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Quality Tool Utilization and Organizational Performance: A Correlational Study of Pareto Analysis and Ishikawa Techniques among Business Enterprises in Bukidnon, Philippines

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ABSTRACT

This study examined the influence of Pareto Analysis and Ishikawa Techniques on the organizational performance of business enterprises in Valencia City and Malaybalay City, Bukidnon, Philippines, employing a descriptive-correlational research design grounded in the quantitative approach. Data were gathered from 390 managers and supervisors selected through stratified random sampling, using a researcher-made structured questionnaire that demonstrated excellent internal consistency. Pareto Analysis was measured across five indicators: frequency of use, problem prioritization, data collection and analysis, action and follow-through, and competency and understanding, while Ishikawa Techniques were assessed through five parallel indicators, and organizational performance was evaluated across operational efficiency, employee effectiveness, continuous improvement, and innovation. Results showed that respondents were predominantly male, college-educated managers with two to seven years of organizational tenure, concentrated in retail and wholesale trade enterprises employing fewer than 100 workers. Managers rated themselves highly utilizing both Pareto Analysis and Ishikawa Techniques. In terms of organizational performance on the other hand, managers indicated to having a strong performance in their operations. Pearson r analysis revealed strong, significant positive correlations between organizational performance and both Pareto Analysis and Ishikawa Techniques with all ten sub-component indicators showing significant positive relationships. Multiple regression analysis identified seven significant predictors of organizational performance, led by Team Participation and Collaboration from Ishikawa Techniques, collectively accounting for 75.0% of the variance in organizational performance. These findings affirm that the collaborative, cross-functional dimension of structured quality tool practice, rather than the analytical mechanics of the tools alone, most powerfully drives enterprise performance. The study recommends institutionalizing collaborative, cross-functional problem-solving practices and targeted competency training to help business enterprises in Bukidnon achieve stronger and more balanced organizational performance.

INTRODUCTION

Organizations across industries are under growing pressure to perform better; improve productivity, reduce waste, strengthen service or product quality, and maintain competitiveness through systematic and evidence-based managerial practices (Saputra *et al.*, 2024). Researchers all over the world are trying to observe multiple aspects to be able to determine which management aspect truly affects organizational performance. George *et al.* (2019) focused on strategic planning in influencing organizational performance while Kurdi *et al.* (2020) posits that employee retention may have an effect on organizational performance. Singh and Misra (2021) argued that external corporate social responsibility positively impacts organizational performance. On the other hand, quality has become a fundamental aspect of the management of almost every area of a company, directly influencing the efficiency of its processes (Kwilinski & Kardas, 2024). According to Bajaj *et al.* (2017), total quality management (TQM) has gained a lot of importance by businessmen, managers, practitioners, and research scholars over the last 20 years. This broad organizational reality underscores the critical importance of equipping managers with practical,

reliable tools that support informed decision-making and continuous performance improvement.

Central to this concern is the construct of organizational performance, which has gained considerable attention in contemporary management research as a reflection of how well an enterprise achieves its goals across multiple dimensions (Rao, 2024). Rather than being limited to financial outcomes alone, organizational performance is increasingly understood to encompass operational efficiency, customer satisfaction, process quality, employee effectiveness, innovation, and long-term sustainability (Moumin, 2024). This multidimensional perspective has intensified the search for managerial practices and analytical tools that can meaningfully influence performance across these varied dimensions, particularly in enterprises operating under resource limitations and complex operational demands.

Within the quality management literature, two tools have consistently emerged as among the most widely recognized and practically accessible instruments for organizational problem-solving: Pareto Analysis and the Ishikawa Technique, also known as the cause-and-effect or fishbone diagram (Barsalou, 2023). Alkiayat (2021)

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defines Pareto Analysis as a relatively small number of causes tend to account for a disproportionately large proportion of observed effects. In organizational settings, this tool is intended to help decision-makers identify which defects, delays, complaints, or inefficiencies contribute most substantially to performance problems, thereby allowing limited resources to be directed toward the issues of greatest impact. The Ishikawa Technique, on the other hand, offers a structured and visual framework for root cause analysis, enabling managers and teams to organize and explore the potential causes of a problem across categories such as manpower, methods, machines, materials, measurement, and environment. Through this process, organizations may be better positioned to move beyond reactive, symptom-based responses and toward more systematic corrective action (Tagaram & Chen, 2024).

The potential relevance of these tools to organizational outcomes has attracted growing scholarly interest. Barsalou (2023) observed that among quality practitioners surveyed, the cause-and-effect diagram appeared to be among the more frequently used tools in root cause analysis, while the Pareto chart was similarly noted as a common instrument for problem prioritization, suggesting that practitioners tend to regard these tools as practically useful in quality work. In a manufacturing context, Oljira and Dinsa (2023) documented that the combined application of Pareto Analysis and Ishikawa diagrams appeared to be associated with reductions in defect rates, improvements in process performance, decreased rework, and gains in resource utilization, pointing to a possible relationship between structured quality tool use and operational outcomes. In the local setting, several attempts have been done to gauge performance within organizations with respect to managing quality. Calingo (2024) attempted to determine whether there is a relationship between continuous improvement, a facet of Total Quality Management, and organizational performance. Romea & Sudaria (2026) measured the effectiveness of lean management on business resiliency within Micro, Small, and Medium Enterprises (MSMEs) which comprises the majority of business in the Philippines. These observations suggest that the use of Pareto Analysis and Ishikawa Techniques may have meaningful implications for how enterprises diagnose, prioritize, and resolve operational problems and by extension, for their overall organizational performance. When organizations are able to identify their most critical issues and trace their underlying causes, they may be more likely to realize improvements in efficiency, quality, and goal attainment.

Despite the attention these tools have received in the quality management literature, their actual adoption and consistent application across diverse business enterprises remains uneven and insufficiently examined. Many organizations are thought to continue relying on intuitive or reactive decision-making rather than structured analytical approaches, a pattern that may diminish the

effectiveness of improvement efforts and weaken overall performance outcomes (Barsalou, 2023). While existing studies have explored the use of these tools primarily in manufacturing and large-scale industrial settings, relatively limited empirical attention has been given to their practice and perceived impact among the varied types of small, medium, and large enterprises operating in developing regional economies such as those found in the provincial districts of the Philippines. This gap raises important questions about whether the patterns observed in other contexts hold across different organizational environments, and whether the utilization of these tools is meaningfully associated with organizational performance in such settings.

It is within this context that the present study is undertaken. This study seeks to determine the influence of Pareto Analysis and Ishikawa Techniques on organizational performance in business enterprises located in the two component cities of Bukidnon. Specifically, it aims to assess the extent to which these tools are utilized by managers in the area and to examine whether their utilization is significantly related to organizational performance across dimensions of operational efficiency, employee effectiveness, continuous improvement, and innovation. By situating this inquiry within a regional Philippine context, the study is expected to contribute to the growing body of literature on quality management and business improvement while providing locally relevant insights into the role of these analytical tools in supporting enterprise performance.

LITERATURE REVIEW

Theoretical Framework

This study is anchored on the Balanced Scorecard Theory of Kaplan and Norton (1992), the Total Quality Management (TQM) Theory as articulated by Deming (1986), Juran and Godfrey (1999), and Crosby (1979), and the Kaizen or Continuous Improvement Theory of Imai (1986) to provide a conceptual architecture for the study's independent variables, dependent variables, and the mechanism through which quality tool use is expected to affect organizational outcomes.

The Balanced Scorecard (BSC) framework was developed by Robert S. Kaplan and David P. Norton (1992) as a response to the limitations of purely financial performance measurement systems, which failed to capture the full range of organizational capabilities and value-creating activities. Kaplan and Norton (1992) proposed that organizational performance should be assessed across four interconnected perspectives: Financial, Customer, Internal Business Process, and Learning and Growth. Total Quality Management (TQM) theory, as developed through the foundational works of W. Edwards Deming (1986), Joseph M. Juran and A. B. Godfrey (1999), and Philip B. Crosby (1979) is a comprehensive management philosophy that holds that quality is not merely a product attribute but an organizational-wide commitment to continuous improvement in all processes, products, and

services, with the ultimate goal of satisfying customer needs and achieving superior organizational performance. TQM theory thus provides the normative and empirical foundation for the study's expectation that the systematic and competent use of Pareto Analysis and the Ishikawa Diagram will be positively associated with improvements in organizational performance.

Guided by these perspectives, this study assumes that the greater the utilization of Pareto Analysis and Ishikawa Techniques, the better the organizational performance of business enterprises. Thus, Pareto Analysis and Ishikawa Techniques are treated as the independent variables, while organizational performance is the dependent variable.

Pareto Analysis

Pareto Analysis is grounded in the Pareto Principle, the notion that a small proportion of causes account for the majority of effects, later adapted to quality management by Juran (1954) as the "vital few and trivial many." Literature across manufacturing, healthcare, and construction settings shows that its organizational value rests on five interlocking practices: regular, institutionalized application rather than sporadic use (Antony & Banuelas, 2002; Kwilinski *et al.*, 2024; Okeke *et al.*, 2025); disciplined ranking of problems by frequency or severity to concentrate resources on high-impact issues (Alkiayat, 2021; Ibrahim *et al.*, 2023; Nguyen *et al.*, 2023); systematic, well-categorized data collection, without which prioritization risks becoming misleading (Tague, 2024; Tagaram *et al.*, 2024); accountable follow-through that converts analysis into verified corrective action (Alkiayat, 2021; Ibrahim *et al.*, 2023; Okeke *et al.*, 2025); and sufficient user competency to produce actionable rather than merely descriptive charts (Okeke *et al.*, 2025; Tagaram *et al.*, 2024). Collectively, this body of work frames Pareto Analysis not as a one-time diagnostic exercise but as a habitual, data-disciplined, and accountability-driven managerial practice.

Ishikawa Techniques

The Ishikawa or fishbone diagram, developed by Ishikawa (1968, 1985) to trace problems across manpower, machine, method, material, measurement, and environment categories, is consistently portrayed in the literature as a fundamentally collaborative root-cause tool rather than a purely technical one. Studies show its impact depends on routinized rather than incident-only use (Ardha *et al.*, 2023; Tague, 2024); thorough, multi-category cause investigation rather than superficial diagram construction (Ishikawa, 1968/1985; Gozali *et al.*, 2020; Tagaram *et al.*, 2024); broad cross-functional participation, which Ishikawa (1985) and later Tague (2024), Ardha *et al.* (2023), and Okeke *et al.* (2025) identify as the single most consequential factor in generating comprehensive and organizationally valuable cause analysis; disciplined corrective-action follow-through and verification (Ardha *et al.*, 2023; Gozali *et al.*, 2020); and facilitation competency, since guiding a team through

systematic, non-premature cause exploration is itself a trainable skill (Tagaram *et al.*, 2024; Singh & Singh, 2015; Okeke *et al.*, 2025). Across this literature, the recurring theme is that the technique's value lies less in the diagram itself than in the depth of investigation and breadth of participation it structures.

Organizational Performance

Organizational performance is treated in the literature as a multidimensional construct extending beyond financial outcomes (Richard *et al.*, 2009), most influentially operationalized through Kaplan and Norton's (1992, 1996) Balanced Scorecard. Four dimensions anchor this study's framework. Operational efficiency, the process-level perspective of the Scorecard, is the outcome most proximally tied to structured problem-solving tools, with quality-management practices consistently among the strongest predictors of defect reduction and process consistency (Flynn *et al.*, 1995; Ibrahim *et al.*, 2023; ASQ, 2024). Employee effectiveness, drawn from the Learning and Growth perspective, is shaped both by formal capability investment and by the engagement and role clarity that collaborative problem-solving processes generate as a byproduct (Kaplan & Norton, 1996; Vărzaru, 2022; Tague, 2024; Okeke *et al.*, 2025). Continuous improvement, rooted in Imai's (1986) Kaizen philosophy, reflects the institutionalization of incremental, ongoing refinement, with Pareto Analysis and Ishikawa Techniques serving as its operational instruments (Tague, 2024; Nguyen *et al.*, 2023). Innovation, the most forward-looking dimension, is empirically linked to structured, evidence-based quality practice, with systematic problem-solving systems shown to sustain innovative activity more reliably than ad hoc approaches (Kaplan & Norton, 1996; Tidd & Bessant, 2018; García-Fernández *et al.*, 2021; Texeira-Quiros *et al.*, 2022).

MATERIALS AND METHODS

This study employed a descriptive-correlational research design grounded in the quantitative approach, allowing for the systematic description of respondents' demographic profile alongside the investigation of relationships between quality-tool utilization (Pareto Analysis and Ishikawa Techniques) and organizational performance, without manipulating any variable (Creswell & Creswell, 2018). A cross-sectional survey was administered, consistent with the study's objective of generating a broad organizational profile of quality-tool use and performance perception.

The study was conducted in Valencia City and Malaybalay City, the two component cities of the Province of Bukidnon, Northern Mindanao, Philippines. Malaybalay City, the provincial capital, hosts a diverse mix of small, medium, and large enterprises serving the province's administrative, educational, and commercial needs, while Valencia City is Bukidnon's commercial and agro-industrial hub, characterized by a high concentration of trading establishments, food processing firms, agribusinesses,

and service organizations. Respondents were managers and supervisors of registered business establishments in both cities who held direct responsibility for or oversight of quality assurance, operations management, or process improvement activities, recognized as the most credible informants on both quality-tool practice and organizational performance outcomes (Saunders *et al.*, 2019).

Stratified random sampling was used to select 390 manager-supervisor respondents proportionally across the two cities, with 364 (93.25%) drawn from Valencia City and 26 (6.75%) from Malaybalay City, reflecting each city's share. Establishments were randomly selected from a list of registered establishments provided by the local government units, and one eligible, consenting manager or supervisor was identified per establishment.

Data were collected using a researcher-constructed structured questionnaire composed of an informed consent section, a demographic profile section, and three scaled sections corresponding to the study's key variables. Pareto Analysis was measured across five indicators—frequency of use, problem prioritization, data collection and analysis, action and follow-through, and competency and understanding—while Ishikawa Techniques were measured across five parallel indicators: frequency of application, root cause identification, team participation and collaboration, corrective action and follow-through, and competency and understanding. Organizational performance was measured across four dimensions: operational efficiency, employee effectiveness, continuous improvement, and innovation. Each indicator or dimension was measured with five items, for a total of 70 Likert-scale items rated from 1 (Strongly Disagree) to 5 (Strongly Agree). Indicators were grounded in established frameworks, including Juran and Godfrey (1999) and Tague (2024) for the quality tools, and the Balanced Scorecard framework of Kaplan and Norton (1992, 1996) and the Kaizen theory of Imai (1986) for organizational performance.

Content and face validity were established through literature review and expert panel review, and the instrument was pilot tested among 30 managers not included in the final sample. The resulting Cronbach's alpha coefficients indicated excellent internal consistency: 0.919 for Pareto Analysis, 0.940 for Ishikawa Techniques, and 0.934 for organizational performance (George & Mallery, 2003; Nunnally, 1978). Questionnaires were personally administered after securing informed consent, and retrieved instruments were checked for completeness before encoding and analysis.

Data were analyzed using frequency counts and percentages to describe the respondent profile; means and standard deviations to determine the extent of Pareto Analysis and Ishikawa Technique utilization and the level of organizational performance; Pearson product-moment

correlation to examine the relationship between quality-tool utilization and organizational performance; and multiple regression analysis to identify which indicators best predict organizational performance. Significance for all inferential tests was set at $\alpha = 0.05$, and analyses were performed using IBM SPSS Statistics. Throughout the study, ethical standards were strictly observed, including securing informed consent, ensuring voluntary participation and confidentiality of respondents, and complying with the Data Privacy Act of 2012 (Republic Act No. 10173).

RESULTS AND DISCUSSION

This section presents the findings of the study organized according to the research objectives: the demographic profile of respondents, the extent of Pareto Analysis and Ishikawa Technique utilization, the level of organizational performance, and the relationships and predictive dynamics among these variables.

Profile of Manager-Respondents

Table 1 presents the demographic profile of the 390 manager-respondents. Male respondents constituted the majority at 57.2%, while female respondents accounted for 42.8%. Most respondents were college graduates (58.7%), followed by those with vocational or technical credentials (18.5%); only 6.7% held a Master's degree and 1.0% held a Doctorate. Regarding organizational tenure, the largest group had been employed for 5 to 7 years (37.7%), followed by 2 to 4 years (34.3%). Retail and Wholesale Trade accounted for the largest share of respondent enterprises (32.6%), followed by Others (24.4%) and Financial and Cooperative Services (15.4%). Most respondents worked in organizations with fewer than 100 employees (63.6%), and most enterprises had been operating for 5 to 10 years (46.2%).

This profile reflects patterns consistent with Philippine enterprise and management literature. The male-dominant composition of managerial respondents aligns with documented gender distribution in Philippine business leadership, particularly in trade and industrial sectors (Maravilla *et al.*, 2025). The dominance of Retail and Wholesale Trade mirrors national data showing this sector consistently accounts for roughly half of all MSME establishments (Department of Trade and Industry, 2024), while the predominance of small enterprises (0–99 employees) is consistent with Philippine Statistics Authority (2023) findings that 99.59% of all business establishments nationwide are MSMEs. The concentration of mid-tenure respondents (2–7 years) further supports the reliability of the sample, as such tenure is generally regarded as sufficient for managers to assess management practices and performance outcomes with confidence (Gagliardi, 2023).

Table 1: Demographic Profile of Manager-Respondent

Indicator		Category	Frequency (N)	Percentage (%)
Sex				
		Female	167	42.8
		Male	223	57.2
	TOTAL		390	100.0
Highest Educational Attainment				
	High School		59	15.1
	Vocational/Technical		72	18.5
	College Graduate		229	58.7
	Master's Degree		26	6.7
	Doctorate Degree		4	1
	TOTAL		390	100.0
Length of Employment in the Organization				
	2-4 Years		133	34.3
	5-7 Years		147	37.7
	8-10 Years		53	13.6
	More Than 10 Years		56	14.4
	TOTAL		390	100.0
Industry Sector				
	Manufacturing		26	6.7
	Retail and Wholesale Trade		127	32.6
	Financial and Cooperative Services		60	15.4
	Healthcare Services		16	4.1
	Hospitality and Tourism		12	3.1
	Construction and Engineering		17	4.4
	Education Services		4	1.0
	Information Technology / Communications		24	6.2
	Agriculture / Agribusiness		9	2.3
	Others		95	24.4
	TOTAL		390	100.0
No. of Employees in the Organization				
	0-99 Employees		248	63.6
	100-199 Employees		69	17.7
	200 or more Employees		73	18.7
	TOTAL		390	100.0
Number of Years the Organization Has Been Operating				
	Less than 5 years		100	25.6
	5 -10 years		180	46.2
	11-20 years		60	15.4
	More than 20 years		50	12.8
	TOTAL		390	100.0

Extent of Pareto Analysis Utilization

Table 2 presents the summary of Pareto Analysis utilization across all five indicators. The overall mean of 4.35 is rated Agree and interpreted as Highly Utilized. Problem Prioritization recorded the highest mean (4.42), followed by Data Collection and Analysis and Action and Follow-Through (both 4.37), while Frequency of Use

(4.33) and Competency and Understanding (4.27) were comparatively, though still highly, rated.

These results indicate that managers have developed strong practical competency in the core decision-making functions of Pareto Analysis, particularly in focusing on high-impact problems and maintaining systematic data and follow-through practices. The comparatively

lower rating for Competency and Understanding, however, suggests that formal training in the technical application of the tool has not fully kept pace with the

practical habits managers have developed, pointing to competency development as the most promising lever for strengthening Pareto Analysis practice further.

Table 2: Summary of Pareto Analysis Utilization

INDICATORS	Mean	Descriptive Rating	Qualitative Interpretation
Frequency of use	4.33	Agree	Highly Utilized
Problem Prioritization	4.42	Agree	Highly Utilized
Data Collection and Analysis	4.37	Agree	Highly Utilized
Action & follow through	4.37	Agree	Highly Utilized
Competency & Understanding	4.27	Agree	Highly Utilized
Overall Mean	4.35	Agree	Highly Utilized

LEGEND

Range	Descriptive Rating	Qualitative Interpretation
4.51-5.00	Strongly Agree	Very Highly Utilized
3.51-4.50	Agree	Highly Utilized
2.51-3.50	Moderately Agree	Moderately Utilized
1.51-2.50	Disagree	Low Utilized
1.00-1.50	Strongly Disagree	Very Low Utilized

This is consistent with Tagaram *et al.* (2024), who found that integrating problem-frequency analysis into routine operational reviews, supported by training, produces the most consistent quality improvement outcomes, and with Okeke *et al.* (2025), who noted that quality tools generate their strongest performance effects when frequency, prioritization, data quality, follow-through, and competency are developed together rather than piecemeal.

Extent of Ishikawa Technique Utilization

Table 3 presents the summary of Ishikawa Technique utilization across all five indicators. The overall mean of 4.33 is rated Agree and interpreted as Highly Utilized. Corrective Action and Follow-Through recorded the highest mean (4.41), followed by Competency and Understanding (4.36) and Root Cause Identification (4.34), while Consistency of Application (4.25) and Team Participation and Collaboration (4.27) were comparatively lower, though still highly utilized.

Table 3: Summary of Ishikawa Technique Utilization

INDICATORS	Mean	Descriptive Rating	Qualitative Interpretation
Frequency of application	4.25	Agree	Highly Utilized
Root cause identification	4.34	Agree	Highly Utilized
Team participation & collaboration	4.27	Agree	Highly Utilized
Corrective action & follow through	4.41	Agree	Highly Utilized
Competency & understanding	4.36	Agree	Highly Utilized
Overall Mean	4.33	Agree	Highly Utilized

LEGEND

Range	Descriptive Rating	Qualitative Interpretation
4.51-5.00	Strongly Agree	Very Highly Utilized
3.51-4.50	Agree	Highly Utilized
2.51-3.50	Moderately Agree	Moderately Utilized

1.51-2.50	Disagree	Low Utilized
1.00-1.50	Strongly Disagree	Very Low Utilized

This pattern reveals stronger performance in the individual, output-oriented dimensions of corrective action and technical competency, and comparatively lower performance in the structural, process-oriented dimensions of application consistency and cross-functional collaboration. This suggests that managers are effective implementers of corrective actions derived from root cause analysis, but that the collective, institution-wide embedding of structured cause investigation as a consistently collaborative practice remains an area for organizational development. These findings echo Tague (2024), who identified habitual, cross-functionally participative use of structured cause analysis as the defining characteristic of organizations with mature

quality improvement cultures, and Tagaram *et al.* (2024), who affirmed that the Ishikawa Technique realizes its full performance potential only when practiced consistently and collaboratively.

Level of Organizational Performance

Table 4 presents the summary of organizational performance across all four dimensions. The overall mean of 4.41 is rated Agree and interpreted as Strong Performance. Continuous Improvement recorded the highest mean (4.42), followed closely by Operational Efficiency and Employee Effectiveness (both 4.41), while Innovation recorded the lowest, though still strong, mean (4.37).

Table 4: Summary of Organizational Performance

INDICATORS	Mean	Descriptive Rating	Qualitative Interpretation
Operational efficiency	4.41	Agree	Strong Performance
Employee Effectiveness;	4.41	Agree	Strong Performance
Continuous Improvement; and	4.42	Agree	Strong Performance
Innovation	4.37	Agree	Strong Performance
Overall Mean	4.41	Agree	Strong Performance

LEGEND

Range	Descriptive Rating	Qualitative Interpretation
4.51-5.00	Strongly Agree	Very Strong Performance
3.51-4.50	Agree	Strong Performance
2.51-3.50	Moderately Agree	Moderate Performance
1.51-2.50	Disagree	Weak Performance
1.00-1.50	Strongly Disagree	Very Weak Performance

The convergence of Operational Efficiency, Employee Effectiveness, and Continuous Improvement at the highest performance levels reflects a mutually reinforcing performance dynamic in which process-level improvements support employee effectiveness, which in turn sustains continuous improvement activity—consistent with the performance logic embedded in the Balanced Scorecard framework (Kaplan & Norton, 1992). The comparatively lower, though still strong, Innovation rating suggests that while the foundations for innovation are present, converting them into consistently measurable innovation outputs represents the primary performance development opportunity for the surveyed enterprises, a pattern consistent with Okeke *et al.* (2025), who found that innovation-oriented performance dimensions tend to lag behind operational ones in TQM-practicing organizations.

Relationship Between Quality-Tool Utilization and Organizational Performance

Table 5 presents the correlation analysis between the

two quality tools and organizational performance. Pareto Analysis recorded a strong, significant positive correlation with organizational performance ($r = .839$, $p < .01$), with all five sub-components—Frequency of Use ($r = .667$), Problem Prioritization ($r = .716$), Data Collection and Analysis ($r = .706$), Action and Follow-Through ($r = .736$), and Competency and Understanding ($r = .731$)—showing significant positive relationships. Ishikawa Techniques similarly showed a strong, significant positive correlation with organizational performance ($r = .821$, $p < .01$), with all five sub-components—Frequency of Application ($r = .655$), Root Cause Identification ($r = .701$), Team Participation and Collaboration ($r = .733$), Corrective Action and Follow-Through ($r = .722$), and Competency and Understanding ($r = .655$)—likewise significant.

Among Pareto sub-components, Action and Follow-Through showed the strongest association with performance, suggesting that whether managers act on and verify the results of prioritization and data analysis matters more than the sheer regularity of tool use—

consistent with Alkiayat (2021), who found that Pareto-based prioritization is most valuable when paired with concrete, time-bound corrective actions. Among Ishikawa sub-components, Team Participation and Collaboration showed the strongest association, underscoring that the collective, cross-functional dimension of root cause analysis, rather than its individual or technical application,

is most closely tied to performance outcomes—affirming Ishikawa’s (1985) original emphasis on the technique’s capacity to surface collective, cross-functional knowledge about problem causes. These results indicate that greater utilization of both quality tools, across all measured dimensions, is meaningfully associated with stronger organizational performance.

Table 5: Correlation Analysis of Pareto Analysis, Ishikawa Techniques, and Organizational Performance

Independent Variables Correlated with Organizational Performance	Correlation Coefficient (r)	p-value
Pareto Analysis	0.839**	.000
Frequency of use	0.667**	.000
Problem Prioritization	0.716**	.000
Data Collection and Analysis	0.706**	.000
Action & follow through	0.736**	.000
Competency & Understanding	0.731**	.000
Ishikawa Techniques	0.821**	.000
Frequency of application	0.655**	.000
Root cause identification	0.701**	.000
Team participation & collaboration	0.733**	.000
Corrective action & follow through	0.722**	.000
Competency & understanding	0.655**	.000

****.** Correlation is significant at the 0.01 level (2-tailed).

CONCLUSION

This study affirms that Pareto Analysis and Ishikawa Techniques are practiced at a high level among business enterprises in Valencia City and Malaybalay City, Bukidnon, and that this practice is strongly and significantly associated with organizational performance ($r = .839$ and $r = .821$, respectively). Managers demonstrate particular strength in prioritizing high-impact problems, maintaining data discipline, and following through on corrective action, while comparatively lower ratings in competency development, consistency of application, and cross-functional collaboration reveal where practice has not yet matured into full organizational habit. Performance itself is strong across operational efficiency, employee effectiveness, and continuous improvement, though innovation lags, suggesting that structured problem-solving has yet to be fully channeled into new value creation. Most notably, regression analysis reveals that organizational performance is not driven by the analytical mechanics of either tool in isolation, but by a combination of seven sub-practices led by Team Participation and Collaboration from the Ishikawa Technique — together explaining 75% of the variance in performance. This finding reframes the practical value of both tools: their contribution to enterprise performance is realized less through technical rigor and more through the collaborative, cross-functional culture of shared problem-solving they generate and sustain.

Given this, the study recommends that business enterprises move beyond reactive, incident-driven use of these tools

toward institutionalized, cross-functionally collaborative problem-solving embedded in regular improvement cycles, since collaboration emerged as the single strongest performance predictor. Managers and supervisors should pursue targeted technical training in Pareto chart construction and multi-category root cause investigation while developing their capacity to facilitate, rather than solely conduct, quality analysis. Human resource and training units should design recurring, applied training programs that pair competency development with explicit links to innovation processes, given innovation’s comparatively lower performance rating. Policy makers and business development institutions, including the Department of Trade and Industry and local government units, should integrate structured quality-tool training into existing MSME support programs, treating collaborative problem-solving capability as a core enterprise development investment alongside financial literacy and access to finance. Finally, future researchers are encouraged to test whether the predictive strength of team collaboration holds across other industries, enterprise sizes, and regions, and to explore contextual moderators such as leadership style and quality-culture maturity, given the 25% of performance variance the current model leaves unexplained.

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