SMES' ENERGY EFFICIENCY IMPROVEMENT: THE ROLES OF KNOWLEDGE, GOVERNMENT INTERVENTION AND PERSONAL NORMS

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ABSTRACT

Energy efficiency is like the 'low hanging fruit' in which improving energy efficiency is one of the easiest ways to lessen energy demand. Firms, large or small, can make a major positive contribution to energy sustainability by improving energy efficiency. This research attempts to examine the effects of SMEs' perceptions in terms of knowledge, government intervention and personal norms on their support for energy efficiency improvement. A survey was carried out to collect data and empirical testing of the research model was conducted. The estimated results suggest that the factors of knowledge and government intervention have significant effects on SMEs' support for energy efficiency improvement. In addition, the results show that personal norms is an important mediator variable in influencing SMEs' decision to improve energy efficiency. The findings of this research provide some fresh insights on energy efficiency improvement of SMEs and several notable implications can be drawn from this research.

Keywords: Energy efficiency improvement, government intervention, knowledge, personal norms, SMEs

1. INTRODUCTION

Energy resources are gradually depleting, and thus long-term energy security is compromised. It cannot be denied that high energy consumption harms the environment. The majority of energy consumption depends on fossil fuels, which are scarce and nonrenewable. Not only that energy use give rise to resource depletion, but also the detrimental effect it has on the environment through the emission of greenhouse and other harmful gases. One of the effective ways to a sustainable energy platform is energy efficiency. It can be defined as a microeconomic situation that measures the technical quantitative relation between the quantity of energy used and the number of energy services derived (Oikonomou et al., 2009). In other words, it refers to the capacity of applying a smaller amount of energy to perform a similar task or function.

In general, the vast benefits of energy efficiency include contributing to the well-being of the

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nation, such as job creation, better disposable income, energy access and affordability, decrease in energy-related public expenditures, better management of natural resources, lower greenhouse gas emissions, and other macroeconomic positive effects (Ryan & Campell, 2012). Overall, it enables the economy to prosper and paves the way to an energy future that is fossil-free and improves well-being and quality of life. Hence, energy efficiency is like the 'low-hanging fruit' that needs to be picked to reap the various benefits.

Specifically, firms or business organizations can benefit enormously from energy efficiency in terms of higher productivity and profitability, reduction in their exposure to rising energy prices and enhancement of their competitiveness (Pye & McKane, 2000). Firms in the industry can be immense energy users through their business operations and activities. Besides large organizations, small and medium-sized enterprises (SMEs) have the potential to improve energy efficiency as a way to help increase energy security and move towards a less carbon-intensive economy. Undeniably, SMEs are the drivers of the economy given their contributions to employment and economic growth. In Malaysia, SMEs represented more than 90% of the whole business establishments and contributed about 38.2% to GDP, 48% to total employment and 33.1% to exports in 2020 (Department of Statistics Malaysia, 2021). Individually, the amounts of energy consumed by SMEs may be modest, but collectively their energy demand is considerably high.

SMEs' knowledge and obligations towards improving energy efficiency have come to be seen as vital in the supply and demand management of energy. It is crucial to understand SMEs' knowledge about energy efficiency improvement and their involvement in implementing energy efficiency measures. There is a possibility of discrepancy between knowledge and behavior towards energy efficiency among SMEs. Extensive knowledge about energy efficiency improvement does not yield the certainty that such knowledge will be put into practice. On the other hand, it may be the lack of knowledge that prevents the action towards embracing energy efficiency by SMEs. Hence, it is worthwhile to investigate the effect of SMEs' knowledge on improving energy efficiency.

The perception of SMEs towards government intervention in stimulating energy efficiency also deserves scrutiny. Government intervention is vital in stimulating firms to support and implement energy efficiency measures, be it through incentives, regulations or other mechanisms. The willingness of SMEs to support energy efficiency improvement may depend on their views on the efforts of the government in promoting energy efficiency. Nevertheless, little is known about SMEs' cooperation and support towards government intervention in stimulating energy efficiency. SMEs and the government may not share the same sentiment on energy efficiency improvement. Therefore, the perception of SMEs towards government intervention in improving energy efficiency deserves attention.

There is another crucial concern in which SMEs may not feel obliged to improve energy efficiency in their business activities. Personal norms or the sense of moral obligation of individuals may influence their decision-making and behavior. In this context, decision-makers of SMEs may or may not personally consider energy efficiency improvement as their responsibility. Some SMEs do not feel the pressure to undertake energy efficiency measures. As such, it is substantial to examine the effect of personal norms on SMEs' support for energy efficiency improvement.

In summary, the research problem lies in the fact that energy demand is rising along with the issues of energy resource depletion and threats to energy sustainability. These are issues in a broader perspective and deserve serious attention. Specifically, there is concern about the lack of regard for energy efficiency improvement among SMEs. As growing firms, SMEs may face challenges such as the lack of knowledge and innovation in energy efficiency. Besides, energy efficiency improvement is also an issue of concern to the government in achieving the goal of energy sustainability. However, not much is truly known to what extent firms especially SMEs embrace the idea of improving energy efficiency in their business activities. Furthermore, there is limited evidence about the possible mediating effects or interconnections between factors determining energy efficiency improvement, as it was rarely established in the literature. Against the backdrop of these issues, this study aims to explore SMEs' support for energy efficiency improvement, focusing on knowledge and government intervention with the integration of personal norms.

2. LITERATURE REVIEW

Most of the past studies that delved into firm-level energy efficiency revolved around the decision on whether to adopt or not adopt energy efficiency measures (Abadie et al., 2012; Arens et al., 2017; Blass et al., 2014; Cagno & Trianni, 2014; DeCanio, 1998; Hrovatin et al., 2016; Kounetas & Tsekouras, 2008; Thollander et al., 2007). As such, binary variables were applied as the indicators to measure the adoption of energy efficiency measures. The selected dependent variables in the past empirical studies varied with common proxies such as implementation, investment and energy consumption. Furthermore, past studies also focused on investigating the enablers and barriers to improving energy efficiency.

One of the identified barriers to energy efficiency improvement was the information barrier. For example, insufficient knowledge about cost-efficient energy efficiency measures, as well as imperfect forms of information that probably favour energy efficiency decisions, impeded the undertaking of energy efficiency measures (Trianni & Cagno, 2012). Besides, access to accurate and transparent information was found to be significant in affecting the decisions on energy efficiency investment (Sandberg & Söderström, 2003). Likewise, unambiguity and trustworthiness of information were also important to drive energy efficiency (Cagno et al., 2017). Furthermore, firms' know-how as well as know-what knowledge and their basic understanding of energy efficiency were found to be significant factors in influencing energy efficiency improvement (Chai & Baudelaire, 2015). Under the knowledge-based theory, knowledge is viewed as a significant resource for firms to create new product activities (Harris, 2001). Firms play the role of efficiently exchanging knowledge and compiling capabilities to generate new ideas to achieve better innovation and competitive advantage (Nickerson & Zenger, 2004). In addition, the knowledge and awareness of energy management system was crucial factor in influencing energy efficiency uptake within firms (Brunke et al., 2014; May et al., 2015).

Government intervention is also important in spurring energy efficiency through various mechanisms and policies. From the economic perspective, the energy efficiency paradox (Brown, 2001; Kounetas & Tsekouras, 2008) has long been attributed to market failures, and thus government intervention is deemed imperative. Hasanbeigi et al. (2010) found that energy

efficiency policies influenced the approval of industrial energy efficiency investments. According to Apeaning and Thollander (2013), a weak government framework or energy policy for industrial energy efficiency led to low implementation of energy efficiency measures. Likewise, Kulin and Sevä (2021) found that people tend to act pro-environmentally when the government is of high quality and effective. Besides energy policies, government incentives are imperative to drive energy efficiency. For example, public capital subsidy was found to be significant in encouraging the implementation of energy efficiency measures (Kounetas & Tsekouras, 2008). As such, the intervention by the government and its institutions is necessary to enhance firms' participation in energy efficiency improvement.

On another note, psychological or behavioural factors may influence firms' decision to pursue energy efficiency. The willingness of firms' decision-makers to support energy efficiency improvement can be regarded as a pro-environmental behaviour. Moral and normative concerns influence environmental behaviour, in which individuals with higher altruistic values have a greater tendency to support environmental movements (Steg & Vlek, 2008). Past studies that examined the effect of personal norms on pro-environmental behaviour were mostly based on the norm activation theory or the theory of values beliefs norms (Schwartz, 1977; Stern, 2000). Personal norms can be deemed as the feelings or sense of moral obligation to act in certain behaviours (Abrahamse & Steg, 2009; Brosch et al., 2014).

Personal norms may have a connection with knowledge and awareness. Individuals may be morally obliged to act or engage in certain environmental behaviours such as the willingness to conserve energy, and this can be influenced by their knowledge. The activation of personal norms is closely related to problem awareness (Schwartz, 1977), referring to an individual's consciousness, realisation or knowledge about the adverse consequences of adopting or not adopting certain behaviour. Likewise, personal norms may also have a connection with government intervention. The acceptability of energy policies was found to be connected to personal norms (Steg et al., 2005). Public policy also had an impact on the perception of individuals and shaping their moral norms (Nyborg, 2003). In addition, the effectiveness of government policies can be reflected by their capacity to stimulate long-term changes in norms and beliefs of the public to sustain the behaviour needed to overcome environmental problems (Kinzig et al., 2013).

3. METHODOLOGY

In this study, the context of energy efficiency improvement refers to action taken by SMEs to achieve lower energy consumption in deriving the same level of output, be it goods or services, in their business activities. Based on the aim of this study, a research model of SMEs' support for energy efficiency improvement is constructed by integrating the perspectives of knowledge, government intervention and personal norms, as illustrated in Figure 1.

Figure 1: Research Model
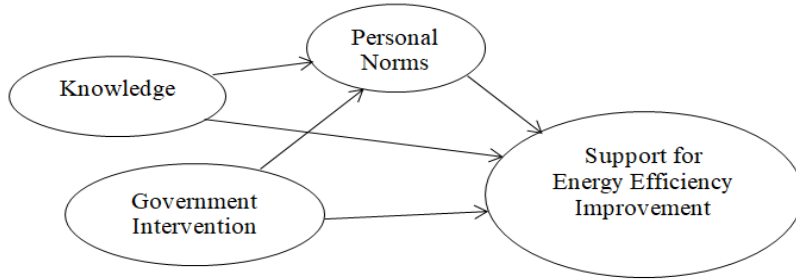
3.1.   *Research Variables and Hypotheses*

Support for energy efficiency improvement (EEI) is the endogenous construct or dependent variable in the research model. It denotes the extent of SMEs' support for energy efficiency improvement. On the other hand, knowledge (KNO) and government intervention (GOV) are the independent or explanatory variables. The research model also includes personal norms (NORM) as a mediator variable to examine the potential mediating influence of NORM on the relationships between the dependent variable and explanatory variables.

In this research, the variable KNO refers to SMEs' knowledge about energy efficiency improvement. For instance, SMEs may or may not have the adequate knowledge, familiarity or technical know-how to improve energy efficiency. In the past, insufficient knowledge and information barriers were found to influence firms' undertaking of energy efficiency measures (Chai & Baudelaire, 2015; Trianni & Cagno, 2012). SMEs that have greater KNO may tend to support energy efficiency improvement. Therefore, it is posited that KNO may influence SMEs' support for energy efficiency improvement, as stated in the following hypothesis:
Hypothesis 1: KNO has a direct relationship with EEI

The variable GOV represents the perception of SMEs towards government intervention in improving energy efficiency. SMEs may have different impressions or views on the ways the government promotes energy efficiency. The role of government was found to be important in influencing industrial energy efficiency (Apeaning & Thollander, 2013; Kounetas & Tsekouras, 2008). GOV is hypothesised to influence EEI based on the proposition that the government via various mechanisms can motivate firms to improve energy efficiency. As such, this perspective has derived the following hypothesis:
Hypothesis 2: GOV has a direct relationship with EEI

The inclusion of NORM in the research model is based on the assertion that an individual's feeling of moral obligation can influence the decision-maker of SMEs to perform certain behaviours. Past studies have shown that personal norms can influence pro-environmental

behaviour (Harland et al., 2007; Steg & Vlek, 2008). NORM of SMEs' decision-makers may reflect their business priorities or corporate social responsibility towards supporting energy efficiency improvement. It is hypothesised that decision-makers of SMEs who are personally more obliged to improve energy efficiency have a greater likelihood to support energy efficiency improvement in their business activities. Hence, the following hypothesis is formed:

Hypothesis 3: NORM has a direct relationship with EEI

The variable NORM is also posited to have a mediating effect on the linkage between EEI and the explanatory variables. In other words, NORM is integrated into the research model to be the mediator or intervening variable between the independent variables (KNO and GOV) and the endogenous variable (EEI). Consequently, the following hypotheses are derived:

Hypothesis 4: KNO has a direct relationship with NORM
Hypothesis 5: GOV has a direct relationship with NORM
Hypothesis 6: NORM mediates the relationship between KNO and EEI
Hypothesis 7: NORM mediates the relationship between GOV and EEI

In this research, focus is given solely on examining the factors that may influence EEI within the scope of the aforementioned research model, while not denying the possible existence of a non-exhaustive list of factors that are beyond the coverage of this research. Drawing insights from past studies, a structured questionnaire was developed to gather information and subsequently examine the effects of the variables in the research model.

The respondents were asked to state the extent of their support for energy efficiency improvement on a five-point Likert scale with 1 indicating 'strongly oppose' to 5 indicating 'strongly support' for each indicator or item under the variable EEI. In this case, the variable EEI is reflected by indicators (eei1 to eei3) that measure SMEs' support for energy efficiency improvement in their business activities. The most common implementation of energy efficiency improvement by firms is related to ventilation, lighting, space heating, compressed air and generic processes (Thollander et al., 2007).

As for the variables KNO (kno1 to kno5), GOV (gov1 to gov5) and NORM (norm1 to norm5), the respondents were required to state whether they agreed or disagreed with statements measuring these variables on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The variable KNO is measured using items that indicate SMEs' knowledge about energy efficiency improvement. A statement such as "Your firm knows how to improve energy efficiency" is given in the questionnaire. The variable GOV is measured using indicators related to SMEs' perceptions towards government intervention in spurring energy efficiency. Statements such as "The government policy on energy efficiency is clear" can be found in the questionnaire. Indicators with emotional content reflecting SMEs' personal norms to improve energy efficiency are included to measure the variable NORM in this research. A statement such as "I feel obliged to improve energy efficiency" is placed in the questionnaire.

3.2. *Sample and Data*

A survey was conducted to gather primary data for this research, using a structured questionnaire developed based on the aim of the research. The questionnaires were distributed to randomly selected SMEs located in the various states of Malaysia. A single-respondent approach was

adopted in which only a certain individual whose opinions can represent the entire firm and familiar with the information sought was selected as the survey respondent (Avlonitis & Salavou, 2007). Hence, owners or senior managers of SMEs were targeted as the survey respondents in this research. Generally, the top-level managers of firms can give a comprehensive and reliable overview of the firm's operating process and business development plans. As such, the respondent's opinions may reflect those of the entire firm or enterprise (Lyon et al., 2000).

Within a power analytical framework, Cohen (1988) focused on statistical power in the estimation of required sample sizes for multiple regression models. In this research, the determination of sample size is based on the recommended sample size by Hair et al. (2022) according to the analyses by Cohen (1992). In this research, the survey participants were given the assurance of anonymity and confidentiality. A total of 103 respondents had agreed to participate in the survey and their responses were received within the stipulated time of data collection.

In this study, only firms that fulfil the specified criteria for SMEs were targeted as the survey respondents. An enterprise will be classified as an SME if it fulfils the specified number of employees or annual sales turnover (SME Corporation Malaysia, 2013). In summary, the responses consist of SMEs from different business activities with the highest percentage falling under the category of food products and beverages (25.2%), followed by machinery and equipment (19.4%), and rubber and plastic products (13.6%). The remaining 41.8% of the surveyed SMEs are from other business activities such as manufacturing paper and printing, metal products, chemical products, computers, optical and electronic products, and textiles and apparel. In terms of number of employees, 62.1% of the surveyed SMEs employed not more than 75 employees. The majority of the SMEs recorded an annual sales turnover of RM3 million but less than RM15 million. In addition, more than 50% of the surveyed SMEs reported length of business of more than 10 years. All the survey respondents hold senior management posts and have been in that position for at least one year.

3.3. *Data Analysis*

Partial Least Square Structural Equation Modeling (PLS-SEM) is applied to analyse the data of this research with SmartPLS software (Ringle et al., 2005). PLS-SEM is a comprehensive approach to hypothesis testing that covers latent variables. This approach makes minimal demands on the data distributions and sample size. PLS-SEM is also useful for estimating complicated path model that involves intervening variable between the dependent and explanatory variables (Byrne, 2010; Hoyle, 1995). The PLS-SEM path model comprising both the measurement model and the structural model can be seen in the research model (see Figure 1). In this case, the measurement model demonstrates the links between the variables (EEI, KNO, GOV, and NORM) and their respective indicators while the structural model describes the connections between these research variables. In the research model, the variables KNO and GOV serve only as the explanatory variables with solely single-headed arrows pointing out of them as illustrated in Figure 1. In contrast, the variables EEI and NORM are the endogenous or dependent variables, with NORM also the mediator variable.

4. RESULTS

Table 1 depicts the descriptive statistics of the research variables. Most of the variables record mean or average values above 3.00 and standard deviation values above 0.50. The indicators (eei1, eei2, and eei3) for the variable EEI record average values of less than 4.00. Judging from this, the extent of SMEs' support for energy efficiency improvement can be concluded as rather weak. As for the explanatory variables, the average values for the variable KNO range from 3.27 to 3.41. The average values for the variable GOV range from 3.00 to 3.47 while the average values for the variable NORM are less than 4.00.

Table 1: Descriptive Statistics

Variable	Item	Mean	Standard Deviation	Minimum	Maximum
EEI	eei1	3.09	0.56	2	4
	eei2	3.25	0.52	2	4
	eei3	2.99	0.51	2	4
KNO	kno1	3.27	0.49	3	5
	kno2	3.32	0.61	2	4
	kno3	3.28	0.45	3	4
	kno4	3.35	0.57	2	4
	kno5	3.41	0.55	2	4
GOV	gov1	3.00	0.70	2	4
	gov2	3.12	0.63	2	4
	gov3	3.30	0.56	2	4
	gov4	3.26	0.54	2	4
	gov5	3.47	0.52	2	4
NORM	norm1	3.45	0.62	2	5
	norm2	3.63	0.73	3	5
	norm3	3.48	0.58	3	5
	norm4	3.95	0.71	3	5
	norm5	3.56	0.68	3	5

4.1. Results of the Measurement Model

The measurement model can be assessed by convergent validity. The results of factor loadings, average variance extracted (AVE) and composite reliability are shown in Table 2. Based on the estimated results, the factor loadings of all the items surpass or are close to the minimum required cut-off value of 0.70 (Hair et al., 2022). This indicates that the measurement items or indicators contribute adequately to their assigned variables, respectively. In addition, the composite reliability values of 0.8 and above suggest that all variables or constructs in the research model have acceptable levels of internal consistency reliability. Furthermore, the values of AVE for each variable are greater than the recommended value of 0.50. This demonstrates that the research variables explain above half of the variance of the indicators (Hair et al., 2022). Therefore, the convergent validity of the research model is established.

The measurement model can also be tested by discriminant validity. It refers to the inter-construct correlation between variables based on the Fornell-Larcker criterion as recommended by Fornell and Larcker (1981). Table 3 shows the inter-construct correlation between variables of the research model. The results indicate that the square root of each of the AVEs in the matrix diagonals is more than the non-diagonal elements in all cases across columns and rows. Hence, the measurement model demonstrates sufficient discriminant validity.

Table 2: Factor Loadings and Reliability

Item	Factor loading	AVE	Composite reliability
eei1	0.82	0.59	0.81
eei2	0.80		
eei3	0.67		
kno1	0.74	0.67	0.91
kno2	0.85		
kno3	0.82		
kno4	0.82		
kno5	0.87		
gov1	0.80	0.59	0.87
gov2	0.73		
gov3	0.78		
gov4	0.70		
gov5	0,81		
norm1	0.92	0.79	0.95
norm2	0.94		
norm3	0.89		
norm4	0.77		
norm5	0.92		

Table 3: Inter-construct Correlation

	EEI	KNO	GOV	NORM
EEI	**0.77**			
KNO	0.64	**0.82**		
GOV	0.52	0.58	**0.77**	
NORM	0.70	0.79	0.62	**0.89**

Notes: The square root of the average variance extracted (AVE) of each variable is indicated by the diagonal element while the non-diagonal elements represent the correlations between the variables.

4.2. *Results of the Structural Model*

Before conducting the standard model estimation, the test of collinearity on the structural model is necessary. The values of the variance inflation factor (VIF) for the research variables are found to be less than the threshold value of 5 (Hair et al., 2022), indicating that collinearity is not an issue in the research model. The significance levels of the factor loadings and path coefficients are determined by applying the bootstrapping procedure under PLS-SEM.

The estimated results (see Table 4) show that the research variables KNO, GOV and NORM are statistically significant in explaining EEI. In addition, all of these three variables were positively related to EEI as postulated. The evidence is stronger for the effect of NORM on EEI as

compared to the effects of KNO and GOV on EEI respectively. Besides, both KNO and GOV are found to have a significant impact on NORM. The empirical results show that the research model explains approximately 52% ($R^2 = 0.52$) and 68% ($R^2 = 0.68$) of the differences in the variables EEI and NORM respectively. In this case, the level of predictive accuracy of the research model can be described as moderate and satisfactory.

Table 4: Results of the Structural Model

Hypotheses	Description	Path coefficients	Standard error	t-Value	Results
H1	KNO→EEI	0.19	0.13	1.49*	Accepted
H2	GOV→EEI	0.11	0.08	1.38*	Accepted
H3	NORM→EEI	0.49	0.11	4.28**	Accepted
H4	KNO→NORM	0.66	0.07	9.62**	Accepted
H5	GOV→NORM	0.24	0.08	3.10**	Accepted

Notes: *$p < .10$; **$p < .01$

NORM is postulated to mediate the relationships between KNO and EEI, and GOV and EEI. Before the assessment of the mediating effect, the significance of the direct effect between the dependent variable and explanatory variable has to be established (Preacher & Hayes, 2008). The value of variance accounted for (VAF) is required to determine the level of the indirect effect between the dependent variable and explanatory variable (Hair et al., 2022). A value of VAF that is more than 0.2 but below 0.8 indicates partial mediation. From the estimated results, the mediating effect of NORM on the linkage between KNO and EEI is found to be statistically significant. Similarly, NORM also significantly mediates the relationship between GOV and EEI. The values of VAF derived from the data analysis indicate that the mediating effects of NORM are partial for both hypotheses H6 and H7, as depicted in Table 5.

Table 5: Results Summary for Mediating Effect

Hypothesis	Description	t-Value	VAF	Results
H6	KNO →NORM →EEI	3.56**	0.64	Partial mediation
H7	GOV→NORM→EEI	2.57*	0.51	Partial mediation

Notes: *$p < .05$; **$p < .01$

5. DISCUSSION

The extent of SMEs' support for energy efficiency improvement can be regarded as low based on the survey responses of this research. In other words, the surveyed SMEs are not keen on undertaking energy efficiency measures in their operations or business activities. This could be because these SMEs are not ready to accept change or implement new ideas. Energy efficiency improvement may require steering a new course for the SMEs in their businesses.

The estimated results indicate that KNO has a significant direct relationship with EEI. This finding echoes the past studies (Cagno et al., 2017; Chai & Baudelaire, 2015; Sandberg & Söderström, 2003) that recognize the importance of knowledge and information in influencing the decision to undertake energy efficiency measures. SMEs that have the knowledge and technical know-how about improving energy efficiency are more likely to support such action.

Hence, SMEs need to have easy access to reliable, precise and sufficient information to be well-equipped with the knowledge of energy efficiency improvement. The estimated results also show that KNO has a significant influence on NORM as postulated. The process of knowledge acquisition and the development of new understandings may promote a proposed change in behaviour as the NORM of individuals may be altered through such a process.

Based on the estimated results, GOV is a significant factor in explaining EEI. This provides statistical evidence to support the notion that firms tend to be more drawn towards EEI when there are effective government policies and incentives (Kounetas & Tsekouras, 2008; Kulin & Sevä, 2020). A transparent and effective energy efficiency policy is vital to serve as a guide for SMEs to undertake energy efficiency measures. In addition, a mutually shared understanding between SMEs and the government on improving energy efficiency is important. Likewise, the relationship between GOV and NORM is found to be statistically significant from the estimated results. This finding supports the proposition that the government can shape the perceptions and personal norms of firms' decision-makers towards supporting energy efficiency improvement.

The estimated results indicate that NORM has a strong significant effect on explaining EEI. Furthermore, the research findings show the existence of partial mediation of NORM on the relationships between EEI and KNO, and EEI and GOV. The mediating effect of NORM is stronger between KNO and EEI as compared to the relationship between GOV and EEI. Therefore, NORM not only affects EEI directly, but also mediates the relationships between EEI and the explanatory variables, KNO and GOV. This finding provides support for the norm activation theory or the theory of values beliefs norms (Schwartz, 1977; Stern, 2000), and reveals the mediating role of NORM through its intervening effect on SMEs' decision-making. The decision-makers of SMEs with a strong sense of moral obligation to improve energy efficiency are more likely to support energy efficiency improvement. In other words, the NORM of the SMEs' decision-makers is accountable for supporting or opposing energy efficiency improvement.

6. CONCLUSION

Overall, this research has shed some light on SMEs' perceptions towards energy efficiency and provided firm-level evidence on SMEs' support for energy efficiency improvement. The results of this study need to be interpreted with care given the use of a single cross-section data and thus the possibility of endogeneity cannot be ruled out. Nevertheless, this research managed to establish some significant connections between knowledge, government intervention, personal norms and SMEs' support for energy efficiency improvement. Energy efficiency improvement should be given high priority by SMEs to enhance energy security and sustainability. It is sensible and necessary for SMEs to embrace energy efficiency noting that not only it benefits the firms but also the nation. All in all, SMEs need to recognise and realise their potential for energy efficiency improvement. They should strive to be well-equipped with the necessary knowledge and make a concerted effort with the government to enhance energy efficiency.

7. RESEARCH IMPLICATIONS

Several notable implications can be derived from the findings of this research. The estimated results imply that SMEs' knowledge of energy efficiency improvement is crucial in influencing their support for improving energy efficiency. Therefore, SMEs must identify ways to have easy access to trustworthy information on energy efficiency improvement. For example, SMEs can take the initiative to consult government agencies, or people across industries to be more informed of the latest energy efficiency improvement or investment opportunities available in the market. Knowledge sharing or knowledge exchange should be greatly encouraged among SMEs, industry players and the government to achieve a mutual and common understanding about energy efficiency improvement. In addition, SMEs can participate in training and workshops on energy efficiency improvement to expand their knowledge. Information and awareness campaigns about improving energy efficiency should give more attention to the accurate source of information available and the way such information is disseminated to prevent any misunderstanding among recipients and thus create a longer-lasting effect. In short, widespread knowledge about energy efficiency improvement has to be intensified.

The variable GOV is found to be significant in explaining EEI in this study. This implies that the perceptions of SMEs towards government intervention in stimulating energy efficiency can influence their support for energy efficiency improvement. The planning of a high-impact intervention as well as an effective strategic roadmap by the government is necessary to propel energy efficiency among SMEs. Hence, SMEs should share their expectations and inputs with the government so that a mutual reinforcement between the government and SMEs in driving energy efficiency can be achieved. SMEs can provide honest feedback to the government from time to time about the effectiveness of policy instruments implemented in the energy policy mix. For example, SMEs can highlight to the government if they find there is a shortage of ambitious and prominent energy efficiency policies that can attract or benefit them to improve energy efficiency. In general, shaping firms' perceptions or obligations where necessary is important because as long as the firms are not concerned with energy efficiency and sustainability, any legislation or government incentives that are in place would not have much impact. Hence, government policies must leave a strong impact on firms' mindsets and cultivate their pro-environmental behavior in energy efficiency.

This study integrates the personal normative aspect into the scope of firms' energy efficiency with the notion that the personal norms of individuals have a significant influence on firm-level decision-making. In this case, it is posited that personal norms may have an impact on SMEs' support for energy efficiency improvement directly and indirectly as a mediator. According to the estimated results of this research, it can be concluded that personal norms affect the pro-environmental behavior of SMEs. Recognizing the significance of personal norms within the scope of firms' energy efficiency gives policymakers further insights that a better understanding of decision-makers' self-expectations and obligations is crucial to designing effective intervention strategies. The intensification of normative strategies such as providing information that can influence or alter individuals' NORM is of vital importance. If properly planned and implemented, such an attempt to cultivate people's NORM in favour of energy efficiency improvement may have a deep and lasting impact on transforming people's mindset and behavior.

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