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UNVEILING THE NEXUS: HOW SUSTAINABILITY PRACTICES INFLUENCE ORGANIZATIONAL ECONOMIC PERFORMANCE IN KP' MANUFACTURING INDUSTRIES: A MEDIATING EFFECT OF QUALITATIVE PERFORMANCE

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Abstract

Corporate sustainability practices are concepts that attract the attention of management analysts and scholars due to its proven positive influence on the performance of an organization. In terms of the institutional theory, the objective of this research was to determine quality performance mediates the relationship between sustainability practices (i.e., exploration and exploitation) and organisational economic performance. Simple random sampling was employed to sample 295 employees from manufacturing industries with an aim to examine the stated relationship. A closed-ended questionnaire based on a five-point Likert scale was used to gather the data. The instrument reliability was determined using Cronbach's alpha. The research hypotheses were tested used regression analysis and for mediation analysis, Process-macro was conducted. As per findings, sustainability exploration and exploitation are significantly and positively related to organisational economic performance. The findings of the mediation analysis indicate that quality performance partially mediates the link between the sustainability practices (i.e., exploration and exploitation) and organizational economic performance. The research concluded that to survive in this competitive environment, industries should shift their focus on short-term profitability to long-term sustainability. This study recommends that manufacturing industries to align themselves to sustainability-oriented practices to achieve long-term stability and growth. Limitations, implications and future study are also discussed.

Keywords: Exploration Practices, Exploitation Practices, Qualitative Performance, Organizational Performance, Manufacturing Industries

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1 INTRODUCTION

A manufacturing sector is one of the backbones of global economy and it is becoming more and more involved in the sustainability exploration (new production technologies aimed at making manufacturing more eco-friendly) and sustainability exploitation (optimization of current processes, such as fuel-efficient production). With the emerging trends of environmental, social, and governance (ESG) frameworks, manufacturers are under pressure to work in tandem with global sustainability objectives, including the Sustainable Development Goals (SDGs) by the United Nations, to ensure that the company is competitive and meets the expectations of its stakeholders (United Nations, 2015). Sustainability exploration leads to the creation of an innovation, e.g. switching to circular economy or renewable energy systems, sustainability exploitation to operational efficiencies, e.g. lessening waste production in production lines (March, 1991; Benner and Tushman, 2015). The mechanisms by which these practices have been converted into economic benefits, especially in terms of qualitative performance indices such as employee engagement, customer satisfaction, and brand image, have not been explored in the manufacturing sector.

The role of manufacturing sector in sustainable development is central because it contributes around 30 percent of the total CO_2 emission, and it utilizes high resources to the extent that sustainable development of the manufacturing sector is needed to reduce the environmental impact (IEA, 2024). The number of leading industrial countries sustainability exploration (investing in green technologies, such as additive manufacturing) has grown by 18 percent since 2021, whereas exploitation (optimizing the supply chain logistics to yield lower emissions) has cut operational costs by up to 15 percent (McKinsey, 2025; Ma et al., 2023). These practices not only have economic payoffs but also qualitative performance in terms of non-financial performance such as morale among the workforce, customer loyalty, and corporate reputation (Masa'deh et al., 2019). In the example, the companies that have implemented exploration sustainability practices, such as producing without waste, state that their customer retention rate has increased by 14 percent because of the increased brand trust and that the exploitation practices, such as energy-efficient machines, have increased their productivity by 10 percent because of the staff satisfaction (Manzoor et al., 2024; Deloitte, 2024). Qualitative performance is an important mediator because sustainable practices lead to employee commitment and trust with stakeholders, which indirectly increases profitability (Hussain et al., 2021). Regardless of these observations, there is limited empirical research on the intervening role of quality performance between sustainability exploration and exploitation and economic performance in the manufacturing sector (especially in emerging markets, where the adoption of ESG is expected to increase by 28 percent by 2030) (World Bank, 2023).

The study is based on the Ambidexterity theory that asserts that organizations that are focused on exploration (innovation) and exploitation (efficiency) have a better performance (O'Reilly and Tushman, 2013), as well as the Resource-Based View (RBV) and the Stakeholder Theory. According to RBV, exploration and exploitation of sustainability consequence in the distinctive resources, which include innovative technologies and smooth processes leading to the competitive advantage (Barney, 1991). The Stakeholder Theory emphasizes the idea that sustainability in the front of stakeholder needs (e.g., employees, customers, regulators) lead to the creation of trust and longevity in profitability (Freeman et al., 2010). This nexus is supported by recent research, which additionally revealed that knowledge management capabilities, such as sustainability-

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oriented learning, can be used to improve manufacturing performance through processes of exploration and exploitation (Tseng and Lee, 2014). In the same way, Inkinen et al. (2015) have shown that innovation outcomes are better with the knowledge improvement through sustainable practices in SMEs, and the qualitative aspects of organizational learning mediate the economic benefits. Qualitative performance is essential in manufacturing because trust and reputation is what makes supply chain partners and meet regulatory requirements (BCG, 2025). Nonetheless, the mediating position of the qualitative performance in the relationship between sustainability exploration and exploitation and economic performance in the manufacturing industry is a research gap especially in the new emerging economies with the rising sustainability needs.

The importance of the given study is that it explores the issues of sustainability and exploitation as a dual force in the economic performance of the manufacturing sector. Due to their direct influence and the mediating role of qualitative performance, in this study, a closer insight into the management of manufacturers to balance innovation with efficiency and implement sustainable economic success can be gained. The research approach is mixed in that it will employ validated measures such as knowledge management capability scale including the knowledge management capability scale (Gold et al., 2001) to assess knowledge improvement driven by sustainability and through qualitative interviews to understand how stakeholders view the issue. The two research objectives include: (1) to determine the direct impacts of sustainability exploration and exploitation on organizational economic performance, (2) to determine the mediating effect of quality performance between EXP and EXPL. Accomplishment these aims, the study will add to the scholarly literature and provide the practical implications in terms of manufacturing leaders and policymakers trying to align sustainability strategies with the economic objectives in the changing ESG environment (Hussain et al., 2021; Inkinen et al., 2015).

Theoretical analysis and Hypotheses

SUSTAINABILITY PRACTICES AND ORGANIZATIONAL ECONOMIC PERFORMANCE

The main theoretical framework used in the explanation of how the sustainability practices can influence the economic performance is the Resource-Based View (RBV). RBV argues that a competitive advantage is attained when firms create valuable, rare, inimitable and non-substitutable (VRIN) resources and capabilities (Barney, 1991). Sustainable practices are such strategic capabilities, which can provide economic value in various ways among them being reducing cost, increasing revenue, reducing risk, and better relationship with stakeholders (Hart and Dowell, 2011). Natural Resource-Based View (NRBV) continues on the same school of thought, but places more emphasis on how companies may achieve the competitive edge based on the strategies of pollution prevention, product stewardship and sustainable development (Hart, 1995). Sustainability exploration is a category of organizational activity that focuses on creating new sustainable technologies, processes, and business models that are radically different to what is going on. This comprises radical changes in adopting renewable energy, implementing a circular economy, and developing green products and transforming the supply chain redesign (Lin and Chen, 2024). The upsurge of sustainability exploration and economic performance is unified through various mechanisms that are deemed positive.

Exploration of sustainability not only makes it possible to enjoy first-mover benefits in new green markets, but also permits it. By innovating in a sustainable way, the manufacturing companies will be able to set technological standards, secure high-end

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market segments, and build obstacles on entry to competitors (Khattak et al., 2021; Sun and Wang, 2022). As an example, businesses that come up with new recycling technologies or bio-based materials will have access to new sources of revenue and they will be able to differentiate their products in the ever-greener market. Second, the idea of exploratory sustainability practices improves organizational learning and dynamic capabilities, which enable the firm to respond better to changing regulatory demands and market expectations (Huang and Li, 2023). This adaptability is all the more useful as the environmental regulations become stricter and the preferences of consumers switch to the sustainable products. in exploratory sustainability, the intellectual property and knowledge base will be useful in a variety of business units and product lines. The manufacturing companies that pursue green R&D often generate patentable technologies and specialized knowledge that generate sustained competitive advantages (Li et al., 2023).

The result of exploratory practices is better relationships with the stakeholders and strengthened corporate image, which results in better access to capital, treatment by environmentally conscious consumers and community support. The mentioned relational benefits directly turn into economic benefits in the form of lower transaction costs, stronger brand equity, and risk management (Geng et al., 2023). Sustainability exploitation entails the refinement, improvement as well as effective application of the already existing sustainability-oriented practices. This involves gradual advances in energy efficiency, waste minimization, optimization of the processes, and constant improvement of environmental management systems (Wang and Zhang, 2022). The good interaction between sustainability exploitation and economic performance is executed in different though complementary ways. The optimal economic advantage of sustainability exploitation is achieved in terms of operational efficiency and cost savings. Companies involved in manufacturing, which engage in the efficient use of resources, energy saving, and waste minimization, make considerable losses in the cost of production (Wang et al., 2023).

Such efficiency gains directly increase the margins of profits and make organizations more resilient to changes in price of resources and disruption of supply chains. Indicatively, an investment in efficient machinery or waste-less technology normally has good returns on investment due to low operational costs.

Unethical sustainability methods can improve the management of operational consistency and quality. The opportunities of environmental management systems, like the ISO 14001, frequently expose potential process improvements that can both lead to a lower environmental impact and improve the quality of the product (Geng et al., 2023). The twofold advantage supports competitive placement and cuts expenses of rework, waste disposal and compliance expenses. Exploitation on sustainability enhances the risk management by making sure that they follow up the current environmental regulation as well as equipping the organizations to the expected changes of regulations. This pro-compliance strategy prevents possible fines, legal expenses, and business troubles and proves that an organization is responsible to regulators and other stakeholders (Huang and Li, 2023). Exploitative practices lead to improved employee involvement and performance. The workers in the manufacturing industries usually react well towards working in facilities which are eco-friendly with efficient operation and updated equipment (Wang & Zhang, 2022). This workplace environment can result into reduced absenteeism, turnover and increased productivity, which directly leads to economic performance. Moreover, safety improvements are commonly determined through these practices and lead to the

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capacity of raising operational reliability and lowering expenses linked to accidents at the workplace and insurance policies.

H1: *Sustainability exploration has positively related to organizational economic performance among the employee of manufacturing industries.*

H2: *Sustainability exploitation has positively related to organizational economic performance among the employee of manufacturing industries.*

THE MEDIATING ROLE OF QUALITY PERFORMANCE

The mechanisms through which sustainability practices translate into economic performance remain a critical area of investigation in operations management literature. While direct relationships between sustainability and economic outcomes have been established, emerging research suggests these relationships operate through important mediating variables. Quality performance encompassing product quality, process quality, and conformance to specifications represents a particularly salient mediator in manufacturing contexts where operational excellence directly influences financial outcomes. This review develops the theoretical rationale for quality performance as a mediating mechanism between both sustainability exploration/exploitation and organizational economic performance. The conceptual framework draws on the Resource-Based View (RBV) and the Natural Resource-Based View (NRBV), which posit that sustainable practices represent strategic capabilities that generate economic value through multiple pathways. Quality management theory, particularly the concept of quality as a multidimensional construct affecting both efficiency and market-based outcomes, provides the theoretical basis for the mediating role (Kaynak & Hartley, 2008). The integration of these perspectives suggests that sustainability practices enhance quality performance through improved process control, employee engagement, and systematic problem-solving, which in turn drives economic performance through cost reduction, price premiums, and enhanced market reputation.

Sustainability exploration activities characterized by radical innovation in sustainable technologies and processes influence quality performance through several distinct mechanisms. First, the implementation of novel environmental technologies often requires advanced process control systems and precision manufacturing capabilities that simultaneously enhance product quality and consistency (Li et al., 2023). For instance, the adoption of additive manufacturing for sustainable production frequently results in superior dimensional accuracy and material properties compared to conventional methods. exploration-oriented sustainability initiatives promote organizational learning and knowledge integration across functional boundaries. This cross-functional collaboration enhances design for manufacturability and improves quality planning processes, leading to fewer defects and higher reliability (Lin & Chen, 2024). The development of new sustainable materials often necessitates rigorous quality testing and standardization procedures that elevate overall quality management systems.

Sustainability exploration fosters a culture of innovation and continuous improvement that extends to quality management practices. Employees engaged in exploratory sustainability initiatives develop problem-solving skills and analytical capabilities that transfer directly to quality enhancement activities (Huang & Li, 2023). This cultural transformation creates an organizational environment where quality excellence becomes embedded in operational routines.

The subsequent impact of quality performance on economic performance is well-established in manufacturing literature. Superior quality performance reduces costs

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associated with rework, scrap, warranty claims, and customer returns (Kaynak & Hartley, 2008). Additionally, high-quality products command price premiums, enhance customer loyalty, and improve market shares all contributing directly to economic performance. Therefore, quality performance serves as a crucial mediating mechanism that translates sustainability exploration investments into tangible economic returns.

Sustainability exploitation activities focusing on incremental improvements in resource efficiency and waste reduction directly enhance quality performance through multiple pathways. First, waste reduction initiatives (e.g., lean manufacturing, Six Sigma) inherently improve process stability and control, reducing variability and enhancing conformance quality (Wang & Zhang, 2022). The systematic elimination of process inefficiencies frequently identifies and addresses root causes of quality defects. Enrgy and resource efficiency improvements often require enhanced process monitoring and control systems that simultaneously improve quality management. For example, optimizing energy consumption in manufacturing processes typically involves stabilizing process parameters that also affect product quality characteristics (Geng et al., 2023). This simultaneous improvement in efficiency and quality represents a classic win-win outcome of exploitation-oriented sustainability practices.

Employee engagement in continuous improvement activities for sustainability exploitation develops quality consciousness and problem-solving capabilities throughout the organization. As employees identify opportunities for resource conservation, they simultaneously develop skills in process analysis and improvement that apply directly to quality enhancement (Sun & Wang, 2022). This bottom-up approach to improvement creates a quality-focused culture that sustains long-term performance. The mediating role of quality performance is particularly strong for sustainability exploitation because both concepts share fundamental principles of continuous improvement, waste reduction, and process optimization. The economic benefits flow from reduced quality costs, improved productivity, enhanced customer satisfaction, and strengthened competitive positioning all stemming from superior quality performance resulting from sustainability exploitation practices.

H3: *Quality performance significantly mediates the relationship between sustainability exploration and organizational economic performance among the employee of manufacturing industries.*

H4: *Quality performance significantly mediates the relationship between sustainability exploitation and organizational economic performance among the employee of manufacturing industries.*

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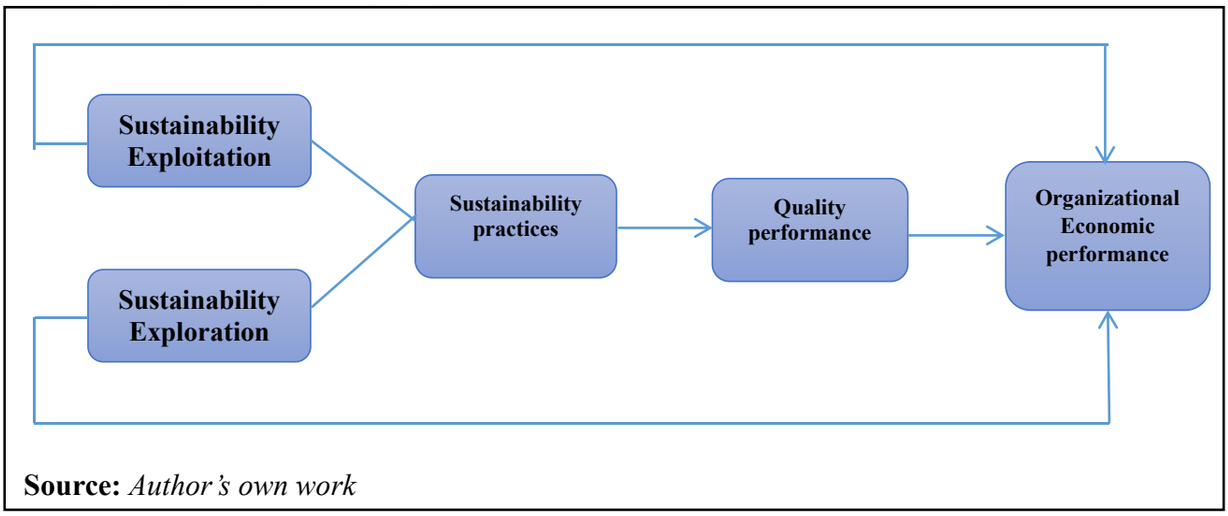
THEORETICAL FRAMEWORK



Source: *Author's own work*

FIGURE 1: THIS STUDY THEORETICAL FRAMEWORK

DATA AND METHODOLOGY

The population of this paper was workers of manufacturing industries operating in Khyber Pakhtunkhwa, Pakistan. Use an adopted questionnaire for primary data collection from target respondents. To confirm a reasonable response rate, survey questionnaires were sent.

SAMPLE SIZE AND PROCEDURE

Data collection was done by randomly distributing questionnaires to employees in manufacturing industries. We evaluated the head of work units and requested the employees who work in their department to allow us to collect data. Employees were notified of the aim of data collection after giving their consent and assured that their information would remain confidential and only be used on the research purpose. They questionnaires were given that they were supposed to fill after giving their consent and they were supposed to do this in a sealed envelope. The respondents were instructed to use their experience when responding to survey questions. Out of the 500 questionnaires that were dispersed, 330 questionnaires were returned; this is a response rate of 59 percent. Among the received questionnaires, which were sent back, 35 of them were discarded either owing to incompleteness, or because of careless answers. This left only 295 questionnaires to analyze. Table 1 provides the demographics of the respondents used in the study.

SCALE DESIGN

The scale was adapted from the past study. The scale items were changed according to the context of the study. Each of the scale was ranked using five-point scale Likert type scale with 1 represents strongly disagree and 5 for strongly agree. The scale used to measure sustainability practices i.e., exploration (items-8) and exploitation (item-6), developed by Maletic et al., (2016). This is a fourteen items scale. In the case of organizational economic performance, the study modified the Maletic et al., (2016) scale that consisted of four items. Likewise, to examine quality performance, Maletic et al., (2016) scale comprising 3 items was used.

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TABLE 1: SCALE RELIABILITY

Variables	Name of variables	No of items	Alpha's Value
Independent Variables	**SEXP**	8	.921
	SEXPL	6	.842
Dependent Variables	**OEP**	4	.798
Mediating Variables	**QP**	4	.904

The reliability analysis provides adequate indications about the instrument's reliability. As shown, the value of Cronbach's Alpha of dependent variable (OEP), Independent variables (SEXP, SEXPL), and intervening variables (QP) is above .7, which checked the reliability of the instruments. Hence, all the instruments were used in the study are reliable.

TABLE 2: KMO AND BARTLETT'S TEST

Variables	Name of variables	KMO	BTS
Independent variable	SEXP	.881	Chi-Sq (1091.35) P<.05
	SEXPL	.857	Chi-Sq (789.73) P<.05
Dependent variable	OEP	.781	Chi-Sq (355.18) P<.05
Mediating variables	QP	.724	Chi-Sq (289.53) P<.05

The sample of this study is properly found on the values of KMO of all variables is above .50. Also, the BTS's values for the constructs are positive and significant, which states that they accept the alternative hypothesis. Exploratory Factor Analysis (EFA) was followed to confirm any cross-loading problems of the study scale. On statistical findings based, factor loading values of all scales were above .60 (ranging from .70 to .90).

RESULT AND ANALYSIS

REGRESSION ANALYSIS

Model 1 (Hypothesis H1)

Sustainability Exploration (SEXP)	Values
Und Beta	.563
Std. e	.042
t	8.405
p	.000
Durbin-Watson	1.468

R^2 = **.224**

The above model table 1 describes the summary of the relationship between sustainability exploration and organizational economic performance. Likewise, the value of ***t*** and ***p*** is concluded that the SEXP has a positive and significant effect on organizational economic performance. Additionally, the R2 value is **.**224, which clearly specifies that the unit change in SEXP will bring 22% units change in organizational economic performance. Thus, hypothesis H1 is accepted.

Model 2 (Hypothesis H2)

Sustainability Exploration (SEXPL)	Values
Und Beta	.708
Std. E	.045
t	15.902

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P	.000
Durbin-Watson	1.557

R^2 = **.508**

The above model table 2 describes the coefficient summary of the relationship of sustainability exploitation and organizational economic performance. Likewise, the value of ***t*** and ***p*** is concluded that the SEXPL has a positive and significant effect on organizational economic performance. Additionally, the R2 value is .508, which clearly specifies that the unit change in SEXPL will bring. 50% units change in organizational economic performance. Thus, we identified support for hypothesis H2.

MEDIATION ANALYSIS

The recommendation of Baron and Kenny (1986) about mediation is that the mediator works well when made a strong link among independent and dependent variables. We expect a strong link between that study independents variables sustainability practices exploration and exploitation with dependent variable organizational economics performance. The current study also suggests that non-financial performance indicators play a position mediating role in the relation among the studies' recommended variables.

Model 3 (Hypothesis H3)

Mediating Variable (Quality Performance)		**Und.Coff**	**Std. error**	**t**	**p**
SEXP → QP		.7855	.0472	16.65	.000
SEXP → OP		.3057	.0604	5.063	.000
QP → OP		.4106	.0577	7.11	.000
SEXP → OP		.6282	.0443	14.19	.000
	Effect	**t**	**P**	**LLCI**	**ULCI**
Total effect	.6282	14.19	.000	.5410	.7155
Direct effect	.3057	5.063	.000	.1867	.4247
Indirect effect	.3225			.2171	.4402
Sobel test (z) 6.54					

The mediation analysis was test the hypothesis that the relationship between sustainability exploration (SEXP) and Organizational economic Performance (OEP) is mediated by Quality Performance (QP). The findings provide strong positive correlation indicating a partial-mediation model. The overall impact of SEXP on OEP was significant (*beta* = 0.628, *p* =.000) which means that a one unit rise in sustainability exploration (SEXP) is linked with a 0.628 unit rise in organizational economic performance. This effect was decomposed into a significant direct effect (*beta* = 0.306, *p* <.000) and a significant indirect effect (*beta* = 0.323) when the mediator (QP) was incorporated. This implies that although sustainability exploration has direct positive effect on the economic performance of the organization, much of its effect is mediated by quality performance.

The importance of the indirect effect was proved with a bootstrapped 95% confidence interval that was not equal to zero [0.217, 0.440], which was supported with a significant Sobel test (z = 6.54, p <.001). This statement indicates that quality performance is a key process in the relationship. In practice, excellent sustainability does not only contribute directly to the economic results in an organization, but also indirectly through the promotion of the quality performance levels. Thus, hypothesis H3 was supported.

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Model 4 (Hypothesis H4)					
Mediating Variable (Quality Performance)		**Und.Coff**	**Std. error**	**t**	**p**
SEXPL → QP		.7272	.0488	14.90	.000
SEXPL → OP		.3048	.0548	5.55	.000
QP → OP		.4169	.0538	7.75	.000
SEXPL → OP		.6079	.0434	13.99	.000
	Effect	**t**	**P**	**LLCI**	**ULCI**
Total effect	.6079	13.99	.000	.5223	.6935
Direct effect	.3048	5.55	.000	.1967	.4129
Indirect effect	.3031			.2102	.4060
Sobel test (z) 6.88					

The mediation analysis was test the hypothesis that the relationship between sustainability exploitation (SEXPL) and Organizational economic Performance (OEP) is mediated by Quality Performance (QP). The findings provide strong positive correlation indicating a partial-mediation model. The overall impact of SEXP on OEP was significant (*beta* = 0.607, *p* =.001) which means that a one unit rise in sustainability exploitation (SEXPL) is linked with a 0.60 unit rise in organizational economic performance. This effect was decomposed into a significant direct effect (*beta* = 0.304, *p* <.001) and a significant indirect effect (*beta* = 0.303) when the mediator (QP) was incorporated. This implies that although sustainability exploitation has direct positive effect on the economic performance of the organization, much of its effect is mediated by quality performance.

The importance of the indirect effect was proved with a bootstrapped 95% confidence interval that was not equal to zero [0.210, 0.406], which was supported with a significant Sobel test (z = 6.88, *p* <.000). This statement indicates that quality performance is a key process in the relationship. In practice, excellent sustainability does not only contribute directly to the economic results in an organization, but also indirectly through the promotion of the quality performance levels. Thus, we identified support for hypothesis H4.

DISCUSSION AND CONCLUSION

Past research study adds a rich understanding about sustainability practices (Maletic et al., 2015; Pujari, 2006; Fairfield et al., 2011). Both managers and scholars are demanding to know how to adopt sustainability practices. Based on detailed analysis of sustainability practices confirmed that it could implement to an inclusive range, i.e., innovative aspects and efficiency. In the era of competition, the success of the organization dependent on appropriate exploitation of its already existing resources, and also new competencies are explored at the same time. While the answer to the dilemma of exploitation, no previous study was found except Maletic et al., (2014a, 2014b, 2015) within the sustainability basis. Hence, in the current study, both concepts within the sustainability practices were validated and empirically tested.

The hypothesis testing of H1 and H2 proves the fact that sustainability exploration and exploitation are crucial to the bottom line of manufacturing firms. This observation is close to the idea of developing competitive abilities in manufacturing (Skinner, 1969; Ferdows and De Meyer, 1990). The cost-effectiveness and operation efficiency, which is a typical competitive priority in manufacturing, are directly promoted by sustainability exploitation which implies optimization of existing processes to waste reduction and energy efficiency. This is in tandem with other studies that have attributed green

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manufacturing practices to reduced cost of compliance, disposal and use of resources (King and Lenox, 2001). On the other hand, exploration that involves the creation of new green products and circular economy models is called sustainability exploration and creates innovation capability and market differentiation. This is corroborated by the findings of Pil and Rothenberg (2003) that discovered that excellent environmental performance can be a competitive dimension in terms of high quality of products and brand names that enable companies to price their products at a high price or gain entry into new markets.

Most essentially, the evidence of H3 and H4 reveals the mediating process of quality performance. This mediating effect proves the fact that economic returns of sustainability are not hypothetical; they are materialized by high-quality results in the manufacturing. Such practices as pollution prevention, lean-green or integration minimize variation and defects in processes, which reiterates the Total Quality Management (TQM) concepts. This empirical finding validates the synergy of the study of Yang et al. (2011) who stated that green practices and quality management are inseparable systems that jointly affect the manufacturing performance. It implies that the innovative sustainable technology (e.g., bio-based materials, closed-loop recycling, etc.) should be effectively converted into high-quality and reliable products to become a commercial opportunity. This observation highlights the significance of having absorptive capacity in the manufacturing companies the capability to identify, internalize, and utilize new external knowledge in a business context (Zahra and George, 2002). An exploration-driven sustainability approach compels organizational learning and sophisticated process controls, which also inherently increase the quality regime on the whole. This is producing not only green products, but also high-performing and more durable resulting in meeting the rising demands of products by the environmentally conscious consumer and business-to-business customer to enhance economic performance (Dangelico & Pujari, 2010).

To manufacturing managers, this research confirms the notion that sustainability is not expenditure but a business tool to achieve economic benefit. The most important key to unlocking this value understands that quality performance is the bridge that is of utmost importance. A dual approach to both exploiting existing green potential and pursuing sustainable innovations in the future, all via a commitment to world-class quality, is the formula behind resilience and profitability in the contemporary manufacturing perspective.

FUTURE STUDY AND LIMITATIONS

Based on results, longitudinal designs should be embraced in future studies in order to establish the causality and the changing impact of sustainability as time goes by. Moreover, a comparative study of this model in the context of particular manufacturing sub-sectors, e.g., a comparison of process industries with separate assembly, would expose important contextual restraints. One of the most promising opportunities is research into the interaction with Industry 4.0 technologies; it is possible that further digitalization (e.g., IoT, AI) is a force multiplier, the presence of which enhances the mediation channel by making it possible to control quality in real-time and perform predictive maintenance, which speeds up the economic payback period of sustainability investments.

Further unpacking of sustainability and performance black box would involve the future research examining other mediators. There are also potential contenders such as operational flexibility since sustainable practices could help a company to become more responsive to the disruption of the supply chain, and employee morale and attraction since a good sustainability image could help increase workforce productivity and minimize the cost of employee turnover. Especially, the introduction of moderators would explain the

conditions of boundaries of these relations. The moderators to be tested include competitive intensity (is the effect more intense in highly competitive markets?), technology confusion (is an evolving technological environment an enabling condition to convert sustainability strategy into quality and economic results successfully?), and top management commitment which is an important supporting condition.

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