stok: 10

Figure 1. Fast-Moving Spare-Part Box Labels

The first intervention introduced a labeling system for boxes containing fast-moving spare parts. The intervention was intentionally focused on frequently used items because these items were directly connected to daily operational activities. Beginning with fast-moving spare parts also allowed KMR to test a more structured storage system within a limited and operationally relevant category before applying it more broadly.

The labels contained the item name or category and a location code identifying the relevant rack or box. Their purpose was not simply to improve the physical appearance of the storage area. They were intended to create a shared spatial information system through which workers could identify where an item belonged without relying entirely on individual familiarity with the workshop.

During the core activity on August 20, 2026, the labeling system was handed over and introduced to the partner. The team explained the functions of the labels, the location-coding system, the proposed placement procedure, and the importance of returning spare parts to their assigned positions. The owner and mechanics were involved in checking whether the names, categories, and locations reflected how items were understood and used in actual workshop operations.

Partner involvement in this process was important because a label would have limited practical value if it used classifications that were technically correct but unfamiliar to the workers. The validation process therefore connected formal management objectives with the workshop's vernacular knowledge. The system had to be sufficiently structured to support consistency while remaining close to the language and categories used in everyday work.

The immediate result of the intervention was the availability of a visible and collectively interpretable method for identifying fast-moving spare parts. Knowledge that had previously taken the form of "this item is usually stored there" began to be represented through labels and location codes that could be read by more than one person. In this sense, the labels externalized part of the mechanics' spatial knowledge into the physical working environment.

This initial result should not yet be interpreted as evidence of improved retrieval time, reduced stock discrepancies, or sustained storage discipline. Such changes would require observation during actual use in the workshop. At the core implementation stage, the most defensible result was that KMR had acquired and understood an initial mechanism for converting item-location knowledge into shared operational information.

The labeling system also demonstrated that managerial transformation does not always begin with sophisticated technology. In a microenterprise workshop, physical visibility may be a necessary component of the information infrastructure. A database may show where an item is expected to be stored, but the information will remain unreliable

if workers do not use consistent item names or return the item to its designated physical location. The labels therefore represent an early connection between the physical organization of spare parts and the future reliability of digital stock data.

3.3. The Kartu Jejak Kerja as a Record of Technical Reasoning

Figure 2. Front and Reverse Sides of the Kartu Jejak Kerja

The second intervention was the introduction and training of the Kartu Jejak Kerja, or Work Trace Card. The KJK was designed to record the trajectory of a workshop job from the initial customer complaint through completion of the work to any subsequent recommendations. Unlike an invoice, which primarily records the transaction, the KJK was intended to preserve the technical and operational processes behind it.

The card included information on customer and vehicle identity, reported complaints, initial diagnosis, agreed technical actions, spare parts and materials used, working time, specific tools or machines used, difficulties or rework, cost components, quality control, recommendations, and required follow-up. It also provided space for recording technical considerations that might be relevant to similar work in the future.

The training conducted on August 20, 2026 began with an explanation of the relationship between technical documentation and workshop management. The team demonstrated that recording a customer complaint was not only an administrative task; it established the initial reference against which diagnosis, action, and final quality could be evaluated. Similarly, documenting spare-part usage could support not only service transparency but also stock control, costing, and future procurement.

The team demonstrated how each section of the KJK could be completed through an example based on a workshop job. The owner and mechanics then participated in the simulation. This process allowed the participants to examine whether the requested information was available during the work process, whether the terminology was understandable, and whether completing the card could be incorporated into existing responsibilities.

The immediate result was the establishment of a common understanding of how one workshop job could be documented as a connected information journey. Before the intervention, different elements of a job could be distributed across oral communication, individual memory, short notes, and invoices. The KJK brought these elements into a single sequence: complaint, diagnosis, action, material usage, quality control, and follow-up.

Table 4. KJK Functions

Technical Information	KJK Component	Potential Managerial Value
Customer's account of the problem	Initial complaint	Establishes a clear starting point for the job
Mechanic's interpretation of the problem	Diagnosis	Preserves technical reasoning and supports future reference
Agreed repair or modification	Technical action	Clarifies the scope of work
Parts and materials consumed	Spare-part and material record	Connects technical work with stock control and costing
Time, difficulty, and rework	Work-process record	Supports reflection on workload and operational constraints
Final inspection	Quality control	Creates evidence that the completed work was checked
Mechanic's advice	Recommendation and follow-up	Supports continuity of service and customer relationships
Practical technical insight	Technical notes	Converts individual experience into reusable workshop knowledge

The KJK did not replace mechanics' professional judgment. Instead, it provided a structure through which that judgment could leave an informational trace. This distinction is important because formalization can sometimes be perceived as an attempt to standardize work that depends on experience and situational interpretation. In this program, documentation was intended to preserve contextual reasoning rather than reduce technical work to a rigid checklist.

The simulation also positioned the KJK as an internal communication tool. If a job were transferred between workers, the card could provide information on the customer's complaint, actions already taken, parts used, and remaining recommendations. This would reduce dependence on a single worker's availability to explain the full history of the job.

Nevertheless, the training and simulation only demonstrated initial comprehensibility and perceived relevance. They did not establish that the KJK would be completed consistently under actual workload conditions. Its practical sustainability would depend on whether the number of fields, the terminology used, and the division of recording responsibilities remained compatible with the workshop's working rhythm.

3.4. Initial Partner Response and Qualitative Feasibility

The initial evaluation focused on how the partner understood and responded to the two tools rather than on numerical measures of adoption. The core activity provided qualitative evidence related to comprehensibility, contextual fit, practical usability, initial acceptance, partner ownership, and potential continuity.



Figure 3. Fast-Moving Spare-Part Storage Boxes After Label Installation at KMR

The owner's and mechanics' participation in validating the labels and simulating the KJK indicated that the tools could be discussed through the language of actual workshop activities. The participants were not positioned only as recipients of a pre-designed intervention. Their operational knowledge was required to determine whether item categories were recognizable, whether the location system corresponded with physical storage, and whether the KJK fields represented information that could realistically be obtained during a job.

The simulation further enabled the team to observe how participants interpreted the relationships among customer complaints, technical diagnoses, spare-part usage, and managerial documentation. The capacity to follow the simulated information flow provided initial evidence that the general logic of the KJK was understandable. However, understanding during a facilitated activity could not be equated with independent and sustained use. Table 4 presents the interpretation of the initial implementation.

Table 5. Initial Evaluation

Evaluation Dimension	Initial Evidence	Interpretation	Current Limitation
Comprehensibility	Participants followed the explanation and KJK simulation	The basic purposes and information flow could be communicated to the partner	Understanding during training does not demonstrate independent use
Contextual fit	The owner and mechanics participated in validating item names, categories, locations, and KJK fields	The tools could be adjusted to the workshop's terminology and routines	Further adjustments may emerge during actual use
Practical usability	The tools were examined through physical placement and a simulated workshop case	Their use appeared operationally possible at the introductory stage	The effect of workload on completion remains unknown
Initial acceptance	The partner received the tools and participated in their introduction and testing	There was initial willingness to trial the intervention	Willingness does not guarantee consistent adoption
Partner ownership	Partner knowledge informed the validation and proposed use of the tools	The intervention was negotiated rather than imposed	Ownership must be reinforced through continued involvement

Evaluation Dimension	Initial Evidence	Interpretation	Current Limitation
Potential continuity	Roles for completing, checking, and storing information were discussed	The program began to identify the human responsibilities behind the tools	Role performance must be observed during follow-up
Managerial relevance	The training connected technical records with stock, costing, quality control, and customer follow-up	Participants were introduced to the broader value of technical documentation	The actual use of records in decision-making has not yet been established

The findings demonstrate why qualitative indicators were appropriate for the initial stage. A numerical count of distributed labels or printed cards would say little about whether the tools were meaningful to their users. Conversely, positive participant responses alone would also be insufficient. Initial feasibility was therefore interpreted through the combination of observed participation, simulation, partner feedback, validation decisions, and the management artifacts produced.

The findings indicate that low-tech tools can provide an accessible entry point for management improvement when they are connected to familiar objects and practices. The labels were attached to storage boxes that workers already used, while the KJK followed a service process that the mechanics already understood. The intervention did not introduce an entirely new logic of work; it made the existing logic more visible and traceable.

At the same time, the initial findings underline that simplicity is not an inherent characteristic of a paper-based tool. A form can still become burdensome when it contains unfamiliar terms, requests information at an inappropriate stage, or lacks a clear person responsible for completing it. The suitability of the labeling system and KJK therefore depends on continued negotiation between the management objectives of the tools and the temporal realities of workshop work.

3.5 Initial Level of Business-Management Empowerment

Based on the criterion-referenced qualitative continuum, KMR was positioned at Level 2, or guided managerial capability, during the initial implementation stage. The participating owner and mechanics identified the managerial relevance of the recorded information, validated the terminology and physical placement of the labels, related KJK fields to stock control, costing, quality control, and customer follow-up, and participated in a facilitated completion exercise. These findings extend beyond the passive receipt of management tools because the partner contributed operational knowledge to their validation and proposed use.

Nevertheless, Level 2 should not be interpreted as evidence of independent or institutionalized management practice. The available evidence was produced during training, discussion, validation, and simulation. Level 3 would require repeated use of the labels and KJK under actual workload conditions without direct facilitation, including evidence that responsibilities for completion, verification, and storage were performed consistently. Level 4 would require evidence that accumulated records were independently used in managerial decisions and prepared for integration into a lightweight database. Accordingly, the present empowerment level represents an initial managerial capability rather than a completed transformation.

3.6 From Individual Experience to Organizational Memory

Taken together, the two interventions addressed different but related forms of workshop knowledge. The labeling system focused on the visibility of physical items, while the KJK focused on the visibility of technical work. The first translated spatial memory into a shared storage reference; the second translated technical reasoning into a traceable service record.

This relationship can be understood as a movement from individual experience toward organizational memory. Organizational memory in this context does not require a complex digital knowledge-management platform. It begins when information can remain available after the immediate activity or conversation has ended. A label keeps knowledge of an item's location visible when a particular worker is absent. Similarly, a KJK allows the job history to remain accessible after the mechanic has completed the work.

The transformation is particularly relevant to a microenterprise because small organizations frequently rely on close interpersonal communication and flexible roles. Such flexibility can support rapid problem-solving, but it may also cause knowledge to remain inseparable from particular people. When workloads increase, personnel change, or customers return after a long period, the absence of a traceable record may limit the workshop's ability to reconstruct previous decisions.

The program therefore did not treat tacit technical knowledge as an inferior form of knowledge. Practical knowledge remains essential in diagnosing mechanical conditions that cannot always be captured through standardized categories. The managerial challenge was to identify which parts of that knowledge should be recorded to support coordination, customer service, stock management, costing, and future learning.

The labels and KJK created an initial mechanism for this selective externalization. They did not attempt to document every detail of mechanical work. Instead, they focused on information that could connect technical practice with managerial needs. This balance is important because excessive documentation could interrupt technical work, while insufficient documentation would fail to create useful organizational memory.

.Low-Tech Assistance as a Foundation for Gradual Digitalization

The initial results show that the labeling system and KJK performed complementary information functions. The labels began to answer two basic questions: what item is stored, and where does it belong? The KJK began to answer a different set of questions: what problem was reported, what diagnosis was made, what action was taken, what parts were used, and what should happen next? The relationship among the two tools can be summarized as follows:

Table 6. Low-Tech Information Layers and Their Potential Digital Connections

Information Layer	Low-tech tool	Information Made Visible	Possible Future Digital Connection
Physical items	Fast-moving spare-part labels	Item identity and storage location	Stock and procurement records
Workshop jobs	KJK	Complaints, diagnoses, actions, materials, and quality control	Service and work-history database
Customers	KJK	Vehicle identity, service needs, and follow-up recommendations	Customer and service-reminder records
Transactions	KJK and existing	Relationship between	Costing and financial

Information Layer	Low-tech tool	Information Made Visible	Possible Future Digital Connection
	invoices	technical work and financial value	reporting
Technical knowledge	KJK technical	Practical reasoning and lessons from completed work	Searchable organizational knowledge

At this stage, KMR cannot yet be described as having completed a digital transformation. No integrated database was implemented as part of the reported core activity. The program's initial contribution was the development of information practices that could eventually make digitalization more meaningful and reliable.

This finding supports a process-oriented understanding of digitalization. For a workshop microenterprise, the first question should not necessarily be which application to adopt. More fundamental questions concern what information needs to be recorded, who will record it, when it will be recorded, how its accuracy will be checked, and how it will support actual decisions. Without answers to these questions, an application may only reproduce existing fragmentation in digital form.

The low-tech intervention therefore functioned as a preparatory information infrastructure. Labeling introduced a shared logic for identifying and locating physical items. The KJK introduced a shared logic for recording the progression of technical work. If these practices become stable, their information can later be transferred into a lightweight database without requiring the workshop to redesign its entire information process at the point of digitalization. The transformation can also be interpreted through the ALIH process:

1. Amati (Observe): examining actual workshop practices and identifying where information remained invisible or dependent on memory;
2. Lacak (Trace): creating ways to trace spare parts, service actions, material usage, and technical decisions;
3. Integrasikan (Integrate): progressively connecting physical labels, work records, customer information, invoices, and stock data; and
4. Habituasikan (Habituate): embedding the use of the tools through repeated practice, feedback, and adjustment.

The reported activity primarily covered the observation, design, and initial tracing stages. Integration and habituation remain continuing processes that require evidence from actual use. The ALIH process should therefore be understood as a gradual management pathway rather than a claim that all stages have already been completed.

3.8. Boundaries of the Initial Results and the Need for Follow-up

The findings presented in this article are limited to the participatory diagnosis and the initial implementation through August 20, 2026. The study can therefore report the identification of information gaps, the development and introduction of the two tools, the partner's participation in validation and simulation, and the tools' initial qualitative feasibility. It cannot yet claim sustained adoption, increased efficiency, improved stock accuracy, stronger customer retention, or readiness for full digital integration.

Follow-up evaluation is necessary because management tools may be understood during training but abandoned when users return to routine work. The next stage should examine how the labels and KJK interact with actual workload, time pressure, role distribution, and existing habits. Particular attention should be given to labels that

become unreadable or misplaced, KJK fields that are frequently left blank, responsibilities that remain ambiguous, and information that users regard as unnecessary or difficult to record.

The decision to proceed to a lightweight database should consequently be based on qualitative evidence of organizational readiness. Such readiness would be indicated when workers routinely refer to the labels, items are returned according to the agreed location system, KJK records are produced across different types of jobs, essential information is sufficiently clear and consistent, and a responsible person reviews and stores the records. If these conditions are not yet present, the appropriate response is not to accelerate digitalization but to simplify and strengthen the underlying information practices.

Overall, the initial implementation indicates that KMR's technical knowledge can begin to be transformed into a managerial asset through tools that remain close to the workshop's physical environment and working language. The Fast-Moving Spare-Part Box Labels made item-related knowledge more visible, while the KJK created a structure for preserving the trajectory of technical work. Their primary achievement at this stage lies not in measurable efficiency gains but in creating an initial bridge between technical experience, shared information, and future managerial decision-making.

The findings also suggest that gradual digitalization is most credible when it begins with the organization of knowledge rather than the acquisition of technology. In KMR's case, the immediate task was to ensure that essential information could first be recognized, recorded, discussed, and traced. Only after these practices become part of everyday workshop routines can digital tools meaningfully extend (rather than merely imitate) the workshop's management system.

4. CONCLUSION

This community engagement program demonstrates that transforming technical knowledge into a management asset can begin with simple, context-sensitive interventions rather than sophisticated digital technology. At Kembang Mulia Racing, the primary constraint was not insufficient technical competence but the limited visibility and traceability of knowledge embedded in individual memory, oral communication, spatial familiarity, and everyday routines. The Fast-Moving Spare-Part Box Labels established a shared reference for frequently used parts, while the Kartu Jejak Kerja provided a structured record connecting customer complaints, diagnoses, technical actions, material use, quality control, and follow-up recommendations. Partner validation and facilitated simulation positioned KMR at Level 2 of business-management empowerment, indicating guided managerial capability but not yet independent use, sustained adoption, or operational improvement. These findings position low-tech assistance as preparatory information infrastructure through which an automotive microenterprise can develop the documentation practices required for gradual digitalization. The ALIH pathway: Amati (Observe), Lacak (Trace), Integrasikan (Integrate), and Habituasikan (Habituate), conceptualizes the progression from identifying information gaps to embedding integrated practices, although the current evidence relates primarily to observation and initial tracing. Follow-up monitoring is required to determine whether the tools can be used consistently, maintained under actual workload conditions, and employed independently in managerial decision-making. A lightweight database should therefore be introduced only when these information practices have become sufficiently stable and reliable, allowing digitalization to extend rather than merely reproduce existing workshop routines.

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