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Digital Literacy, Culture, and Engagement as Catalysts of SME Performance: Evidence from West Java

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Abstract

Small and Medium Enterprises (SMEs) in West Java have lots of challenges in the digital era, and requirement of change which is most important to survive in new competitive environment. This research focuses on the identification of factors that affect the Business Performance of SMEs in the region. Applying Partial Least Squares analysis, this research investigates the research gap around Digital Literacy, Engagement in Digital Initiatives, Internal Digital Culture, Government Support Policies, and Market Competitiveness. An exploration of the relationship between the variables of Digital literacy, Digital engagement, and digital culture and their effect on SMEs business performance show that research tests point to significant effects of the three variables on at least one dimension of Business performance. Nonetheless, Government Support Policies and Market Competitiveness appear to be less relevant but they still have places. There is evidence where governments have provided chances to SMEs, though not optimal. In this sporting goods industry, market forces justified the business need for adaptation in today's market. This research provides valuable recommendations to policy makers and practitioners. When digital challenges are understood as unavoidable obstacles and approached as a set of priorities, getting to know internal digital cultures, economies, and financing opportunities in the context of West Java SMEs, it will be possible to outline general strategies for the successful development of firms in the discussed region.

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1. Introduction

In the dynamic of global economies, the digital transformation of Small and Medium Enterprises (SMEs) represents a pivotal domain for scholarly inquiry and practical development. The shift toward digitalization, catalyzed by technological advancements and global crises such as the COVID-19 pandemic, has reshaped operational paradigms across sectors. Digital literacy, employee engagement, and internal digital culture have emerged as critical factors influencing SMEs' ability to adapt and compete in this evolving environment (Añón Higón & Bonvin, 2024; Bening et al., 2023). Yet, a significant gap persists in understanding the interplay between these factors and external elements such as government support and market competitiveness, particularly within the Indonesian context.

Despite the acknowledged importance of digitalization, recent studies reveal stark disparities in its adoption among Indonesian SMEs, with only 22% actively leveraging e-commerce technologies (Bening et al., 2023). This contrasts with higher digital maturity observed in SMEs in regions such as Europe and Latin America, where digital initiatives have substantially enhanced productivity and customer satisfaction (Kádárová et al., 2023; Gonzalez-Tamayo et al., 2023). These disparities underscore the urgent need for targeted research to address unique contextual challenges faced by Indonesian SMEs, including limited digital competencies and insufficient governmental support.

The theoretical discourse on digital transformation emphasizes the critical role of organizational readiness and cultural alignment in achieving sustainable business performance. However, existing literature largely overlooks the nuanced interdependencies between internal capabilities and external support mechanisms in the Indonesian SME sector. Previous research has often focused on general trends, such as the impact of digital literacy or technological adoption on productivity (Surahman et al., 2023; Judijanto et al., 2023), without adequately exploring how these elements interact with policy frameworks and market dynamics. This oversight limits the applicability of these findings to the complex realities faced by SMEs in Indonesia, a context characterized by rapid technological evolution and diverse socio-economic landscapes.

Moreover, while studies in regions such as Vietnam and Latin America have explored factors like leadership, self-efficacy, and digital readiness (Thuy et al., 2023; Gonzalez-Tamayo et al., 2023), there remains a scarcity of empirical evidence addressing how these factors manifest in the Indonesian context. Gaps also persist in understanding how digital culture and employee engagement mediate the relationship between digital literacy and business performance, particularly in markets with fragmented digital infrastructures and limited governmental intervention (Wilestari et al., 2023). Addressing these gaps is critical for developing robust, context-sensitive strategies to enhance SME resilience and competitiveness in Indonesia.

This study addresses existing gaps by exploring the relationships among digital literacy, employee engagement in digital initiatives, and internal digital culture, along with their effects on business performance in Indonesian SMEs, while incorporating government support policies and market competitiveness as moderating factors. By providing a comprehensive framework, the research highlights the dynamics of digital transformation in

a developing economy, offering valuable insights for policymakers, business leaders, and academics to design targeted interventions that foster digital inclusivity and sustainable growth. Emphasizing the local context and unique challenges, this study underscores the need to enhance SMEs' capacity to adapt and excel in an increasingly competitive digital economy.

2. Literature Review

Digital Literacy

Digital literacy has become a fundamental capability that determines how effectively organizations adopt, utilize, and benefit from digital technologies. According to Hsu et al. (2019), digital literacy encompasses technical proficiency, critical thinking, and adaptability in applying digital tools for work-related tasks. For SMEs, digital literacy goes beyond basic skills; it represents a form of digital competence that enables innovation, operational efficiency, and competitiveness (Arifin et al., 2024).

Empirical studies indicate that employees with higher levels of digital literacy are more capable of identifying market opportunities, using data-driven decision-making, and managing digital platforms effectively (Santoso et al., 2019; Surahman et al., 2023). Moreover, digital literacy enhances communication and knowledge-sharing within organizations, creating a more adaptive and innovative work environment (Bening et al., 2023).

In developing countries such as Indonesia, limited digital skills remain a major obstacle to SME performance (Judijanto et al., 2023). Enhancing employees' digital literacy allows SMEs to optimize resources, integrate technology into business operations, and respond dynamically to market shifts. Therefore, digital literacy is viewed as a key enabler of sustainable performance improvement.

H1: Digital Literacy influences Business Performance.
H2: Digital Literacy influences Internal Digital Culture.

Employee Engagement in Digital Initiatives

Employee engagement in digital initiatives refers to the degree to which employees actively participate in digital projects, contribute innovative ideas, and take initiative in adopting new technologies (Lee & Jo, 2023). Engaged employees serve as internal champions of digital transformation by integrating technological innovation into daily routines and influencing their peers (Boskovic, 2021).

Previous research shows that engagement in digital initiatives enhances productivity and performance by fostering proactive behavior, collaboration, and knowledge sharing (Hizam et al., 2023). In the SME context, where resources are often constrained, employee engagement plays an even more critical role—it compensates for technological and financial limitations by fostering internal creativity and adaptability (Wang & Kim, 2017).

Organizations that successfully engage their employees in digital transformation tend to achieve higher customer satisfaction and business sustainability. Engagement also reinforces a culture of experimentation and openness to technological change, which directly supports competitive advantage (Kişi, 2023).

H3: Employee Engagement in Digital Initiatives influences Business Performance.
H4: Employee Engagement in Digital Initiatives influences Internal Digital Culture.

Internal Digital Culture

Internal Digital Culture (IDC) refers to the shared values, attitudes, and practices that support digital adoption and innovation within an organization (Firican, 2023). A strong digital culture promotes collaboration, agility, and openness to change, which are essential for sustaining performance in a rapidly evolving digital environment (Cardoso et al., 2024).

IDC acts as a mediating factor between individual competencies (such as digital literacy) and organizational outcomes. When an organization develops a supportive digital culture, employees are more likely to embrace new technologies, leading to improved innovation and operational efficiency (Wilestari et al., 2023). In SMEs, IDC strengthens adaptability, enabling firms to respond quickly to technological and market disruptions.

Empirical evidence demonstrates that firms with a robust digital culture are more capable of transforming digital potential into measurable business performance through improved communication systems, digital collaboration, and innovation-oriented mindsets (Sulastri et al., 2023).

H5: Internal Digital Culture influences Business Performance.
H6: Internal Digital Culture mediates the relationship between Digital Literacy and Business Performance.
H7: Internal Digital Culture mediates the relationship between Employee Engagement in Digital Initiatives and Business Performance.

Government Support Policy

Government Support Policy (GSP) encompasses strategic interventions—such as digital infrastructure, training programs, subsidies, and incentives—designed to facilitate technology adoption among SMEs (Anetor, 2020). In emerging economies, government initiatives often play a catalytic role in enabling digital transformation by reducing financial barriers and creating conducive regulatory environments (Santoso et al., 2019).

However, prior research provides mixed findings. Some studies show that government support positively impacts SME digital adoption and competitiveness (Iskandar, 2023), while others argue that many programs lack contextual sensitivity, resulting in limited effectiveness (Azila & Noor, 2011). In Indonesia, policy inconsistencies and bureaucratic limitations often hinder the optimal realization of these programs, leaving SMEs to rely heavily on internal capabilities.

Thus, while government support policies may not directly enhance performance, they can strengthen the effect of internal capabilities such as digital literacy by improving access to infrastructure and digital ecosystems.

H8: Government Support Policy influences Business Performance.
H9: Government Support Policy influences Internal Digital Culture.
H10: Government Support Policy moderates the relationship between Digital Literacy and Business Performance.
H11: Government Support Policy moderates the relationship between Digital Literacy and Internal Digital Culture.

Market Competitiveness
Market competitiveness reflects the degree of market pressure that compels firms to innovate, adapt, and maintain efficiency to survive in dynamic environments (Rehman et al., 2023). Under high competition, SMEs must utilize digital tools to strengthen customer relationships, improve service quality, and accelerate innovation (Ni et al., 2021).

Competitive markets encourage SMEs to adopt agile strategies and develop technological capabilities that differentiate them from competitors. Moreover, competitive intensity often amplifies the relationship between employee engagement and business performance—engaged employees respond more effectively to market demands and drive innovation that supports firm survival (Prameswari et al., 2017).

However, when competitiveness outpaces SMEs' technological readiness, it can create performance disparities. Hence, the role of market competitiveness as a moderating factor is context-dependent, particularly in emerging economies like Indonesia.

H12: Market Competitiveness influences Business Performance.
H13: Market Competitiveness influences Internal Digital Culture.
H14: Market Competitiveness moderates the relationship between Employee Engagement in Digital Initiatives and Business Performance.
H15: Market Competitiveness moderates the relationship between Employee Engagement in Digital Initiatives and Internal Digital Culture.

Based on the reviewed literature, this study develops a model integrating internal capabilities (Digital Literacy, Employee Engagement, Internal Digital Culture) and external enablers (Government Support Policy, Market Competitiveness) to explain Business Performance among SMEs in West Java. IDC serves as a key mediating construct, while GSP and MC function as contextual moderators that strengthen or weaken these relationships.

3. Research Method

This research uses quantitative research methods using surveys distributed to SMEs in West Java. The survey process was carried out online with the help of influencers and also offline in several SME players in the region. To determine the sample size, the Slovin formula was

used (Susanti et al., 2019). Which resulted in distributing questionnaires to 525 respondents. However, of these, only 240 respondents met the predetermined criteria for the purposes of this study.

This research incorporates six variables categorized into dependent, independent, intervening, and moderating variables, each comprising multiple indicators. These variables include Digital Literacy (DL), Employee Engagement in Digital Initiatives (EEDI), Internal Digital Culture (IDC), Government Support Policy (GSP), Market Competitiveness (MC), and Business Performance (BP), each with three indicators. The following Table 1 presents the measurement of variables studied as follows:

Table 1. Measurement

Variable	Indicator	Item
DL (Hsu et al., 2019)	Percentage of employees proficient in using office software and applications.	DL1
	Employees' confidence level in using digital technology to complete work tasks.	DL2
	Employee participation in training and skill development programs for DL.	DL3
EEDI (Lee & Jo, 2023)	Level of employee participation in digital projects or implementation of new systems.	EEID1
	Employee initiative in seeking technological solutions to enhance work efficiency.	EEDI2
	Frequency of employees providing input or ideas related to technology or system development within the organization.	EEDI3
IDC (Firican, 2023)	Level of support and acceptance from management towards digital initiatives and new experiments.	IDC1
	Availability of resources and technological infrastructure facilitating digital collaboration and communication.	IDC2
	Frequency of discussions or open forums related to digital transformation and innovation in the work culture.	IDC3
GSP (Anetor, 2020)	Number and types of incentives or support programs available for SMEs in adopting digital technology.	GSP1
	Level of SME participation in government support programs related to digital transformation.	GSP2
	Availability of digital infrastructure provided or supported by the government to assist SMEs.	GSP3
MC (Rehman et al., 2023)	Relative market share of SMEs compared to their competitors.	MC1
	Level of innovation in products or services offered compared to competitors in the market.	MC2
	Level of SME adaptation to market trends and changes triggered by technology and innovation.	MC3
	Annual revenue growth from year to year.	BP1

Variable	Indicator	Item
BP (Abidin et al., 2023)	Net profit margin from sales of products or services. Level of customer satisfaction measured through surveys or feedback.	BP2 BP3

Sources: recent studies

This study utilized Smart PLS 3 software with the PLS method to analyze the data, examining the relationships between variables outlined in the conceptual model. The research aims to gain insights into factors influencing BP and offer strategic guidance to enhance SME performance in West Java.

4. Results

Each Table 2 below presents the profile of the respondents. It was found that most of the respondents are engaged in Fashion Retail (25%), Food & Beverage (20.83%), Manufacturing (16.67%) and Other Services such as Salon and Laundry (37.50%).

Table 2. Respondent Profile

Characteristic		Frequency (N=240)	(%)
Business Type	Fashion Retail	60	25.00
	Food & Beverage	50	20.83
	Manufacturing	40	16.67
	Other Services (Salons & Laundry)	90	37.50
Years in Business	0-2 years	70	29.17
	2-5 years	90	37.50
	> 5 years	80	33.33
Location	Bandung	100	41.67
	Bogor	70	29.17
	Depok	70	29.17
Annual Revenue	< IDR 100,000,000	120	50.00
	IDR 100,000,000 - IDR 500,000,000	80	33.33
	> IDR 500,000,000	40	16.67
Total of Employees	1-5	150	62.50
	5-10	50	20.83
	> 10	40	16.67

Sources: data procesed

Table 3 presents validity and reliability outcomes for DL, EEDI, IDC, Validity testing ensured data reliability through factor loading analysis, assessing questionnaire GSP, MC, and BP, each with three indicators.

Table 3. Results of Validity and Reliability Tests

Variable	Item	Validity Test	Reliability Test

		Factor Loading	Decision	Cronbach Alpha	Decision
DL (Hsu et al., 2019)	DL1	0.975	Valid		
	DL2	0.967	Valid	0.970	Reliable
	DL3	0.972	Valid		
EEDI (Lee & Jo, 2023)	EEID1	0.968	Valid		
	EEDI2	0.974	Valid	0.967	Reliable
	EEDI3	0.963	Valid		
IDC (Firican, 2023)	IDC1	0.949	Valid		
	IDC2	0.973	Valid	0.960	Reliable
	IDC3	0.964	Valid		
GSP (Anetor, 2020)	GSP1	0.939	Valid		
	GSP2	0.896	Valid	0.925	Reliable
	GSP3	0.962	Valid		
MC (Rehman et al., 2023)	MC1	0.851	Valid		
	MC2	0.959	Valid	0.911	Reliable
	MC3	0.951	Valid		
BP (Abidin et al., 2023)	BP1	0.978	Valid		
	BP2	0.985	Valid	0.980	Reliable
	BP3	0.979	Valid		

Sources: data procesed

The reliability of the current study was achieved through high convergent validity, internal consistency, and surpassing the recommended threshold, hence the validity of the results is assured (Hair et al., 2017). The outcomes of the bootstrapping process are illustrated in Figure 3 as depicted below:

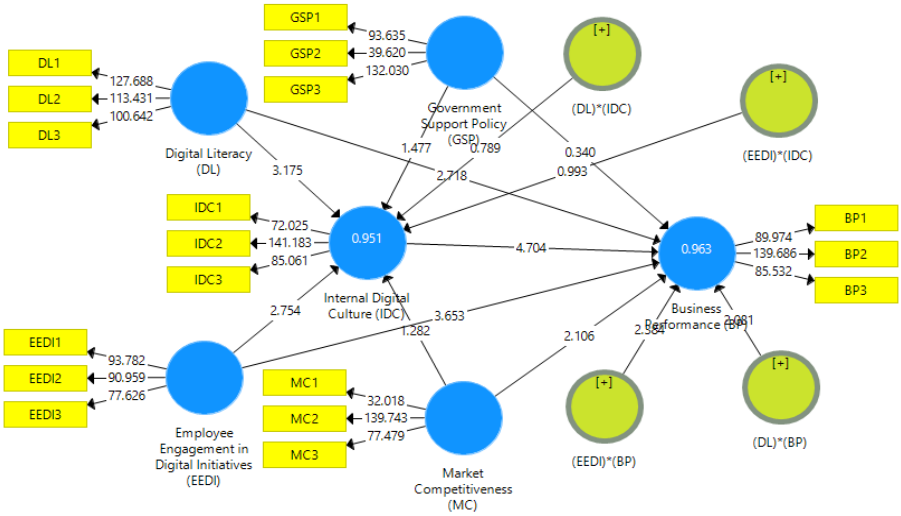

Figure 1. Bootstrapping Result

The tabulation of the research data is done by Smart-PLS software and the result is shown in table number 4.

Table 4. Direct Effects

Path	Original Sampel	T Statistics	P Value	Decision
(DL)*(BP) -> BP	-0.081	2.081	0.038	Accepted
(DL)*(IDC) -> IDC	-0.041	0.789	0.430	Rejected
(EEDI)*(BP) -> BP	0.098	2.384	0.018	Accepted
(EEDI)*(IDC) -> IDC	0.054	0.993	0.321	Rejected
DL -> BP	-0.309	2.718	0.007	Accepted
DL -> IDC	0.385	3.175	0.002	Accepted
EEDI -> BP	0.490	3.653	0.000	Accepted
EEDI -> IDC	0.392	2.754	0.006	Accepted
GSP -> BP	0.016	0.340	0.734	Rejected
GSP -> IDC	0.100	1.477	0.140	Rejected
IDC -> BP	0.615	4.704	0.000	Accepted
MC -> BP	0.184	2.106	0.036	Accepted
MC -> IDC	0.122	1.282	0.200	Rejected
DL -> IDC -> BP	0.237	2.336	0.020	Accepted
EEDI -> IDC -> BP	0.241	2.567	0.011	Accepted

Sources: data procesed

Discussion

Table 4 displays DL and GSP's role as moderating variables between BP and the relation described above. The presence of the approved path coefficient of -0.081 indicates that the GSP enhances the friendly relationship between DL and BP. This illustrates how measures taken by the government to train the workers and or make the devices and internet accessible will improve the workers digital literacy and subsequently the performance of the SME businesses. These results advocate for targeted policy solutions to enhance digital competencies and enhance SME productivity, which will be helpful to policymakers contemplating assistance programs that are effective (Santoso et al., 2019). The analysis results show that there is no significant moderation effect of DL x GSP on IDC. The coefficient (DL)*(IDC) is -0.041 with corresponding t-statistic 0.789, and p-value of 0.430, which means that the interaction does not have a significant effect on IDC. This indicates that while both DL and GSP can additively hamper IDC to a large extent, their simultaneous influence on IDC of the company is not substantial (Cardoso et al., 2024).

The analysis reveals that EEDI moderately interacts with MC in determining BP. Performance on the path coefficient shows that an improvement in MC enhances the effect of EEDI on BP, evidenced by a value of 0.098, t-statistic of 2.384, and p-value of 0.018. This means that there is the need to have EEDI while in the competitive markets, stress is put on BP to boost it, and therefore supporting the emotions that Digital Adoption strategies are keywhen there is an aspect of competition. The Moderation 2 analysis results show that EEDI and MC interaction has no moderation effect on IDC with regard to null hypothesis. The coefficient for the path (EEDI)*(IDC) is 0.054, the t-statistic of 0.993, while the p-value of 0.321 imply that IDC is not affected by this interaction to a large extent. Even though EEDI

and MC levels may affect a company's IDC, the combination of the two does not greatly affect the company's IDC (Prameswari et al., 2017).
The study also provides evidence of the prominent effects of DL on BP that have been identified in previous studies. Digital literacy skills amongst employees lead to improved business performance with the path coefficient of -0.309, t-statistic at 2.718, and a significance level of 0.007. Improved DL leads increased productivity and competitiveness which may result from efficiency in the use of digital tools, communication, and innovation. Thus, more attention should be paid to the problem of training employees in the required digital competencies as the key component of the company's performance and successful management of the digital context (Alawiye-Adams & Afolabi, 2014). The more time is spent on Deep Learning (DL), the higher is the mean time that Intrusion Detection Systems (IDC) are engaged. DL has a favourable effect on IDC, with a path coefficient of 0.385, t-statistic 3.175, and a $p<0.000$. Technology self-support facilitates acquisition of technological competence, internet collaboration, and participation in change initiatives strengthens a firm's IDC. This culture fosters creativity, and flexibility which are important in today's unpredictable business world. The decision to invest in DL improves both functional flexibility and the cultural climate for sustainable development and sustainability (Arifin et al., 2024).

The results established a high degree of correlation between EEDI and BP. The result reveals that the EEDI has an influence on BP where the path coefficient detects 0.490, the t-statistic is 3.653, and P-value = 0.000. Being actively involved in digital projects show the openness of the employees accepting change embracing innovation and sustainability of productivity and competitiveness (Wang & Kim, 2017). EEDI fosters a creative work culture highly relevant to sustainability and adaptability in the modern age of work (Anabila, 2020). To enhance BP and drive successful management of digital changes, a key intervention must be pursued; namely, the advancement of EEDI. From the examination made, a high correlation between EEDI and IDC is evident. The empirical result reveals a positive association between EEDI and IDC, with the path coefficient of 0.392 ($t = 2.754$, $p = 0.006$). EEDI stands for the active embrace of employees toward digital technology with enhanced focus on creating a positive climate for experimenting with technology (Kişi, 2023). The promotion of EEDI stimulates an IDC that enhances the technology utilisation and advances the operating capability and organisational flexibility necessary in an increasingly digitalised environment (Boskovic, 2021). For that reason, it is necessary that various forms of businesses support EEDI to improve IDC and gain a competitive advantage within the digital area.

According to the analysis findings, there is substantial evidence that this GSP variable does not significantly affect the business's BP. This means that the the path coefficient between GSP and BP is not significantly different from zero; $t =0.340$; $p = 0.734$. In this regard, while GSP intends to improve the BP of SMEs, the findings show that these policies are insufficient to boost firms' BP (Azila & Noor, 2011).It is suggested by Trainor et al., (2014) that generic strategic factors, such as management initiatives, people's involvement, and other contexts might influence BP more than GSP.nificant as indicated by a path coefficient of 0.016, a t-statistic of 0.340, and a p-value of 0.734. In this situation, although GSP aims to enhance

SMEs' BP, the analysis results indicate that implementing such policies does not greatly improve firms' BP (Azila & Noor, 2011). Factors like management strategies, employee engagement, and market conditions may have a greater impact on BP than GSP, according to (Trainor et al., 2014).

The test results reveal that the GSP factor is not significantly related to the company's IDC. They found that the link between GSP and IDC is not considered important with the path coefficient registered at 0.100, t-statistic of 1.477 and p-value of 0.14. Despite the fact that GSP is intended to support digitalization and digital change, the company's IDC is not affected by the implementation of this strategy to a great extent. Probably, leadership, management strategies, and employees' participation might have a much greater effect on IDC as for other elements (Wilestari et al., 2023).

The examination further presents a sustainable and significant level of linkage between IDC and BP with a path coefficient estimate of 0.615, t statistic value of 4.704 and p-value of 0.000. The quantitative results demonstrated that IDC thickness yielded a positive impact on BP by encouraging digital adoption, digital collaboration, digital innovation and digital adaptability within a firm. For enhancing business performance, organizations need to prioritize the following IDC areas: management support for digital alterations, digital literacy enhancement of the workforce, and organization responsiveness and solutions encouragement (Wilestari et al., 2023). By improving IDC, durable growth results from the betterment of efficiency, productivity, and competitiveness.

It is found that MC is significantly affecting the BP with a path coefficient of 0.184, t-statistic of 2.106 and p-value 0.036. This simply means that an increase in MC increases BP and therefore many sales opportunities, market share and revenue. Thus, these marketing practices for companies to improve MC are customer focus, innovation, marketing agility, and marketing campaign success. According to the assessment results for the model, the path coefficient of MC for IDC is 0.122 and the t-statistic is 1.282, but the p-value is 0.200, which mean that MC has no influence on IDC. This means that the correlation between MC and IDC remained insignificant or non-significant to achieve realistic statistical differences. The role which MC plays in shaping the business strategies to influence IDC is significant, but the relationship is not fully understood (Ni et al., 2021). IDC could be more impacted by internal factors such as the decisions made by the managing team and the perception that employees have of the technology (Ni et al., 2021). Hence, although MC is essential for company success, its link with IDC seems to be more complex and, albeit, mediated.

DL and IDC have a positive correlation with a path coefficient of.237; t=2.336, p=.020. Better Digital Literacy enhances the dignity of its digital framework by inspiring the workforce to use digital assets to reinvent the organization. This developed culture has a positive effect on the BP since businesses are in a position to adapt to change effectively in their markets hence enhancing the competitive advantage. Therefore, investment in DL not only facilitates internal digital competencies but also drives up the results of BP (Rita Inoni et al., 2019). The link between EEDI and IDC in the current study was found to be significant with a path coefficient of 0.241 and a t-statistic of 2.567, and the p-value 0.011. EEDI is

specifically used to illustrate how employees collaborate and innovate on specific digital projects (Sharma and Bhatnagar, 2016). This leads to emergence of IDC which enhances flexibility of the organization and hence helps BP (Boskovic, 2021). It is found that by advocating for EEDI, a firm can enhance the firm's digital culture and thus impact positively the firm outcome (Hizam et al., 2023).

5. Conclusion

As pointed out by the research, DL and EEDI serve progressive functions in enhancing IDC and leading to improved BP. However, GSP and MC did not significantly affect IDC and BP and it is suggested to further enhance the outcomes related to the factors by concentrating on the following: It is important for organizations to adapt to the new and dynamic policies and market environment that are available today. However, the importance of the study would be limited to SMEs operating in West Java only. Future studies should look at different factors and business environments in order to understand fully the dynamics of digital transformation. Call people to be more engaged in digital projects, as well as, develop teamwork and creativity at the workplaces will enhance flexibility and productivity in the organization. These include being sensitive to policy shifts, the advocate for policies that enhance the advancement of digital solutions, as well as frequent assessment of the market forces that dominate the digital frontier as crucial approaches toward enthroning competitiveness in the digital economy.

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