

Level of Micro, Small & Medium Enterprises (MSMEs) Involvement in the Manufacturing Productivity Management (MPM): Basis for an Enhanced Productivity and Management Program

Patrick Evan E. Alegre¹

^a *patrickalegre22@gmail.com*

Bataan Peninsula State University, Balanga City, Bataan, 2100, Philippines

Abstract

This study evaluates the operational efficacy of the Manufacturing Productivity Management (MPM) system among Micro, Small, and Medium Enterprises (MSMEs), focusing on the critical relationship between organizational involvement and technical process implementation. Utilizing a mixed-methods research design, baseline data were collected across key technical dimensions—including plant layout, machine utilization, and operational workflows—to assess current productivity frameworks. Quantitative analysis revealed significant variations in program engagement based on distinct business profiles, alongside a strong, positive correlation between active enterprise involvement and the successful implementation of core technical enhancements. Concurrently, qualitative evaluation identified critical operational challenges and institutional opportunities encountered by MSMEs during program execution. These combined empirical findings provide a data-driven foundation for a newly proposed Enhanced Productivity and Management Program designed to mitigate systemic implementation barriers. Ultimately, this research offers an actionable framework for optimization, demonstrating that structured consultation interventions and aligned stakeholder engagement are vital for sustaining long-term operational efficiency and industrial scaling in the MSME sector.

Keywords: manufacturing productivity management; MSME; operational efficiency; mixed-methods research; operations management; enterprise optimization

1. Introduction

Micro, Small, and Medium Enterprises (MSMEs) are critical drivers of economic growth, innovation, and job creation, yet their success is often hindered by financial constraints, inadequate managerial skills, and technical barriers (Jain & Jain, 2022; Paul, 2024). To address these challenges, the Department of Science and Technology (DOST) provides targeted support through programs like the Manufacturing Productivity Extension (MPEX) and Manufacturing Productivity Management (MPM), which offer consultancy, lean manufacturing training, and digital integration to modernize production processes (Catacutan & Onuh, 2023; Veseli et al., 2024). In Region III, these initiatives specifically target the Metals and Engineering sector, helping firms adopt best practices and technological upgrades to enhance efficiency. However, a significant

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research gap exists as most studies treat MSMEs as a monolithic group, failing to account for how business size and resource levels impact program engagement and technical implementation (Pedraza, 2021). Furthermore, there is a lack of established metrics to assess the extent to which these interventions are integrated into daily operations. This study employs a mixed-methods approach to evaluate MSME involvement and identify barriers, such as financial constraints and resistance to change (Sarita, 2025b). Ultimately, the findings provide an evidence-based foundation for an Enhanced Productivity and Management Program, serving as a roadmap to bridge talent gaps, optimize institutional support, and boost the region's long-term industrial competitiveness (Zhu et al., 2023).

1.1 *Objectives of the Study*

The primary objective of this study is to assess the level of involvement of Micro, Small, and Medium Enterprises (MSMEs) in the Metals and Engineering sector in Manufacturing Productivity Management (MPM) by the Department of Science and Technology, as well as the implementation of Technical Areas, which will serve as the basis for a proposed Enhanced Productivity and Management Program.

Specifically, this study sought answers to the following questions:

1. How may the profile of the MSMEs be described in terms of business size, years of operations, and services offered?
2. What is the level of MSMEs' involvement in the MPM in terms of awareness of MPM initiatives, participation, adoption of practices, resource utilization, and collaboration or partnership?
3. How may the following MPM Technical Areas of the MSMEs be described in terms of plant layout, machines and equipment utilization, and process and operations?
4. Is there a significant difference in the level of involvement of MSMEs across profiles?
5. Is there a significant relationship between the level of MSMEs' involvement and the Technical Area-related factors?
6. What challenges and opportunities do MSMEs face?
7. What enhanced productivity and management program may be proposed based on the study results?

1.2 *Framework of the Study*

The diagram below shows the general structure and the study's guide.

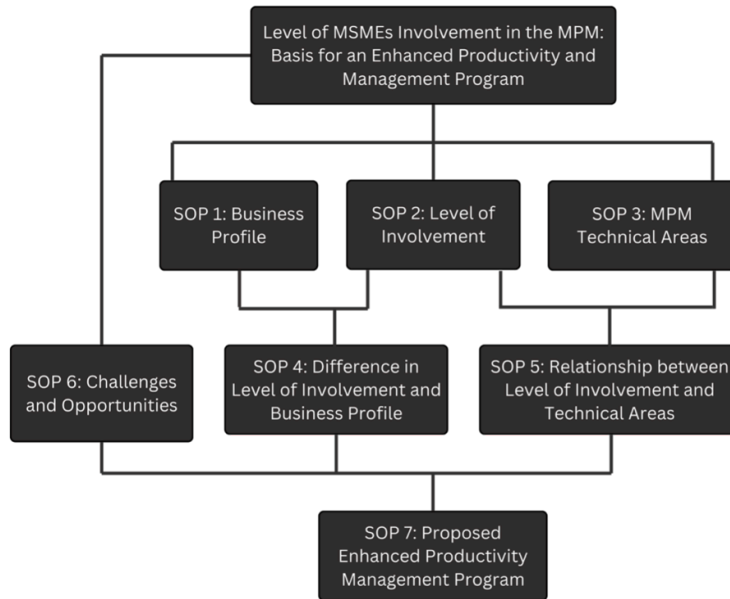


Fig 1. Proposed Original Model Conceptual Framework.

The study commences with the acquisition of foundational data via SOP 1, SOP 2, and SOP 3, which determine the business profile, the existing engagement in productivity initiatives, and the state of MPM technical domains, including plant layout, machine and equipment utilization, and processes and operations. The baseline variables are investigated through two main perspectives: SOP 4 examines significant differences in the level of involvement across business profiles. SOP 5 examines the significant relationship between involvement and implementation of technical activities.

Alongside this quantitative analysis, SOP 6 outlines the qualitative difficulties and opportunities faced by MSMEs throughout the program. Ultimately, all these findings—the profiles, degrees of involvement, technical implementations, correlations, and qualitative obstacles—combine to establish the evidence-based framework for SOP 7: the Proposed Enhanced Productivity and Management Program.

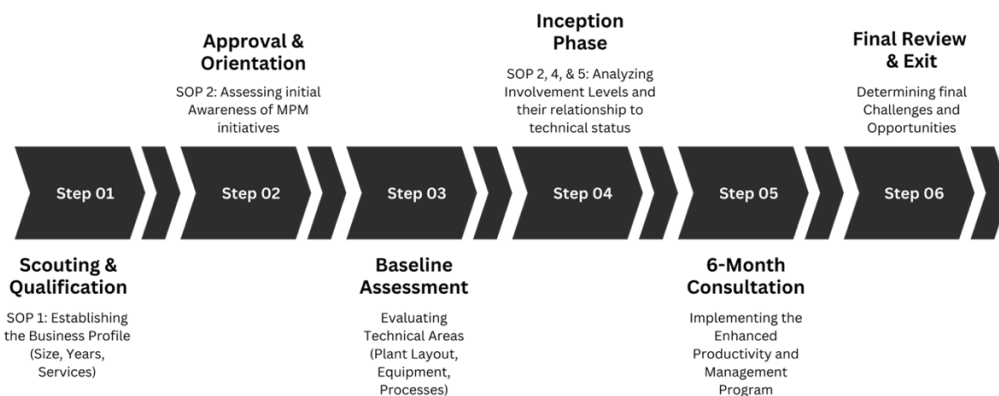


Fig 2. MPM Program with Research SOP.

The first steps of the Manufacturing Productivity Management (MPM) system are scouting and qualification. This provides the strategy for conducting research and creating basic enterprise profiles. The next step, Approval and Orientation, checks how well the enterprises in the study first understood MPM plans. The program uses the Baseline Assessment to identify problems in technical areas such as plant layout, equipment utilization, and operations and processes. During the Inception Phase of the cycle, the researcher examines the level of MSME involvement with MPM and how this relates to the current technical status. The core 6-month Consultation is the major intervention point for implementing the study's Enhanced Productivity and Management Program. The last step in the process is Final Review and Exit. This is where the challenges and opportunities facing MSMEs will be identified.

2. Methodology

This study employs a sequential explanatory mixed-methods research design to assess the extent of MSMEs' engagement in Manufacturing Productivity Management (MPM) and the implementation of Technical Areas in Region III. The descriptive component categorizes MSMEs by business size, operational duration, and services provided, while assessing their engagement in MPM through awareness, participation, practice adoption, resource use, and collaboration. It evaluates the degree of implementation in the Technical Area, encompassing plant layout, machine utilization, and operational processes. Descriptive statistics, including frequency, percentage, mean, and standard deviation, are employed to encapsulate the data.

The correlational component identifies significant variances and correlations among MSME characteristics, their degree of MPM involvement, and the implementation of Technical Areas. Inferential statistical methods, such as the Spearman Rho Correlation Coefficient, and the Kruskal-Wallis H-test are employed for analysis.

A mixed-methods strategy enhances the study by employing structured survey questions for quantitative data and semi-structured key informant interviews, alongside document analysis, to generate qualitative insights. Thematic analysis, utilizing Braun and Clarke's six-phase framework, is employed to interpret qualitative replies.

The research examines 25 deliberately selected MSMEs in the Metals and Engineering sector in Region III, particularly those involved in manufacturing and engaged in MPM projects under DOST. Research instruments undergo expert validation and pilot testing to ensure validity and consistency.

The methodology combines quantitative and qualitative methods to provide a comprehensive analysis of MSME involvement in MPM and Technical Area implementation.

3. Results and Discussion

Table 1. Profile of the Respondents

Business Size	Frequency	Percentage
Micro Enterprise	13	52%
Small Enterprise	10	49%
Medium Enterprise	2	8%
TOTAL	25	100%

Years of Operation	Frequency	Percentage
1 to 3 years	0	0%
4 to 6 years	8	32%

7 to 10 years	11	44%
more than 10 years	6	24%
TOTAL	25	100%

Services Offered	Frequency	Percentage
Machine Shops	9	36%
Metal Fabrication	13	52%
Others	3	12%
TOTAL	25	100%

Table 1 details the profiles of the 25 participating MSMEs, categorized by firm size, operational tenure, and services provided. The majority are Micro Enterprises (52%), followed by Small (40%) and Medium (8%) firms, reflecting the region's typical industrial structure. While no firms have fewer than three years of experience, most have operated for 7 to 10 years (44%), followed by 4 to 6 years (32%) and over a decade (24%), suggesting a well-established respondent base. In terms of services, Metal Fabrication is predominant (52%), followed by Machine Shops (36%) and other related services (12%). Overall, the sample consists of experienced micro and small enterprises primarily focused on metal fabrication and machining within the metals and engineering sector.

Scale	Descriptive Rating
3.25 – 4.00	Fully Implemented / Strongly Agree
2.50 – 3.24	Implemented / Agree
1.75 – 2.49	Poorly Implemented / Disagree
1.00 – 1.74	Not Implemented / Strongly Disagree

Table 2. Summary of Level of Involvement

Level of Involvement	Average Mean	SD	Descriptive Rating
Awareness of MPM Initiatives	3.54	0.43	Strongly Agree
Participation in MPM	3.61	0.45	Strongly Agree
Adoption of MPM Practices	3.47	0.48	Strongly Agree
Resource Utilization	3.36	0.47	Strongly Agree
Collaboration	3.54	0.46	Strongly Agree
Overall Average Mean	3.50	0.41	Strongly Agree

MSMEs' "Strongly Agree" mean score of 3.50, ($SD = 0.41$), $SD = 0.41$, indicates strong participation in the Manufacturing Productivity Management (MPM) program. Participation was the most rated dimension, followed by awareness and collaboration. This shows that these firms are actively involved in MPM operations, aware of program objectives, and aligned with consultants and partner organizations. MPM abilities and resource handling scored well, while resource utilization scored worse. MSMEs have the expertise and intent, but resource optimisation is still a key area for improvement. Overall, the data shows a proactive sector focused on productivity, efficiency, and market competitiveness. MPM has helped several companies implement lean, quality control, and process optimization. This success relies on government support—specialized training, consultation, and technical funding—to establish a collaborative environment. Larger organizations thrive under these programs, but smaller firms often need more targeted, "high-touch" coaching to translate gains into operational success fully. The high involvement levels found drive sustainable

growth, but they also highlight the need for institutional support and specific interventions, particularly to close the resource utilization gap.

Table 3. Summary of Level of Implementation

Level of Implementation	Average Mean	SD	Descriptive Rating	Interpretation
Plant Layout	3.40	0.67	Strongly Agree	High
Machines and Equipment Utilization	3.58	0.45	Strongly Agree	High
Process and Operations	3.48	0.45	Strongly Agree	High
Overall Average Mean	3.49	0.4	Strongly Agree	High

The mean score of 3.49 indicates strong adoption of Manufacturing Productivity Management (MPM) technical components. Machine and equipment utilization received the highest rating (3.58), indicating that MSMEs are efficiently managing, maintaining, and exploiting their physical assets to ensure continuous and efficient production cycles. While processes and operations (3.48) and plant layout (3.40) also showed high implementation, the data suggest a structured, methodical approach to operational procedures is popular across the sector. The narrow range of mean scores and low standard deviations indicates good technical consistency among surveyed firms. Despite these positive results, plant layout received the lowest rating, suggesting MSMEs should maximize space use and workflow design. Systematic Layout Planning (SLP), lean manufacturing, and simulation modelling can eliminate bottlenecks and improve spatial efficiency, according to academic research. Integrating predictive maintenance and sophisticated scheduling systems could improve equipment dependability and operational performance. Ultimately, MSMEs are dedicated to technical excellence. These enterprises are improving regional competitiveness and manufacturing performance by balancing efficient machinery utilization with organized procedures and new productivity tactics.

Table 4. Level of Involvement vis-à-vis Business Size

Variables	H-value	p-value	Interpretation
Awareness of MPM Initiatives	1.09	0.58	Not Significant
Participation in MPM	0.65	0.72	Not Significant
Adoption of MPM Practices	0.14	0.93	Not Significant
Resource Utilization	0.06	0.97	Not Significant
Collaboration	1.74	0.42	Not Significant
Overall	0.59	0.75	Not Significant

At the .05 level of Sig.

The Kruskal-Wallis H-test results indicate that there are no significant differences in MSME involvement in Manufacturing Productivity Management (MPM) across business sizes. Micro, small, and medium enterprises exhibit similar levels of awareness, participation, practice adoption, resource utilization, and collaboration. This suggests that firm size does not determine how actively an MSME engages in MPM initiatives. The findings imply that efforts to improve MPM awareness and implementation have been consistently applied across all MSME categories. Policymakers and development agencies should therefore focus on inclusive support programs that address the common challenges faced by MSMEs of all sizes, rather than assuming that larger enterprises naturally have higher engagement or capacity.

Table 5. Level of Involvement vis-à-vis Years of Operation

Variables	H-value	p-value	Interpretation
Awareness of MPM Initiatives	0.7	0.7	Not Significant
Participation in MPM	0.11	0.95	Not Significant
Adoption of MPM Practices	1.43	0.49	Not Significant
Resource Utilization	2.32	0.31	Not Significant
Collaboration	0.69	0.71	Not Significant
Overall	0.59	0.75	Not Significant

At the .05 level of Sig.

The table shows that Manufacturing Productivity Management engagement does not differ significantly by enterprise age. The ~~pb~~ ^p-values were continuously above 0.05 for awareness, involvement, practice adoption, resource use, and collaboration. This fails to reject the null hypothesis, showing no substantial variance by operation year. These data imply that a business's duration does not drive its MPM participation. Newer and older MSMEs are equally engaged, suggesting that operational experience does not affect commitment to productivity. The results suggest that external and structural factors, including equal training, institutional support from DOST, and individual management commitment, drive participation. This shows that productivity programs work regardless of an enterprise's maturity.

Table 6. Level of Involvement vis-à-vis Services Offered

Variables	H-value	p-value	Interpretation
Awareness of MPM Initiatives	0.84	0.66	Not Significant
Participation in MPM	3.04	0.22	Not Significant
Adoption of MPM Practices	1.14	0.57	Not Significant
Resource Utilization	0.92	0.63	Not Significant
Collaboration	0.4	0.82	Not Significant
Overall	0.82	0.66	Not Significant

At the .05 level of Sig.

The table indicates that the type of service an MSME provides—whether machine shop operations, metal fabrication, or other related services—does not significantly influence its engagement in Manufacturing Productivity Management (MPM). Since all p-values were greater than 0.05, there were no significant differences in awareness, participation, practice adoption, resource utilization, or collaboration across service groups, indicating that MSMEs are equally involved in MPM initiatives regardless of industry sector. This suggests that participation in MPM is driven more by common factors such as government support, access to training, management commitment, and resource availability rather than the specific nature of the business. Because no service category demonstrates a clear advantage or disadvantage in engagement, productivity development programs should remain inclusive and accessible to all MSMEs. However, while overall participation levels are consistent, tailoring strategies to address the specific operational needs of different sectors may further enhance MPM integration, improve productivity, and strengthen overall competitiveness.

1.1. Challenges

1.1.1. Organizational and Behavioral Challenges

Resistance to Change:

"Our team had been used to doing things a certain way for years, so introducing new systems and processes took time, training, and a lot of patience."

-MSME 1

"We have to change employees as the old employees do not want to make a change."

-MSME 3

"The hardest part was keeping everyone involved. We are a small team, and sometimes people feel it is extra work instead of improvement."

-MSME 7

Managerial Doubts and Problems:

"At first, some of our team and even I were hesitant about the changes from the MPM/MPEX implementation."

-MSME 1

"When we changed our layout, production slowed at first. It took time before workers adjusted, and some processes even became more confusing."

-MSME 5

"Change takes time and practice to get right."

-MSME 7

The findings show that organizational and behavioural factors substantially impact MSMEs' productivity reform adoption and sustainability. MPM efforts need a systematic change management plan due to low engagement, resistance to transformation, and managerial hesitation.

Productivity management human factors include organizational and behavioural issues. Poor worker involvement and managerial hesitance initially slowed advancement, according to the report. Most MSMEs achieve behavioural congruence and performance through participatory leadership and training. Micro, Small, and Medium Enterprises (MSMEs) should invest in attitudes and motivation, alongside machinery and processes, to boost productivity. This is crucial for staying successful.

1.1.2. Financial Constraints

Budgetary Constraints:

"Some of the changes required investment, like new tools or machines, which we could not afford all at once."

-MSME 10

"Some upgrades we wanted to do right away had to be scheduled gradually because of budget constraints."

-MSME 1

Upgrade Cost:

"Our old machines cannot do everything the consultants suggested. Money was also a problem, so we could not upgrade right away."

-MSME 5

"Karamihan ng rekomendasyon ay may gastos sa makina at training."

(Translation: "Most of the recommendations involve expenses for machinery and training.")

-MSME 6

Financial limitations are the biggest barrier to MSME manufacturing productivity management. MPM provides important frameworks and technical assistance, but cost constraints prevent many organizations from fully utilizing its benefits (Banerjee, 2023). MSMEs adjust slowly and creatively with external collaborations despite financial difficulties.

Thus, any comprehensive development strategy from the study should focus on financial empowerment methods that enable MSMEs to turn MPM proposals into continual productivity increases. They must prioritize long-term viability.

1.1.3. Technological Limitations

Outdated Machinery:

"Our old machines cannot do everything the consultants suggested."

-MSME 5

"Ang mga luma naming makina rin ay limitasyon."

(Translation: "Our old machines are also a limitation.")

-MSME 6

Impracticality of Technologies:

"The technology I requested for the MPM/MPEX program was not suitable for our business because our customers often requested changes in design."

-MSME 8

"Certain recommendations also needed advanced tools or technology that we did not have on hand, and investing in them meant stretching our budget."

-MSME 1

MSMEs' MPM implementation is hindered by technology. Old equipment, inadequate technology, and a lack of technical expertise impede operating efficiency and creativity. These issues demonstrate that upgrading technology requires capacity-building, context adaptability, and infrastructure development (Chibueze, 2022). MSMEs must overcome technology impediments to adopt more efficient, sustainable production methods. Successfully shifting boosts local and global competitiveness. Flexibility is crucial to this technique.

1.1.4. *Lack of Technical Skills and Competence*

Lack of Technical Skills:

"Some required skills were not readily available within our team, so we had to either train people or outsource, which took time."

-MSME 1

"Limited labor skills made it hard to apply new methods from the MPM/MPEX program, since our work involves detailed handcrafting."

-MSME 9

These findings show a structural issue. MSMEs frequently lack access to formal training programs, certified trainers, or adequate financial resources to fully develop their workforce. Bridging the skills gap is therefore more than only intention or desire. It also involves practical possibilities. If ongoing upskilling is discontinued, efforts to apply modern manufacturing approaches are likely to underperform or stagnate.

These points show that human capital serves both as an important asset and a potential barrier to MSME progress. For effective adoption of recent manufacturing techniques, companies must align workforce competencies with new process demands through gradual upskilling initiatives, mentorship, and strategic collaborations. Otherwise, the advantages of advanced methods can stay mostly unrealized (Brozović et al., 2023).

1.1.5. *Inadequate Training and Development Programs*

Inadequacy of Training:

"Kaya ng mga tao matuto kung may training, pero dahil kulang ang budget, basic lang muna ang naipatupad."

(Translation: "The personnel are capable of learning if training is provided, but due to budget constraints, only basic improvements have been implemented thus far.")

-MSME 6

"Our workers needed more training to adapt, and our old machines cannot do everything the consultants suggested."

-MSME 5

These statements reflect how short-lived most training programs in MSMEs appear to be. Training tends to be episodic and brief rather than integrated into regular capacity-building strategies. Productivity gains under such conditions remain partial and fragile: launching a system can initially boost efficiency, but the lack of ongoing learning opportunities means workers may revert to previous habits over time, reducing the long-term impact (Bakare et al., 2024).

Institutionalizing continued learning alongside adaptation is important within organizational procedures. For MSMEs, establishing environments where ongoing education occurs—even as incremental and sensitive to available resources—may help strengthen employee skills, encourage innovative approaches, and modernize the workforce's abilities and firm processes over time. To sum up, productivity improvement involves more than system adoption; creating an environment in which staff continue to develop their competencies remains essential.

1.1.6. Time Constraints and Competing Priorities

Time Constraints:

"We could not just stop production to make adjustments, so we had to find ways to implement changes without disrupting our commitments to customers."

-MSME 1

"Finding time to focus on the program while still handling all our customer orders."

-MSME 8

Learning and skill development often compete with short-term productivity goals. Because businesses cannot afford to stop production, training, or the adoption of new technologies, these activities could be delayed, fragmented, or applied inconsistently. Over the long term, this restricts the firm's ability to fully utilize novel methods or achieve complete efficiency gains, since employees miss structured opportunities to acquire, practice, and consolidate new skills. By adopting more structured teaching programs, accessible supports designed around capacity-building concepts, and a shift toward working cultures that favor continuous learning, MSMEs may overcome these gaps. If investment is made in people—not only in machinery—the enterprise may build a sustainable base to support productivity enhancement and innovation goals.

1.1.7. Operational and Process Efficiencies

Workflow Disruptions:

"When we first applied the new plant layout and introduced updated machines and processes, we quickly realized it was not as smooth as we had hoped... Some machines were not positioned for optimal workflow, causing delays as materials had to be moved back and forth."

-MSME 1

"When we changed our layout, production slowed at first. It took time before workers adjusted, and some processes even became more confusing."

-MSME 5

Implementation Adjustments:

"Sa proseso lang po medyo bumagal sila dahil hindi sanay sa proseso pero tiyagaan lang po."
 (Translation: " They slowed down a bit in the process because they are not used to it yet, but they are just persevering through it.")

-MSME 2

"The new steps slowed us down at first. We learned that change takes time and practice to get right."

-MSME 7

"The challenge was applying new methods while keeping up with customer deadlines. Sometimes we went back to old ways when work got too heavy."

-MSME 5

"Some processes did not align well with our actual day-to-day operations. These hiccups led to longer lead times, increased costs, and a small quantity of frustration for the team."

-MSME 1

Operational and process inefficiencies necessitate temporary sacrifices when adopting productivity enhancement programs. Altered layouts, procedural changes, and technology introductions commonly confuse at the initial stage, with output slowing until the workforce fully adjusts and operations become stable over time (Ghelani, 2021).

While operational inefficiencies are temporary and unavoidable during transitions, successful MSMEs often navigate transformations through adaptability alongside planned learning efforts. So, the MPM program needs ongoing operational support and tailored process design to help MSMEs make adjustments smoothly towards sustained efficiency improvements.

1.1.8. Collaboration and Communication Difficulties

Limited Time of Consultation:

"Maganda ang tulong nila pero medyo maikli ang consultation. Mas matagal na gabay sana ang kailangan."

(Translation: " Their assistance is good, but the consultation period is quite short. What is needed is a longer period of guidance.")

-MSME 6

"We wanted more time for consultation."

-MSME 7

Scheduling Difficulties:

"Sometimes their schedule was hard to follow."

-MSME 5

"Mostly on scheduling. Sometimes it took a while before we could set meetings or visits, which slowed down the progress."

-MSME 9

These kinds of delays have major consequences as they may result in loss of momentum. For programs that plan to improve productivity levels, timely participation is crucial; extended breaks between consultations or follow-ups reduce continuity, obstruct reinforcement of new practices, and could decrease motivation among workers. When smaller enterprises must handle strict production planning with a limited workforce, any disturbance in the program rhythm disproportionately impacts success compared to larger organizations (Yun,

2021).

Regular, well-structured scheduling is not only an administrative matter but also a major factor in ensuring the effectiveness and continuity of productivity initiatives. By addressing scheduling limitations with a flexible, adaptive strategy, MSMEs can access greater benefits from consulting programs while maintaining operational stability.

1.1.9. Communication Barriers and Technical Understanding

Communication Barriers:

"Some technical terms and processes also took a while for us to grasp fully, so applying them on the ground was not always straightforward."

-MSME 1

"The technical terms were not easy to understand, so we needed more explanations."

-MSME 5

"One difficulty we faced during the MPM/MPEX engagement was the lack of clear communication at the start... we did not fully understand how to explain our production needs."

-MSME 8

Although the MPM initiative provides useful know-how on technology aspects, its achievements depend mainly on how efficiently MSMEs interact with consultants and maintain engagement over time. The difficulties identified—scheduling issues stemming from limited consultation time and language barriers—highlight the need to foster an open culture that supports continuous dialogue and mentorship during program delivery (Sarita, 2025b).

Where communications remain straightforward yet accessible throughout the consulting period and beyond, MSMEs can adapt recommendations and apply them precisely, ensuring sustainable enhancements that go beyond temporary advice sessions and lead to stronger overall impacts through manufacturing productivity strategies.

1.1.10. Time and Production Pressure

Balancing Difficulty:

"We could not just stop production to make adjustments, so we had to find ways to implement changes without disrupting our commitments to customers."

-MSME 1

"Finding time to focus on the program while still handling all our customer orders."

-MSME 8

Decline in Productivity:

"When we rearranged our layout, production slowed down for a while because everyone was adjusting to

the changes.”

-MSME 9

“At first, the technology we adopted slowed us down as we were still grasping how to use it properly.”

-MSME 8

The topic concerning time pressure in the production outlines tension between consistency and renewal inside MSMEs. While many enterprises see value in boosting productivity, daily tasks and client obligations often limit the time and resources available for innovation. A lack of available hours for training or experimental work leads several firms to delay or weaken their MPM applications.

However, findings indicate that MSMEs possess resilience to respond adaptively. Through carefully timed, gradual actions, they introduce enhancements without risking operational interruption. So, any plan that plans to raise MSME output should take temporal limitations as seriously as financial or technical barriers, helping ensure time supports rather than blocks sustainable manufacturing progress.

1.2. Opportunities

1.1.11. Enhanced Operational Efficiency and Competitiveness

Enhanced Operational Efficiency:

“Manufacturing productivity management is the backbone of our operations... we can deliver quality products on time, minimize waste, and control costs.”

-MSME 1

“Tinulungan kami nito para mapabilis at mapaayos ang aming negosyo.”
(Translation: "This helped us to speed up and better organize our business.")

-MSME 2

The discussion emphasizes that MSMEs with few resources may compete if they are organized. An MPM gives you the discipline and structure you need to keep an eye on, review, and continuously change operations. This promotes efficiency and responsiveness, enabling MSMEs to meet client requirements while remaining cost-effective (Ramadhona et al., 2023a).

The topic suggests that MPM is more than just technical methods. It helps keep operations going and makes them more competitive. It teaches MSMEs how to use resources wisely, maintain high quality, and meet market expectations for long-term success. Sometimes, small and medium-sized businesses struggle to grow.

1.1.12. Strategic Process Innovation and Capacity Building

Strategic Process Innovation:

“We streamlined our workflow, reorganized workstations, and adopted simple but effective scheduling tools.”

-MSME 1

“Mas maayos ang schedule at gamit. Nabawasan ang delay at mas mabilis ang delivery.” (Translation: "The schedule and resources are better organized. Delays were reduced, and delivery has become faster.")

-MSME 6

“We introduced better scheduling and inventory systems, which helped reduce delays and wasted materials.”

"Simple things like fixing workflow, setting clearer schedules, and organizing tools better really helped."

-MSME 9

-MSME 7

There is a clear link between MSMEs taking part in MPM programs and adopting process-based innovation. Many MSMEs increased production without employing expensive or complex technologies by reorganizing workstations, improving inventory management, and standardizing procedures (Purnomo & Purwandari, 2025d). Companies can use structured productivity programs to reduce waste and downtime and enhance operations. Training and consulting made staff more aware of technology and more disciplined in their work, yet some companies noticed they lacked sufficient resources. These changes make process-driven management superior to informal practices, thereby making the business more competitive and sustainable (Panting, n.d.).

1.1.13. Emerging Market and Innovation Opportunities

Emerging Market and Innovation Opportunities:

"Implementing the recommended practices opened doors we did not expect. We were able to automate some tasks and explore new markets."

-MSME 1

"Opo sa tinging namin naging mas competitive kami kumpara sa dati."
(Translation: "Yes, we believe we have become more competitive compared to before.")

-MSME 2

"Mas naging competitive kami sa local market." > (Translation: "We became more competitive in the local market.")

-MSME 6

"Yes, the implementation of recommended practices helped us uncover new opportunities. By collaborating with other manufacturing companies that generously shared their expertise, we were able to identify more efficient processes and better understand the technology needed for our setup. This not only improved our competitiveness but also opened doors to potential new markets we had not considered before."

-MSME 9

"Yes, it improved the quality of our work and made us more reliable with delivery times. That gave us a better chance to compete locally."

-MSME 10

The findings show that the MPM program benefits MSMEs strategically and commercially beyond internal procedures. Enhancing workflow efficiency, product quality, and delivery reliability gives companies confidence to automate, adopt digital tools, enter new markets, and diversify. Productivity increases innovation readiness and competitiveness, allowing enterprises to handle greater orders and meet local and export market demands. MPM also promotes innovation by gradually shifting from traditional to technology-driven and collaborative techniques (Panting, n.d.). Although preparation depends on resources and capacity, even smaller MSMEs benefit from laying the groundwork for sustainable growth.

1.1.14. Human Capital and Digital Growth Opportunities

Human Capital and Digital Growth Opportunities:

“Our team gained valuable training that boosted their skills and confidence... It opened our eyes to digital tools that could simplify operations.”

-MSME 1

“Nalaman namin na kailangan talaga ng proper training ang mga empleyado kapag may mga bagong makinarya.”

(Translation: "We realized that proper training for employees is truly essential whenever there is new machinery.")

-MSME 4

“Our participation in the MPM/MPEX program opened up valuable opportunities for employee and technical development. Through workshops and expert consultations, our team gained practical knowledge in process improvement, quality assurance, and lean manufacturing. These learnings encouraged us to strengthen internal training and promote a culture of continuous learning.”

-MSME 9

“Our team learned to use some basic digital tools to track production, and they became more conscious of efficiency.”

-MSME 10

The findings show that MSMEs need trained and adaptive workers to maintain productivity gains. Technical training, mentoring, and exposure to new management practices and digital tools through structured programs such as MPM increase human capital, enabling workers to improve processes and solve problems actively (Nurqamarani et al., 2021). Digital transformation is still in its early stages for many organizations, but awareness and progressive adoption of digital technologies indicate readiness to upgrade operations. Despite financial and infrastructure constraints, MSMEs are gradually motivated to embrace technology. Workforce capabilities and digital readiness boost productivity, innovation, and competitiveness, preparing MSMEs for market changes and Industry 4.0 trends (Nugraheni et al., 2025).

1.1.15. Sustainability and Continuous Improvement Commitment

Sustainability and Continuous Improvement Commitment:

“We plan to sustain the gains by continuously training our team and investing in equipment upgrades.”

-MSME 1

“Continuous improvement sa pamamagitan ng pag adopt ng mga bagong makinarya.”

-MSME 4

“Itutuloy namin ang simpleng improvements at dahan-dahan mag-iinvest kung may budget.”

(Translation: "We will continue with the simple improvements and gradually invest if there is a budget.")

-MSME 6

“Moving forward, our firm plans to sustain and expand the benefits gained from the MPM/MPEX engagement by continuing to apply the recommended practices that have proven effective in our operations.”

-MSME 9

The data suggest that MSMEs are moving from one-time productivity programs to continual development. Maintaining operational advantages from MPM and planned, progressive modernization and adaptation are now a matter of sustainability. MSMEs are institutionalizing training, process reviews, reinvestment, and collaboration with other enterprises to improve learning and efficiency. As companies balance operational needs with strategic goals, they mature (Mudau et al., 2024). Many make incremental changes to be competitive and resilient despite financial constraints (Monteiro et al., 2019). Enforcing productivity principles in daily operations promotes sustained growth, continuous learning, innovation, and alignment with industry standards, making the manufacturing sector more stable and competitive.

1.3. *Enhanced Productivity and Management Plan for Enhancing MPM Implementation Among MSMEs*

Area	Objectives	Strategies/Activities	Success Indicators
Awareness of MPM Initiatives	Increase MSME comprehension of MPM concepts and benefits	• Conduct MPM orientation sessions • Develop an MSME-friendly MPM handbook • Provide visual process guides and infographics	Increased awareness survey
	Improve accessibility of technical concepts.	• Simplify terminologies • Provide translated modules (Filipino/vernacular) • Offer short-video explainers	MSME self-reported clarity and comprehension
Participation in MPM Activities	Sustain and deepen participation	• Implement attendance monitoring • Introduce participation incentives • Conduct peer-sharing sessions	More consistent attendance
	Strengthen commitment	• Create continuity plans • Assign MPM consultants to each firm	Reduced reversion to old practices
Adoption of MPM Practices	Enhance employee readiness	• Hands-on workshops • Coaching sessions on workflow improvement	More consistent attendance
	Strengthen commitment	• Change management seminars • Skills upgrading courses	Reduced reversion to old practices
Resource Utilization	Improve MSMEs' ability to optimize materials, workforce, and machines	• Introduce material tracking sheets • Train in waste-reduction techniques	10% reduction in reported waste
	Ensure access to funding.	• Fast-track SETUP enrollment • Link MSMEs to government financing (DTI, CDA, LGU)	The number of MSMEs receiving funding increases

Collaboration and Partnerships	Strengthen DOST-MSME communication	● Establish helpdesk/hotline ● Regular follow-up visits ● Online support groups	Higher satisfaction ratings
	Build an MSME learning network.	● MSME cluster meetings ● Peer mentoring	Number of peer sessions held
Plant Layout Optimization	Ensure smooth transition	● Phased layout changes ● Provide mock-up layout plans	Increased workflow efficiency
	Provide feasible alternatives	● Recommend incremental layout adjustments	Improved productivity flow
Machines and Equipment Utilization	Ensure appropriate tools	● Link firms to SETUP ● Provide equipment leasing options	Number of upgraded machines
	Build technical proficiency	● Hands-on machine usage training ● Maintenance workshops	Reduced downtime
Process and Operations Improvement	Strengthen process mastery	● SOP development ● Role-specific training	Fewer production errors
	Improve scheduling efficiency	● Introduce production planning tools ● Demand forecasting training	Reduced bottlenecks

The summary of the enhanced productivity and management program outlines seven strategic focus areas designed to address the specific challenges identified in the Manufacturing Productivity Management (MPM) study. To bridge awareness gaps, the plan emphasizes the creation of strengthened information tools and simplified technical guides to ensure MSMEs understand program concepts. Participation and adoption challenges are addressed through engagement incentives, accountability measures, and specialized change-management training to improve employee readiness and reduce resistance to new practices.

To overcome resource limitations and implementation bottlenecks, the focus shifts to securing funding linkages, providing equipment support, and offering technical assistance to optimize resources. Collaboration issues are managed through more frequent follow-ups and established communication channels to ensure concerns are handled efficiently. Finally, workforce and technology gaps are addressed through continuous upskilling and digital readiness initiatives. Overall, these interventions aim to create a sustainable framework that optimizes plant layout, machine utilization, and general operations within the MSME sector.

4. Conclusion

The investigation's findings indicate that MSMEs in the Metals and Engineering sector in Region III are mature, stable, and highly proactive businesses that recognize the strategic importance of DOST's productivity initiatives. Because no significant differences were found across business profiles, it is concluded that the desire to improve productivity is universal and unaffected by firm size or experience.

Furthermore, the strong relationship between involvement and implementation demonstrates that technical success in manufacturing is primarily dependent on managerial awareness and active participation. However, it is also concluded that, while technical recommendations are sound, their full implementation is frequently hampered by "human factor" barriers, such as resistance to change and small firms' financial inability to modernize aging equipment.

1.4. Recommendation

To address awareness and technical comprehension gaps, DOST and productivity consultants should create MSME-friendly handbooks and simplified visual process guides, translated into the local language. This will help to overcome the reported communication barriers and the difficulty MSMEs have in understanding specialized technical terms.

To improve resource utilization and equipment modernization, MSMEs should be more aggressively linked to government financing programs, such as the SETUP program, which provides the capital required for technological upgrades. In addition, firms should implement the proposed material tracking sheets and waste-reduction techniques to address the inefficiencies identified in material and workforce management.\

MSME owners should prioritize phased or incremental layout changes over total reconfigurations to reduce workflow disruptions and worker confusion, which can initially slow production. Continuous upskilling through hands-on workshops and coaching is required to close the skills gap and foster a culture of sustained process excellence.

Finally, it is recommended that the DOST form a dedicated audit team to conduct systematic assessments after the MPM consultation period. This team would monitor long-term adoption of practices and the effectiveness of technical implementation, ensuring that firms do not revert to inefficient habits and enabling data-driven refinements to increase the program's impact.

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Appendix A. Questionnaire

A.1. Survey Questionnaire

Part 1: Profile of the MSMEs

Instruction: Please check (✓) the box that best describes your business profile.

A. Business Size

What is the size of your business based on the number of employees?

- ☐ Micro Enterprise (1–9 employees)
☐ Small Enterprise (10–99 employees)
☐ Medium Enterprise (100–199 employees)

What is the size of your business based on capital?

- ☐ Micro Enterprise (₱3,000,000 and below)
☐ Small Enterprise (₱3,000,001 to ₱15,000,000)
☐ Medium Enterprise (₱15,000,001 to ₱100,000,000)

B. Years of Operation

How long has your business been in operation?

- ☐ Less than 1 year
☐ 1–3 years
☐ 4–6 years
☐ 7–10 years
☐ More than 10 years

C. Services Offered

What type of services does your business provide? (Check all that apply)

- ☐ Metal Fabrication Shops
☐ Machine Shops
☐ Welding Services
☐ Sheet Metal Works
☐ Metal Product Manufacturers
☐ Foundries and Casting Services
☐ Automotive Metal Parts Manufacturers
☐ Metal Packaging and Containers
☐ Others (Please specify): _____

Part 2. Level of MSME Involvement in MPM

Instruction: Please read each statement carefully and select the response that best represents your opinion.

Check (✓) the box that best reflects your perspective. Use the 4-point Likert scale below:

- 4 – Strongly Agree (SA): Completely agree
- 3 – Agree (A): Generally agree
- 2 – Disagree (D): Generally disagree
- 1 – Strongly Disagree (SD): Completely disagree

A.1.1. Awareness of MPM Initiatives

How aware is your business regarding Manufacturing Productivity Management (MPM)?

No.	Statement	4 (SA)	3 (A)	2 (D)	1 (SD)
1	In general, I am familiar with the concept of the Manufacturing Productivity Management (MPM), formerly Manufacturing Productivity Extension (MPEX) Program, as one of the Department of Science and Technology's (DOST) Technical Consultancy Services.				
2	I know the intention or purpose of the MPM/MPEX Program for an MSME like us.				
3	I am aware that MPM/MPEX has required minimum qualifications to avail the program.				
4	I am familiar about the procedure of the implementation of MPM/MPEX.				
5	I understand the potential benefits and improvements that can be gained from participating in the MPM/MPEX Program.				

A.1.2. Participation in MPM

To what extent does your business participate in MPM-related activities?

No.	Statement	4 (SA)	3 (A)	2 (D)	1 (SD)
1	Our firm attended and actively participated during the Inception Meeting.				
2	Our firm provided the necessary data and support required for the productivity assessment and recommendations.				
3	Our firm joined all the training provided by DOST through the MPM/MPEX.				
4	Our firm cooperated with the assigned productivity consultants throughout the entire duration of the MPM/MPEX engagement.				
5	Our firm actively participated during the final report presentation.				

A.1.3 Adoption of MPM Practices

To what extent has your business adopted the recommendation from MPM/MPEX Consultants?

No.	Statement	4 (SA)	3 (A)	2 (D)	1 (SD)
1	Our firm has started implementing the productivity improvement recommendations provided by the MPM/MPEX consultants.				
2	Our firm has made adjustments in our operations based on the findings and suggestions from the MPM/MPEX Program.				
3	Our firm monitors the results or improvements after adopting the recommended MPM/MPEX practices.				
4	Our firm designated a team or point person to oversee the implementation of MPM/MPEX recommendations.				
5	Our firm plans to sustain and continuously improve the practices learned through the MPM/MPEX engagement.				

A.1.4. Resource Utilization

How effectively does your business manage its resources?

No.	Statement	4 (SA)	3 (A)	2 (D)	1 (SD)
1	Our firm provided necessary budget allocation for the implementation of the recommended strategies from MPM/MPEX Consultants.				
2	Our employees are trained to optimize resource utilization.				
3	Our firm improved the utilization of equipment and machinery as a result of the MPM/MPEX engagement.				
4	Our firm regularly monitors the usage of materials, manpower, and equipment to avoid waste and inefficiency.				
5	Our firm adopted new systems or practices to maximize the efficiency of available resources after the MPM/MPEX intervention.				

A.1.5. Collaboration

How engaged is your business in collaboration/cooperation with DOST and MPM/MPEX Consultants during MPM/MPEX implementation?

No.	Statement	4 (SA)	3 (A)	2 (D)	1 (SD)
1	Our firm actively collaborated with DOST throughout the MPM/MPEX implementation.				
2	Our firm maintained open and consistent communication with the assigned MPM/MPEX consultants.				
3	The MPM/MPEX consultants were approachable and receptive to our concerns and inquiries.				
4	Our firm ensured smooth coordination among all parties involved (DOST, consultants, and internal staff) during the program.				
5	Our firm provided feedback and suggestions during the engagement, which were acknowledged and considered by the consultants.				

Part 3. Assessment of the Implementation of MPM Technical Areas

Instruction: Please indicate the extent to which you agree or disagree with the following statements by checking the appropriate box.

A.1.6. Plant Layout

How well does your business implement an efficient plant layout for manufacturing productivity?

Did the consultant provide a recommended plant layout?

☐ Yes

☐ No; Why? _____

If your answer to the above question is YES, please assess the implementation of the recommended plant layout based on the following statements:

No.	Statement	4	3	2	1
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		(SA)	(A)	(D)	(SD)
1	Our firm clearly understood why the MPM/MPEX consultants recommended the new plant layout.				
2	Our firm implemented the suggested plant layout fully or with minor modifications to suit our operations.				
3	The new plant layout has contributed to smoother workflow and improved productivity.				
4	Employees are satisfied with the current plant layout and its impact on productivity.				
5	Our firm plans to maintain or further enhance the implemented plant layout based on the MPM/MPEX recommendations.				

A.1.7. Machines and Equipment Utilization

How effectively does your business utilize machines and equipment for manufacturing productivity?

No.	Statement	4 (SA)	3 (A)	2 (D)	1 (SD)
1	Our firm understands how to properly use the machines and equipment based on the recommendations from the MPM/MPEX consultants.				
2	Our firm regularly maintains the machines and equipment to ensure optimal performance.				
3	Our firm acquired new machines or equipment as suggested by the consultants to improve operations.				
4	Our employees are trained to use the machines and equipment efficiently to minimize downtime and waste.				
5	The utilization of machines and equipment has improved after applying the MPM/MPEX recommendations.				

A.1.8. Process and Operations

How well does your business implement efficient manufacturing processes and operations?

No.	Statement	4 (SA)	3 (A)	2 (D)	1 (SD)
1	Our firm has improved its production processes based on the recommendations from the MPM/MPEX consultants.				
2	The new operational procedures suggested by the consultants are being followed consistently.				
3	Our firm experienced increased efficiency and reduced bottlenecks after implementing the recommended process changes.				
4	Employees were properly trained to adapt to the updated processes and operational guidelines.				
5	Our firm regularly reviews and adjusts its operations to maintain the improvements gained from the MPM/MPEX engagement.				

A.2. Interview Questions

A.2.1. General Information

- What role does manufacturing productivity management play in your business operations?

A.2.2. Challenges in MPM

- What are the biggest challenges your enterprise faced in improving manufacturing productivity through the MPM/MPEX program?
- How did labor skills, technology limitations, or financial constraints affect your firm's ability to adopt MPM/MPEX recommendations?
- Can you describe the operational inefficiencies or issues encountered when applying plant layout, machine use, or new processes? How did these affect your business?
- What difficulties did your firm experience when collaborating with DOST or consultants during the MPM/MPEX engagement?
- How did your firm deal with resistance to change from employees or management during MPM/MPEX implementation?

A.2.3. Opportunities in MPM

- What improvements, strategies, or innovations helped enhance your firm's manufacturing productivity as a result of MPM/MPEX?
- Did the implementation of recommended practices help your firm discover new opportunities—such as entering new markets, automating processes, or improving competitiveness?
- What opportunities for employee development or digital transformation arose from your MPM/MPEX participation?
- How does your firm plan to sustain or expand the benefits gained from the MPM/MPEX engagement moving forward?

A.2.4. Recommendations for Development Plan

- In your opinion, what improvements can be made to the MPM/MPEX Program to better support MSMEs like yours?
- Were the consultants' recommendations realistic and tailored to your business needs? If not, what could have been done better?
- How can DOST and consultants enhance their communication, training, and support during and after the implementation?
- What additional services or support mechanisms would make the MPM/MPEX Program more accessible and effective for resource-limited MSMEs?
- If given another chance to participate in the program, what changes would you suggest for a better experience and outcome?