



Nexus of Knowledge Transfer, Green Innovation and Environmental Performance: Impact of Environmental Management Accounting

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ABSTRACT

The present study is motivated to investigate the importance of ecological innovations and knowledge management in influencing environmental performance (EPR). The focus of the present study lies in identifying the contribution of environmental management accounting (EMA) in driving the firm's knowledge transfer (KTR), green innovation (GIN), and EPR in Indonesian small and medium enterprises sector. The current collected the data from 223 respondents from different SMEs of Indonesia. The results of PLS-SEM confirm that all variables have a positive and significant impact on the EPR of Indonesia SMEs. Moreover, the outcomes of the PLS-SEM confirm that KTR, GIN, and EPR have significantly and positively impacted by EMA system. The outcomes of partial least square structural equation modelling also indicate that KTR and GIN have also positively and significantly impact on the EPR. The results further recommended that the firms can improve their EPR by implementing good EMA system.

Keywords: Knowledge Transfer, Green Innovation, Environmental Performance, Indonesia

JEL Classifications: Q55, Q50

1. INTRODUCTION

In the current environmental era, safeguarding environment has been the center of attention and a major concern for businesses (Chuang and Huang, 2018). Ecologically driven organizational procedures have increasingly been adopted as the eminent part of management. This is followed by an increased consideration for environmental management in the recent literature. There exist several motivations that pursue firms for ecological practices. They involve ethical considerations (Helfaya et al., 2018; Traer, 2018; Isaak, 2017), monetary benefits (Friede et al., 2015; Molina-Azorín et al., 2009; Watson et al., 2004), legislation (Feng and Liao, 2016; López-Gamero et al., 2010) and stakeholders concerns (Theyel, 2006; Céspedes-Lorente et al., 2003; Zhu and Chen, 2018).

Organizational characteristics underlie a significant part in influencing environmental management (Jime'nez-Aleixandre, 2002; Sharma, 2000; Hale and Hovden, 1998). Firms' inclination for technology usage and knowledge management support organizations' vision of sustainability. The way organizations execute knowledge transfer (KTR) is critical in disseminating the motivations for ecological improvements in subsequent counterparts to ensure enhanced coordination and efficient results. Knowledge exchange is another procedure which is assumed as a fundamental element in firms' prosperity (Argote and Ingram, 2000; Rodgers et al., 2017). Knowledge exchange is "the movement of knowledge from one organizational unit, individual or possession to another" (Liyanage et al., 2009; Zhang et al., 2017). Specifically, "Knowledge move in corporations is the procedure through which one unit is influenced by the experience of another" (Argote and

Ingram, 2000). In the literature, many studies look to find the best strategies for knowledge dissemination in Firms (Rodgers et al., 2017). Collection of new knowledge by those accepting it shows effective knowledge exchange. While knowledge exchange was, at first, an idea important just for personal development, it has turned into a significant idea in the literature related to advanced managerial applications and organizational theory (Argote and Ingram, 2000; Zhang et al., 2018), with intrigue to a great extent emerging from the idea that knowledge exchange is urgent for performance (Weidenfeld et al., 2010).

The relationship between ecologically driven firm practices has been extensively criticized in sustaining organizational performance (Raut et al., 2019). The significance of green management emerges as a substantial tool in driving firm performance and thus, discussed abundantly in existing literature (Molina-Azorin et al., 2009; Raut et al., 2019). Similarly, the adoption of technology in the course of environmental management also helps to supplement business goals for reducing ecological burdens in the form of energy usage, air pollution, and augmented waste levels. This lead to enhance the firm's potentials for efficiency and improved performance. Quite a few years of investigation into innovation in business management have neglected to give clear and reliable discoveries or reasonable counsel to entrepreneurs, governments, and policymakers. On similar grounds, Tidd (2001) stated that innovation in being a "best practice" is dependent upon the scope of components that are crucial to excel the utilization of technology into organizational motives of improved performance.

In this regard, environmental accounting has emerged as a significant driver of organizational inclination for pursuing green innovation (GIN) and knowledge management to attain higher environmental performance (EPR) (Bebbington et al., 2017; Wonyra, 2018). The field of accounting has always been vital for the identification, collection, and reporting of information that strengthens decision making (Ahmed et al., 2017). The recent surge in organization's adoption of environmental management accounting (EMA) have enhanced firm's efficiency for assimilating and utilizing environmental information for aiding firm's desire of improved environmental quality, reduced ecological pressures and lessen the negative impacts of organizations on existing environment (Yakhou and Dorweiler, 2004; Schaltegger et al., 2003). Initially, the application of environmental accounting has been linked to identifying environmental costs and disclosure reporting. However, in recent years, the emphasis of firms has been diverted to investigate and allocate the efficiency of EMA towards firms' EPR (Latan et al., 2018) and the application of environmental systems in enhancing KTR and technological innovation to ensure performance (Hamdoun et al., 2018).

Therefore, the present study is motivated to investigate the importance of ecological innovations and knowledge management in influencing firm performance. The focus of the present study lies in identifying the contribution of EMA in driving firm's KTR, GIN and EPR in Indonesian manufacturing sector. To the best of our knowledge, the current study is novel in studying the joint contribution of environmental accounting, innovation and KTR in boosting firm's EPR and therefore add greater value to the literature in identifying a critical empirical link among the

variables. In this way, the current investigation can be useful in lending support to build efficient environmental and organizational policies for decision making and sustainability.

The remaining part of the current study is outlined as follow. Section-2 of the examination presented the overview of prevailing literature on environmental management, KTR, environmental accounting, GIN, and performance nexus. Section-3 portrayed the applied methods of sampling and construct information. Section-4 presented empirical results and statistical interpretation. In the end, Section-5 summarized the findings and provided policy implications.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Several examinations in the prevailing literature have analyzed the relationship of GIN and performance. However, none of the studies have investigated the joint effect of KTR, GIN, and EMA on EPR. At the operational level, there exist some studies that established the positive impact of environmental management practices on KTR, especially through improved regulations (Claver et al., 2007; Yao et al., 2017). By definition, knowledge transmission is regarded as the flow of knowledge from one organizational unit, individual or possessor to another (Liyanage et al., 2009). In particular, specifically, knowledge transmission in corporations is the procedure through which one unit is influenced by the experience of others (Argote and Ingram, 2000). In the existing literature, many studies look to find the best strategies for knowledge dissemination in Firms (Rodgers et al., 2017).

Assessing the relationship of KTR with firm performance, Makino and Delios, (1996) examined how KTR impact joint ventures (JOV) of Japanese local and international firms. The outcomes from 558 JOV revealed that associating with domestic firms can supplement KTR and therefore, improves JOV performance. In addition, the findings also supported that JOV in host nation has also been successful in eliminating the drawback of limited knowledge and thus resulted in improved JOV performance. In another study, Hamdoun et al. (2018) studied the association between KTR, innovation, quality management, and environmental management in Tunisia. The outcomes of the investigation supported the significant positive association of environmental management practices with KTR. The results of the investigation also found the positive effect of KTR on innovation.

Linking KTR with innovation and firm performance, Wang and Wang, (2012) also examined the relationship of explicit and tactic KTR with innovation speed & quality and firms financial & operational performance. The findings o the analysis reported the significant positive impact of tactic KTR on firms operational and financial performance. As for explicit knowledge, the results of the investigation only found the significant impact of explicit KTR on a firm's financial performance. The findings of innovation also presented mixed findings. The results indicated that innovation speed is significant to carry a positive impact on a firm's operational and financial performance. However, innovation quality only affects a firm's financial performance.

Analyzing the impact of ecologically driven innovation, Weng et al. (2015) studied the role of GIN on firm performance. Analyzing the responses of 202 firms in Taiwan, the outcomes of the investigation found support for the positive relationship of innovation on with the performance. In particular, the results suggested that GIN is significant to enhance firm financial as well as EPR (Haseeb et al., 2019). Moreover, Aguilera-Caracul and Ortiz-de-Mandojana, (2013) also examined the link between GIN and financial performance. Assessing the data of eighty-eight eco-innovated and seventy matched organizations, the results of the study found that GIN does not carry any improvement in the form of financial performance. On the other hand, Chiou et al. (2011) also analyzed the association of GIN on a firm's EPR and competitiveness. The outcomes of the investigation established the significant positive impact of GIN on a firm's EPR and competitive advantage.

Focusing on EMA, Latan et al. (2018) studied the role of EMA in influencing firm's EPR. Studying the sample of Indonesian firms, the results of the analysis found support for the significant positive association of EMA with a firm's EPR. Linking EMA with GIN, Ferreira et al. (2010) also studied the critical association between product and process innovation with environmental accounting usage. The results of the analyses found that EMA utilization carried a significant positive impact on an organization's process innovation but failed to find the significance of EMA in enhancing the firm's product innovation. Studying the moderating impact of management accounting and control systems (MACS), examined the link between ecological innovation and international firm performance (Jermsittiparsert, 2016). The result of the study found that modern MACS enhanced the positive impact of GIN on performance.

Assessing the role of knowledge sharing in accounting firms, Trivellas et al. (2015) found that KTR is motivated from information-driven communication, problem-solving, and decision making challenges. The results of the analysis indicated that accounting managers are motivated by knowledge accommodating environment that enhanced their efficiency and improved the firm's competitiveness and performance. Similarly, Mirzaee and Ghaffari, (2018) also established that information systems motivate the firm's KTR through system quality and technology. Examining the connection between accounting information systems (AIS) and KTR in Malaysian firms, Sori, (2009) studied the utilization of AIS in knowledge management (Jermsittiparsert et al., 2019). The findings of the case study reported that utilization of AIS supplements KTR in the firm's functions and thus add informational efficiency to processing.

Therefore, in light of the above literature, the current examination postulated the following hypotheses.

Hypothesis 1: EMA is significant to enhance Firm's KNT

Hypothesis 2: EMA is significant to enhance Firm's GRI

Hypothesis 3: EMA is significant to enhance Firm's ENP

Hypothesis 4: KNT is significant to enhance Firm's ENP

Hypothesis 5: GRI is significant to enhance Firm's ENP

The conceptual model of the current study is displayed in Figure 1.

3. METHODOLOGY

The strategy for data gathering in the current investigation is done by gathering the information from the little and medium enterprises (SMEs) firms of Indonesia. Moreover, we select 72 various SMEs of Indonesia for the data collection procedure. For quick and rapid data gathering process, we make an understanding of our research study into the English language and send to the selected various SMEs of Indonesia. In addition to this, we collected an aggregate of 285 samples was assembled to utilizing both printed and soft copy of the research instrument. The strategy for information gathering took a time of total 107 days and assembled 227 survey polls with the reaction rate of 79.64%.

The present examination explores the effect of the EMA system, KTR, and GIN on EPR in different SMEs of Indonesia (Ali and Haseeb, 2019). To accomplish this objective, the present research focuses on the research framework based on previous studies, and the framework is represented in Figure 1. The basic properties of the factors are clarified by using the Likert scale procedure from 1 (strongly disagree) to 5 (strongly agree). Generally, the present examination utilizes four factors. The factors utilized in this examination are the EMA, KTR, GIN and EPR. The constructs of these factors are further selected from the past researches. The four constructs of (EMA) are taken from the before the investigation of Latan et al. (2018). In addition, the four items of (KTR) are embraced from the earlier research of Donate and Sanchez-de-Pablo, (2015). Besides, the four constructs of (GIN) are taken from the past research of Chen et al. (2006). At long last, the four constructs of (EPR) utilized in this investigation are taken from the past investigation of Zhu and Choi, (2016).

4. DATA ANALYSIS AND INTERPRETATION

In the present examination, the data analysis is finished by utilizing two novel programming software, which is the SmartPLS Version 3.2.8 (Ringle et al., 2015) and Statistical Package for Social Sciences (Version-23). The last data taken for the present examination is 223 ensuing to taking out univariate and multivariate outliers. The procedure for the seeing of univariate and multivariate outliers are Z-test score and Mahalanobis Distance (D2) by utilizing SPSS (V-23), and additional data examination is done by applying SmartPLS. Demonstrated Table-1 is the structure and composition of the final gathered information used in this examination. Besides, Table-2 detailed the mean and Pearson's Correlation of the data used in the present investigation. Likewise, to manage the issue of multicollinearity, we seek after the examination of Hair et al. (2010) start that by a wide range in Pearson's Correlation examination ought to underneath 0.90. Subsequently, to affirm the nonappearance of multicollinearity among the factors (Frooghi et al., 2015; Hair et al., 2013).

The outcomes of descriptive statistics are reported in Table-1 with complete structure and composition of the collected data. The descriptive statistics are further divided into four different sub-categories, which are gender, age, work experience, and education. Table-1 explains the percentage decomposition of all the sub-categories.

Figure 1: Research model

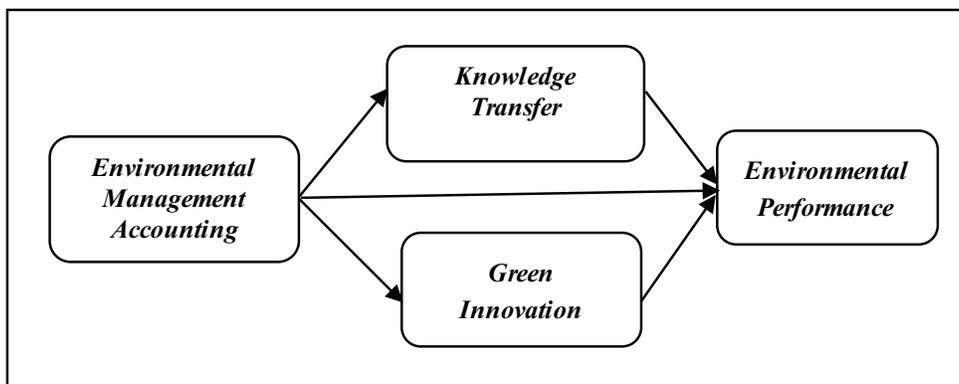


Table 1: Descriptive statistics

| Descriptive statistics | Frequency | Percent (%) |
|------------------------|-----------|-------------|
| Gender | | |
| Valid | | |
| Female | 88 | 39 |
| Male | 135 | 61 |
| Total | 223 | 100 |
| Age | | |
| Valid (years) | |) |
| 20-30 | 28 | 13 |
| 31-40 | 137 | 61 |
| 41-50 | 28 | 13 |
| 51 and above | 30 | 13 |
| Total | 223 | 100 |
| Working experience | | |
| Valid (years) | | |
| 1-5 | 37 | 17 |
| 6-10 | 138 | 62 |
| 11-15 | 30 | 13 |
| <15 | 18 | 8 |
| Total | 223 | 100 |
| Education | | |
| Valid | | |
| Undergraduate | 18 | 8 |
| Graduate | 159 | 71 |
| Postgraduate | 19 | 9 |
| Others | 27 | 12 |
| Total | 223 | 100 |

Source: Authors estimation

Table 2: Means and pearson correlations

| Variables | MEAN | EMA | KTR | GIN | EPR |
|-----------|-------|---------|---------|---------|-----|
| EMA | 3.594 | - | | | |
| KTR | 3.959 | 0.382** | - | | |
| GIN | 3.847 | 0.227** | 0.338** | - | |
| EPR | 4.005 | 0.284** | 0.195** | 0.318** | - |
| n=223 | | | | | |

**Correlation is significant at the 0.01 level (2-tailed), EMA: Environmental management accounting, KTR: Knowledge transfer, GIN: Green innovation, EPR: Environmental performance

Furthermore, content authenticity is developed if the constructs utilizing in the data analysis load with high values in their particular factor in correlation with the things showed up in the model, while inner consistency is recognized whether the estimation of Cronbach’s alpha and composite dependability found more observable than 0.7 (Hair et al., 2013; Waseem et al., 2013). Factor loadings and composite dependability values appear in Table-3, which show that

a smooth estimation of the construct factor loadings more clear than 0.7. Furthermore, these loadings show up in their individual parts, which guaranteeing the internal consistency of the selected construct.

Additionally, convergent authenticity discloses to what degree a construct with respect to a particular factor loaded to different elements where they expected to be loaded (Afshan and Sharif, 2016; Mehmood and Najmi, 2017; Afshan et al., 2018; Khan et al., 2019). In this examination, convergent authenticity is shown by utilizing an average variance extracted (AVE) for each factor (Fornell and Larcker, 1981). They gave the benchmark of more central than and revealed contrastingly in relationship with 0.5 for confirming the convergent authenticity. The outcomes of AVE in Table-3 is confirming the basic parameters.

In the next step, discriminant authenticity is uncovered as how much a construct of a factor is discriminant and novel from different factors utilized in a model (Frooghi et al., 2015). As shown by Fornell and Larcker (1981), the discriminant authenticity is said to be built up if the AVE square root value is more than the pair-wise relationship of the unidentified factor (dormant variable). The outcomes showed up in Table 4, bold, and italic values are the square root of AVE, which is more than the cutoff value, which is the pair-wise relationship of each factor. Moreover, Table 5 demonstrates the factor loadings of other and individual factor, in like way, articulating the cut-off benchmark. therefore, the discriminant authenticity is also asserted if the Hetro Trait and Mono Trait parameter are lower than 0.85 as proposed by Henseler et al. (2015). The results in Table 6 revealed that all components have Discriminant legitimacy.

In the final step, we related a partial least square system to research the model structure and hypothesis testing, which showing path coefficients, t-stats, and significance value. As showed up by Chin (1998) proposition, a bootstrapping system utilizing 1000 sub-test was related to confirming the quantifiable key assessments of the considerable number of values. Table 7 uncovers beta coefficients, t-statistics, and their noteworthy incentive with the remarks about the hypothesis testing.

The outcomes of the partial least square structural equation modelling are shown in Table 7. It confirmed that the outcomes with regression path coefficient, t-statistics, probability values

Table 3: Measurement model results

| Variables | Items | Factor loadings | Cronbach's alpha | Composite reliability | AVE |
|-------------------------------------|-------|-----------------|------------------|-----------------------|-------|
| Environmental management accounting | EMA1 | 0.839 | 0.843 | 0.893 | 0.601 |
| | EMA2 | 0.811 | | | |
| | EMA3 | 0.854 | | | |
| | EMA4 | 0.873 | | | |
| Knowledge transfer | KTR1 | 0.820 | 0.901 | 0.921 | 0.632 |
| | KTR2 | 0.787 | | | |
| | KTR3 | 0.797 | | | |
| | KTR4 | 0.791 | | | |
| Green innovation | GIN1 | 0.793 | 0.882 | 0.911 | 0.569 |
| | GIN2 | 0.772 | | | |
| | GIN3 | 0.824 | | | |
| | GIN4 | 0.745 | | | |
| Environmental performance | EPR1 | 0.782 | 0.885 | 0.902 | 0.593 |
| | EPR2 | 0.773 | | | |
| | EPR3 | 0.746 | | | |
| | EPR4 | 0.728 | | | |

Source: Authors estimation, EMA: Environmental management accounting, KTR: Knowledge transfer, GIN: Green innovation, EPR: Environmental performance, AVE: Average variance extracted

Table 4: Discriminant validity fornell-larcker criterion

| Variables | EMA | KTR | GIN | EPR |
|-----------|-------|-------|-------|-------|
| EMA | 0.775 | | | |
| KTR | 0.402 | 0.795 | | |
| GIN | 0.332 | 0.242 | 0.754 | |
| EPR | 0.394 | 0.115 | 0.563 | 0.770 |

Source: Authors estimation, EMA: Environmental management accounting, KTR: Knowledge transfer, GIN: Green innovation, EPR: Environmental performance

Table 5: Results of loadings and cross loadings

| Variable | EMA | KTR | GIN | EPR |
|-------------------------------------|-------|-------|-------|-------|
| Environmental management accounting | 0.839 | 0.209 | 0.291 | 0.141 |
| | 0.811 | 0.341 | 0.222 | 0.207 |
| | 0.854 | 0.087 | 0.163 | 0.188 |
| | 0.873 | 0.289 | 0.280 | 0.224 |
| Knowledge transfer | 0.120 | 0.820 | 0.281 | 0.129 |
| | 0.104 | 0.787 | 0.171 | 0.263 |
| | 0.064 | 0.797 | 0.125 | 0.231 |
| | 0.156 | 0.791 | 0.141 | 0.172 |
| Green innovation | 0.146 | 0.171 | 0.793 | 0.128 |
| | 0.231 | 0.109 | 0.772 | 0.140 |
| | 0.114 | 0.109 | 0.824 | 0.129 |
| | 0.212 | 0.261 | 0.745 | 0.089 |
| Environmental performance | 0.287 | 0.238 | 0.225 | 0.782 |
| | 0.199 | 0.302 | 0.455 | 0.773 |
| | 0.226 | 0.369 | 0.424 | 0.746 |
| | 0.122 | 0.276 | 0.351 | 0.728 |

Source: Authors estimation, EMA: Environmental management accounting, KTR: Knowledge transfer, GIN: Green innovation, EPR: Environmental performance

Table 6: Results of HTMT ratio of correlations

| Variables | EMA | KTR | CIN | EPR |
|-----------|-------|-------|-------|-----|
| EMA | | | | |
| KTR | 0.573 | | | |
| CIN | 0.472 | 0.693 | | |
| EPR | 0.421 | 0.482 | 0.608 | |

Source: Authors Estimation, EMA: Environmental management accounting, KTR: Knowledge transfer, GIN: Green innovation, EPR: Environmental performance, HTMT: Hetro Trait and Mono Trait

Table 7: Results of path coefficients and hypothesis testing

| Hypothesized path | Path coefficient | C.R | P-value | Remarks |
|-------------------|------------------|-------|---------|-----------|
| KTR←EMA | 0.304 | 3.894 | 0.000 | Supported |
| GIN←EMA | 0.283 | 4.023 | 0.000 | Supported |
| EPR←EMA | 0.211 | 4.441 | 0.000 | Supported |
| ENP←KTR | 0.189 | 5.483 | 0.000 | Supported |
| ENP←GIN | 0.249 | 3.581 | 0.000 | Supported |

Level of significance (5% i.e., 0.050), Source: Authors' estimation, EMA: Environmental management accounting, KTR: Knowledge transfer, GIN: Green innovation, EPR: Environmental performance

enterprises in Indonesia. Moreover, the outcomes of the PLS-SEM confirm that KTR ($\beta=0.304$, $P<0.000$), GIN ($\beta=0.283$, $P<0.000$) and EPR ($\beta=0.211$, $P<0.000$) have significantly and positively impacted by EMA system hence affirming H_1 , H_2 , and H_3 . The outcomes of partial least square structural equation modelling also indicate that KTR ($\beta=0.189$, $P<0.000$) and GIN ($\beta=0.249$, $P<0.000$) have also positively and significantly impact on the EPR, therefore, confirming H_4 and H_5 . Technically speaking, the results of partial least square confirm that all factors, i.e., EMA system, GIN, and KTR are the positive and significant contributor to enhance the EPR of small and medium enterprises in Indonesia.

CONCLUSION AND DISCUSSION

In the era of technology, ecologically driven organizational procedures have increasingly been adopted as the eminent part of management. This is followed by an increased consideration for environmental management in the recent literature. There exist several motivations that pursue firms for ecological practices. They involve ethical considerations, monetary benefits, legislation, and stakeholders' concerns. Organizational characteristics underlie a significant part in influencing environmental management. Firms' inclination for technology usage and knowledge management support organizations' vision of sustainability. The way organizations execute KTR is critical in disseminating the motivations for ecological improvements in subsequent counterparts to ensure enhanced coordination and efficient results. The relationship between ecologically driven firm practices

(P-values) and the remarks related to the hypothesis testing. Generally, the outcome confirms that all selected variables have a positive and significant impact on EPR in small and medium

has been extensively criticized in sustaining organizational performance. The significance of green management is emerged as a substantial tool in driving firm performance and thus, discussed abundantly in the existing literature. In this regard, environmental accounting has emerged as a significant driver of organizational inclination for pursuing GIN and knowledge management to attain higher EPR. The field of accounting has always been vital for the identification, collection, and reporting of information that strengthens decision making.

Therefore, the present study is motivated to investigate the importance of ecological innovations and knowledge management in influencing firm performance. The focus of the present study lies in identifying the contribution of EMA in driving a firm's KTR, GIN, and EPR in the Indonesian manufacturing sector. The current collected the data from 223 respondents from different SMEs of Indonesia. The results of PLS-SEM confirm that all variables have a positive and significant impact on the EPR of Indonesia SMEs. Moreover, the outcomes of the PLS-SEM confirm that KTR, GIN, and EPR have significantly and positively impacted by EMA system. The outcomes of partial least square structural equation modelling also indicate that KTR and GIN have also positively and significantly impact on the EPR. In general, the results of partial least square confirm that all factors, i.e., EMA system, GIN, and KTR are the positive and significant contributor to enhance the EPR of small and medium enterprises in Indonesia.

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