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Factors Influencing Innovation Capability and Operational Performance: A Case Study of Power Generation Fields in Vietnam

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Abstract

This research examines the effects of organizational learning and network involvement, as well as many contextual factors, on power generation businesses' innovation capability and operational success in Vietnam. This research also aims to attest to the moderating roles of top management support and company age, and firm possession type in the power generation industry. This study applied the exploratory factor analysis (EFA) and PLS-SEM approach for data analysis. In this research, we have tested hypotheses with data collected from 132 top managers and other key personnel from power generation companies in Vietnam. The results also attest to the moderating role of top management support on the two relationships between organizational learning - innovation capability and network involvement - innovation capability. Another important finding is that the company age has a negative impact on operational performance but shows a positive moderating role in the relationship between innovation capability and operational performance. This study highlights the central roles of organizational learning and innovation capability in impacting the organizational performance of power generation companies. These companies play a key role in supporting the development of industries in practice. This research also emphasizes the moderating roles of top management support and company age and possession type in practice.

Keywords: Organizational Learning, Innovation Capability, Top Management Support, Contextual Factors, Operational Performance, Power Generation

JEL Classifications Code: O30, O31, O32

1. Introduction

In the volatile world, it is vital to uphold competitive advantages for any firm. Yet nowadays, firms got into trouble with the increasing product variety and shortening of product's life-cycle (Govindarajan & Trimble, 2005). To maintain and strengthen their competitive advantages, companies have to sustain their innovation. Andriopoulos and Lewis (2009) suggested that in the current business environment, innovation brought in advantages but put lots of challenges ahead of any organization. In real life, innovation was a key factor to enhance the competitive advantage and growth of businesses (Chandy & Tellis, 1998).

Power generation is an important link in the electricity production chain in Vietnam. In practice, most power generation companies in Vietnam are state-owned companies that are characterized by high inertia for change and innovation. However, power generation companies are currently under high pressure to enhance their manufacturing technologies and management practices to catch up with the liberalization of Vietnam's power market (vn-prime.minister, 2011). Under liberalized power market, the competition pressure is very high which pushes power generation companies to innovate.

The power generation field in Vietnam has several specific characteristics such as the business area with a single product, rigid production system, and inflexibility to innovation. Despite this fact, innovation always plays an important role to improve the performance of power generating companies.

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However, the impact of innovation capability on the operational performance of power generating companies has not been studied before. Therefore, this research proposes a model to study the influence of innovation capability on operational performance and the impacts of several other important factors on innovation capability and operational performance in the power generation field. This research also looks at the moderating effects of top management support and several contextual factors in the proposed model.

This research aims at enriching the body of knowledge on innovation in a typical field of business, and the results of this study will contribute to motivating innovation activities in Vietnam's power generation field.

2. Literature Review

The innovation terminology has been mentioned for a long by many scholars. Crossan and Apaydin (2010) defined innovation as 'production or adoption, assimilation, and exploitation of a value-added novelty in economic and social spheres; renewal and enlargement of products, services, and markets; development of new methods of production; and establishment of new management systems. It is both a process and an outcome. While Damanpour et al. (2009) mentioned innovation as the development and implementation of new ideas or behaviors in organizations.

Among innovation types, technological innovation has received much interest from many authors (Anahita et al., 2009; Dosi, 1982; Wang, 2019). Technological innovation is related to the giving of new technological knowledge aiming to do tasks in better manners in manufacturing and services (Heij, 2015). Technological innovation can be defined with different levels (Damanpour, 1987; Volberda et al., 2013). It can be the introduction of new technologies, process innovation, or the introduction of new products attached to new knowledge. Technological innovation, is generally, divided into two categories: product/service and process innovation (Camisón & Villar-López, 2014).

Besides technological innovation, there are other types of innovation regarding non-technological innovation. (Heij, 2015) studied three types of non-technological innovation which were management innovation, customer co-creation, and business model innovation. Other types of non-technological innovation that have been studied include organizational administrative, and marketing innovation (Camisón & Villar-López, 2014; Crossan & Apaydin, 2010; Damanpour et al., 2009; Gunday et al., 2011; Hervas-Oliver & Sempere-Ripoll, 2015; OECD, 2005).

This research is interested in the knowledge creation process that leads to organizational learning and creates innovation capability in firms. Nonaka (1994) introduced a model (*SECI - socialization, externalization, combination, internalization*) to explain the forming of organizational knowledge, which was based on the interaction between tacit and explicit knowledge. Nonaka et al. (2000, 2006) proposed an extension model of knowledge creation based on: "(a) the SECI process, the process of knowledge creation through conversion between tacit and explicit knowledge; (b) *ba*, the shared context for knowledge creation; and (c) knowledge assets—the inputs, outputs, and moderator of the knowledge-creating process". In their model, top and middle management both play important roles in energizing *ba*. Meanwhile, Cohen and Levinthal (1990) pointed out the important effect of the capacity to absorb knowledge on innovation and performance.

Von Krogh et al. (2012) considered the impact of leadership on knowledge creation and pointed out the role of leadership in the knowledge creation process. In practice, the support from top management is an important factor that impacts innovation capability and innovation performance (Aragón-Correa et al., 2007). Von Krogh et al. (2012) also noted that the cooperation and sharing among members had a positive impact on organizational knowledge. Moreover, leadership has a positive impact on the collaboration between members.

Network involvement refers to the role of extra-organizational players that influences the innovation capability and performance of organizations. The extra-organizational players can be suppliers, experts, and researchers from consulting and research organizations (Mol & Birkinshaw, 2009). The positive impacts of extra-organizational players have been shown by several studies (Murat Ar & Baki, 2011; Romijn & Albaladejo, 2002). The extra-organizational players can be considered as a part of the shared context (*ba*) in the knowledge creation model of Nonaka et al. (2000, 2006).

Studies in the literature showed that innovation capability was an important asset of an organization which results in competitive advantages. Practically, innovation capability causes a positive impact on organizational performance, as authenticated by several authors (Ali et al., 2020; Calantone et al., 2002; Camisón & Villar-López, 2014; Hoang & Ngoc, 2019; Rajapathirana & Hui, 2018).

In the power generation field of Vietnam, the extra-organizational learning through knowledge sharing and absorption with the helping hand of top management support certainly plays an important role, particularly in the process of knowledge absorption and innovation of system operations (Lin, 2007). Clarifying this process helps organizations in Electricity of Vietnam (power generation firms in this case) to propose solutions to push up the implementation of innovation in their businesses. The research results contribute to developing the theory of affecting factors in the studied field of research.

The study used a survey method with quantitative assessment using exploratory factor analysis method (EFA) and partial least square – structured equation modeling method (PLS-SEM). Factors in the research model include top management support, organizational learning, and network

involvement. These factors affect innovation capability and result in the enhancement of operational performance in Vietnam's power generation companies. In this study, we also examined the moderating impact of top management support on the relationship between organizational learning, network involvement, and innovation capability in Vietnam power generation companies and the impacts of several contextual factors as well.

3. Research Model and Hypotheses

3.1. Research Hypotheses

This section reviewed factors influencing innovation capability and performance in organizations and proposed hypotheses and a model to evaluate factors impacting innovation capability and operational performance in the power generation field in Vietnam.

Organizational learning is considered the capability of an organization to define, absorb, and exploit knowledge from the environment. Aragón-Correa et al. (2007) studied large firms operating in Spain in several areas, which include farming, manufacturing, construction, and services, and stated that "organizational learning supports creativity, inspires new knowledge and ideas, and increases the ability to understand and apply them". They also showed that organizational learning positively affected organizational performance. Another study from Hung et al. (2011) confirmed the impact of organizational learning capability on organizational performance. As state-owned companies dominate the power generation market in Vietnam, this research focused on operational performance instead of financial performance. Therefore, this research aims to attest to the hypothesis regarding the significant impact of organizational learning on operational performance:

H1: *Organizational learning positively influences operational performance.*

Lawson and Samson (2001) defined innovation capability as the ability to continuously transform knowledge and ideas into new products, processes, and systems. Liao et al. (2007) studied 170 Taiwanese firms, including electronic, financial insurance, and medical industries, and attested the influence of absorptive capability, which is another representation of organizational learning on the innovation capability of organizations. Si-Meng et al. (2021) showed that absorptive capability significantly impacts firms' innovation performance. The impact of organizational learning (represented by knowledge donating and knowledge collecting) on firm innovation capability was also authenticated in the research of Hsiu-Fen (2007). Therefore, this research proposed the following hypothesis:

H2: *Organizational learning positively impacts innovation capability.*

The network involvement with external partners, including suppliers, may bring information and knowledge supporting innovation into enterprises. The external linkage can be considered as a component of the environment (*Ba*) in the research of Nonaka et al. (2000, 2006) and thus has a positive influence on organizational knowledge and learning. The impacts of external sources on the performance of an organization have been attested by several authors (Love & Mansury, 2007; Mol & Birkinshaw, 2009; Murat Ar & Baki, 2011; Nguyen et al., 2015; Romijn & Albaladejo, 2002). To attest to this relationship, the following hypothesis was proposed:

H3: *Network involvement has a positive impact on organizational learning.*

Murat Ar and Baki (2011) confirmed that the relationship with suppliers had a significant impact on product innovation. In practice, the external linkages (including suppliers, research institutes, and universities) can provide experiences to implement innovation activities (Birkinshaw et al., 2008). Romijn & Albaladejo (2002) studied small UK electronics and software firms and confirmed the positive impact of suppliers, R&D institutions, and service providers on the innovation capability of firms. In their study, R&D institutions constantly had the strongest influence on innovation capability. Therefore, this research hypothesized the existence of a positive relationship between the external linkages with innovation capability:

H4: *Network involvement positively influences innovation capability.*

Several scholars confirmed the positive influence of network involvement on organizational performance (Murat Ar & Baki, 2011; Romijn & Albaladejo, 2002). In the research of Murat Ar and Baki (2011), the supplier relationship had a positive impact on product innovation and then had a significant effect on firm performance. This led to the following hypothesis:

H5: *Network involvement positively affects operational performance.*

The positive influence of innovation capability on operational performance has been authenticated by scholars (Ali et al., 2020; Calantone et al., 2002; Camisón & Villar-López, 2014; Rajapathirana & Hui, 2018; Sidik et al., 2021; Al-Hakim & Hassan, 2013). Studying manufacturing and service companies, Prajogo (2006) attested to the

relationship between innovation capability and business performance. This research showed that the impact of innovation capability on business performance was stronger for manufacturing companies. Other authors (Camisón & Villar-López, 2014; Maldonado-Guzmán et al., 2019) also showed that innovation capability had positive influence on firm performance. Thus, we proposed the following hypothesis:

H6: *Innovation capability has a positive impact on operational performance.*

The impact of top management support on innovation has been examined by several scholars (Aragón-Correa et al., 2007; Vaccaro et al., 2012). In their study, Nonaka et al. (2000, 2006) showed that leadership (or top management support) strongly influences the organizational knowledge creation process which is important for enhancing the innovation capability of the firm. The strong impact of the top management support on innovation was also authenticated by Vaccaro et al. (2012). However, top management support was shown to have an insignificant impact on management innovation in the state-owned subsidiary power distribution companies, as described in Le-Anh et al. (2021a). In this study, we are interested in the positive impact of top management support on innovation capability. Thus, we hypothesize:

H7: *Top management support positively influences innovation capability.*

Nonaka et al. (2002, 2006) indicated the role of leadership in the knowledge creation process, while knowledge motivates the innovation activity. Top management support, which is closely involved with leadership, plays a crucial role in influencing innovation and organizational performance. Von Krogh et al. (2012) stressed the essence of collaboration between individuals to create organizational knowledge and also identified that leadership impacts the outcome of their cooperation. This implied the moderating role of leadership in the knowledge creation process that leads to innovation capability. We expect a stronger level of leadership (or top management support) leads to a higher impact of organizational learning on innovation capability. The leadership has influenced the outcomes of collaborations between internal and external sources as well. Stronger management support will lead to higher impacts of external networks on the innovation capability of a firm. Thus, in this research, we aim to attest to the following hypotheses:

H7a: *Top management support positively moderates the relationship between organizational learning and innovation capability.*

H7b: *Top management support positively moderates the relationship between network involvement and innovation capability.*

Innovation capability plays a central role in improving organizational performance. In practice, this factor can have a strong mediating role between organizational performance and other factors. Thus, this research also aims to test the mediating role of innovation capability between the following relationships: a) organizational learning and operational performance; b) network involvement and operational performance. Thus, we proposed the following hypotheses:

H8a: *Innovation capability positively mediates the relationship between organizational learning and operational performance.*

H8b: *Innovation capability positively mediates the relationship between network involvement and operational performance.*

All these hypotheses form the research model, which is shown in Figure 1.

3.2. Contextual and Moderating Variables

In this study, we looked at the possible moderating impacts of two contextual factors which were company age and firm possession type. Company age showed its (moderating) impact in the study of Camisón and Villar-López (2011) and Le-Anh et al. (2021b). The joint-stock and private companies have a stronger motivation for getting better performance than state-owned companies in general, hence the interactions in the model concerning different firms' possession types may show significant differences. Therefore, this research is interested in the possible moderating impacts of the company age and firm possession type in the proposed model.

Generally, companies with newly established systems have a high probability to have better operational performance than the older ones, in which the technological systems have been already worn out. In this research, company age is classified into five categories as shown in Table 1. And the possession type of power companies is classified into three types: state-owned, state possession from 50 to under 100%, and the other Table 1.

3.3. Research Design

This paper used a survey of power generation companies in Vietnam. Currently, in Vietnam, there are more than 383 power generation companies, of which 116 companies have generated power of more than 30MW. The main generation companies belong to state-owned corporations including

Table 1: Characteristics of Power Generation Companies

Company	Characteristics	Number of Responses	Rate%
Capacity (MW)	30–100	31	23.5
	Above 100	101	76.5
Form of possession	State-owned 100% (SO100)	52	39.4
	State-owned above 50% and less than 100% (SO>50)	53	40.2
	State-owned under 50% and private (SO<50)	27	20.5
Operational duration (year)	Under 4	8	6.10
	5–9	48	36.4
	10–19	33	25.0
	20–49	10	7.60
	Above 50	23	17.4
	No information	10	7.60

Electricity of Vietnam (with more than 64% of the total generating power), Petro Vietnam, and Vietnam National Coal and Mineral Industries Group (with more than 16% of the total generating power). This research had focused on power generation companies with the generating power from 30MW and higher (all of them have to participate in the power generation electricity market).

3.3.1. Sampling Method

This research surveyed power generation companies in Vietnam generating power from 30MW and above (116 companies). The respondents are top managers or other key personnel of the power generation companies. The surveying period had been from September to December 2018. The questionnaires had been sent through email and postal mail. The number of questionnaires returned was 155, in 132 of them have enough information to proceed. According to Bowman and Ambrosini (1997), the number of respondents from an organization can be more than one. The questionnaires had been controlled by suitability, completeness, and abnormal distribution of data.

Data had been analyzed using SPSS and SmartPLS packages. SPSS software had been used for exploratory factor analysis and ANOVA. SmartPLS software had been used for regression analysis. SmartPLS is a specialized package for PLS-SEM analysis (Hair et al., 2017). The advantage of this software is the capability of analyzing complicated structural equation models with high reliability and with a limited amount of data. And, the data does not need to meet the normal distribution criterion.

Hair et al. (2016) suggested that for PLS-SEM analysis, to guarantee the statistical power of 80% and detect minimum R^2 values of 0.1 with three (max) arrows pointing at management innovation construct and a significant level of 95%, the sample size should be at least 103. Therefore, 132 useful questionnaires in this survey were appropriate for analysis.

3.3.2. Scales

Variables and indicators in the proposed model had mainly been inherited from previous studies. Several indicators had been adjusted for the case study or had been developed by consulting experts in the power generation field. Variables and indicators were adopted as follows: top management support (Hung et al., 2011; Murat Ar & Baki, 2011), organizational learning (Hung et al., 2011), network involvement (Murat Ar & Baki, 2011). Questions on innovation capability and operational performance were adopted from Hung et al. (2011) and were consulted with experts in the power distribution field. In this research, we focused on the operational performance of companies since most power generation companies are state-owned.

The Likert five scale was used in the designed questionnaires. The contents of the questionnaires were divided into two parts: a) personal information of respondents; and b) information on the variables and indicators of the research. Questionnaires had been consulted with ten experts in the power generation business. The demographic data of the survey, variables and indicators of the model are given in Table 1 and Table 2. Since several questions (indicators) had been adjusted or newly proposed for the survey, an exploratory factor analysis (EFA) was carried out to confirm the appropriateness of variables and indicators in the research.

Table 1 presents the information about the power generation companies. We had received answers from 71 power generation companies, and for each company, we used a maximum of three respondents.

4. Results and Discussion

4.1. Data Analysis

The indicators in the model had been adopted from previous studies and newly proposed, then an EFA analysis had been applied. Doing EFA, we used "*Principal Axis Factoring*" with the "*Promax*" rotation method in SPSS to guarantee the appropriateness of factors. "*Principal Axis Factoring*" is suitable with data that is not required to be normally distributed (Costello & Osborne, 2005) and "*Promax*" rotation (an "*Oblique*" rotation method) helps to reduce the structured bias of data (Gorsuch, 1997). Results in Table 2 show that indicators are valid according to the statistical criteria: EFA outer loads are higher than 0.5; Cronbach's Alphas are greater than 0.6, and other criteria are also satisfied (Hair et al., 2014).

The data then is analyzed using SmartPLS following the procedure to proceed with reflective models as described in Hair et al. (2017). All outer loadings in Table 2 are higher than 0.7, which satisfies statistical requirements. Only one indicator with outer loading is smaller than 0.7 (0.69), but it can be kept according to the reflective model processing procedure (Hair et al., 2017).

Their criteria for the model validity of the research model were verified. Cronbach's alpha and composite reliability are broadly used in the PLS-SEM method, and Average Variance Extracted (AVE) is an important criterion for validity. All criteria meet statistical requirements (Hair et al., 2014; Hair et al., 2017), in which Cronbach's alpha

Table 2: Variables and Indicators

Structure and Scale		Loading	
		EFA	PLS
Organizational learning (OL), Cronbach's Alpha = 0.848	The company encourages employee discussion and team learning	0.623	0.810
	The company has a mechanism to share knowledge and information with all members	0.672	0.759
	An employee is open to sharing knowledge and experiences with others	0.814	0.790
	The employee can integrate their knowledge new knowledge	0.528	0.816
	The employee can apply new knowledge to their works	0.619	0.777
Network involvement (NI), Cronbach's Alpha = 0.831	The company develops tight cooperation with organizations in Vietnam Electrical Engineering Association	0.601	0.793
	The company develops tight cooperation with universities and research institutes	0.893	0.777
	The company develops tight cooperation with consulting organizations	0.727	0.857
	The company frequently updates information from technical and professional sources (such as journals, experts)	0.533	0.817
Innovation Capability (IC), Cronbach's Alpha = 0.878	The company frequently inspects to eliminate unnecessary operations and reduce costs	0.730	0.847
	The company continuously improves energy and resource consumption	0.510	0.749
	The company has the capability to change manufacturing technology to adapt to the new demand	0.897	0.845
	The company has the capability to update new technological/ management processes	0.740	0.804
	The company has the capability to receive and absorb new knowledge of manufacturing technology	0.696	0.859
Top Managenent Support (TMS), Cronbach's Alpha = 0.787	The company has the policy to encourage new ideas	0.540	0.860
	The company provides valuable prizes for new successful ideas	0.656	0.868
	The company strategy stresses the importance of technological innovation	0.732	0.782
Operational Performance (OP), Cronbach's Alpha = 0.826	System failure rate is continuously reduced	0.755	0.762
	Equipment and system reliabilities are constantly improved	0.870	0.895
	The power generating system has a high level of stability	0.765	0.750
	The production system has a high level of safety for employees	0.821	0.859

and composite reliability are greater than 0.7, and AVE is greater than 0.5.

The discriminant validity of the model was satisfied conforming to Heterotrait - Monotrait (HTMT) approach proposed by Henseler et al. (2015). All values according to the HTMT criterion were smaller than 0.9. All VIF values were smaller than 5 (Hair et al., 2014), therefore the multi-collinearity problem did not occur. To check the goodness-of-fit of the model, we used the Standardized Root Mean Square Residual (SRMR) criterion (Hair et al., 2017). This model has the SRMR value of 0.094 (<0.1), which is acceptable (Hu & Bentler, 1998).

The values in Figure 1 are the results of the model estimation process using the Bootstrapping procedure in SmartPLS (Hair et al., 2017). An R^2 value in Figure 1 explains the percentage of the response variable variation that is explained by impact factors. The R^2 values of innovation capability (0.530) and operational performance (0.562) are quite good. The R^2 value of organizational learning (0.309) is not high, but it is still satisfied the meaningful level (Hair et al., 2017).

The results in Figure 1 show that organizational learning has the strongest impact on innovation capability (0.426) and innovation capability shows the highest influence on operational performance (0.683). Network involvement does not have a significant direct impact on operational performance but indirectly affects organizational learning and innovation capability.

Figure 1 also depicts that top management support has a positively direct effect on innovation capability and has a moderating impact on the two relationships: organizational learning - innovation capability and network involvement - innovation capability. This authenticates the moderating role of leadership, as indicated by Von Krogh et al. (2012).

Table 3 shows the moderating impacts of top management support. The stronger top management support causes a higher impact of organizational learning and network involvement on innovation capability. This is agreeable with the discussion by Nonaka et al. (2000, 2006) and Von Krogh et al. (2012). The moderator effect (TMS × OL) equals 0.177 means that the impact value of organizational learning on innovation capability increases to 0.595 (= 0.416 + 0.177) while top management support increases by one deviation unit.

Table 4 shows the mediating impacts of innovation capability in this research. As indicated in Table 4, the mediating relationships of innovation capability between organizational learning and operational performance are complementary, and the mediating relationship of innovation capability between network involvement and operational performance is indirect only (Hair et al., 2017).

The results of the study confirm most hypotheses (H1-H4, H6-H8), except for hypothesis H5. All moderating and mediating hypotheses (H8a, H8b) are confirmed.

Table 5 represents the influences of the contextual variable (Company Age) in the proposed model. Company

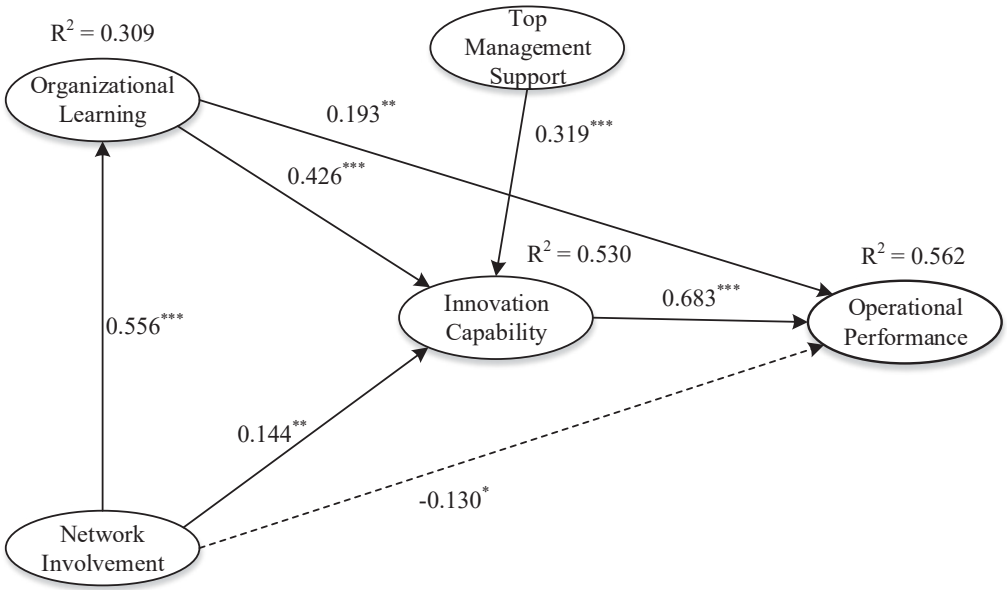

Figure 1: The Impact Levels of Factors in the Proposed Model
*p < 0.10; **p < 0.05; ***p < 0.001; Significant at the 0.05 level.

Table 3: Results of Hierarchical Regression Analyses: Innovation Capability

Independent Variable	Innovation Capability (IC)		
	Model	**Model 1a**	**Model 1b**
Organizational Learning (OL)	0.426***	0.416***	0.397***
Network Involvement (NI)	0.144**	0.175**	0.198**
Contextual Variable			
Top Management Support (TMS)	0.319***	0.297***	0.347***
TMS×OL		0.177**	
TMS×NI			0.158**
R^2	0.530	0.560	0.557

Note: Model 1a, 1b contains the core model in Figure 1 adding moderating variables in succession, all reliability criteria are satisfied;
**p < 0.05; ***p < 0.001; Significant at the 0.05 level.

Table 4: Mediating Effects of Innovation Capability

Hypotheses		***β***	***t*-value**	***p*-value**	**Results**	**Effects**
H8a:	Organizational Learning → Innovation Capability → Operational Performance	0.291	5.006	0.000	Supported	Partial mediation (Complimentary)
	Organizational Learning → Operational Performance	0.193	2.489	0.013	Supported	
H8b:	Network Involvement → Innovation Capability → Operational Performance	0.099	2.261	0.024	Supported	Full mediation (Indirect-only) /
	Network Involvement → Operational Performance	–0.130	1.913	0.056	Not Supported	

Table 5: Results of Hierarchical Regression Analyses: Operational Performance

	Operational Performance (OP)		
Independent Variable[a]	**Model 2**	**Model 2a**	**Model 2b**
Innovation Capability (IC)	0.618***	0.698***	0.605***
Organizational Learning (OL)	0.178**	0.166**	0.179**
Network Involvement (NI)	−0.080ns	−0.078ns	−0.074ns
Contextual Variable			
Company Age (Com.Age)	−0.123*	−0.083ns	−0.129*
Com.Age × IC		0.180**	
Com.Age × OL			−0.038[ns]
R^2	0.574	0.592	0.575

Note: Model 2, 2a, 2b contain the core model in Figure 1 adding contextual and moderating variables in succession, all reliability criteria are satisfied;
[a]Independent variables in the relation with OP.
*p < 0.10; **p < 0.05; ***p < 0.001; ns: not significant; Significant at the 0.05 level.

Age shows a negative impact on operational performance only at a 90% significant level. Moreover, it also proves to have a positive moderating influence on the relationship between innovation capability and operational performance. However, its moderating effect on the relationship between organizational learning and operational performance is negligible. The direct impact of network involvement on operational performance is insignificant; hence we did not look at the moderating impact of company age on this relationship.

In this research, we also looked at the effects of firm possession type (a contextual variable) on the interactions in the proposed model by running a Multi-Group Analysis (MGA) for different firms' possession types. It was found the only interaction (TMS-IC) showed a significant difference between the two groups (SO > 50 and SO100, see Table 1). We have not found significant differences in other interactions between other groups in the experiments.

4.2. Discussion and Implications

4.2.1. Discussion

This research examined the relationship between organizational learning, network involvement, innovation capability, top management support, and operational performance in the power generation field in Vietnam. The research results confirmed the impact of organizational learning ($\beta = 0.426$) and network involvement ($\beta = 0.144$) on innovation capability (Hsiu-Fen, 2007; Lawson & Samson, 2001; Liao et al., 2007) and operational performance (Aragón-Correa et al., 2007; Hung et al., 2011).

The results also showed the central role of innovation capability in enhancing the operational performance ($\beta = 0.683$) of power generation companies which are conformed to the several previous studies (Camisón & Villar-López, 2014; Rajapathirana & Hui, 2018).

Network involvement which reflects the role of the external environment (or *Ba* in the knowledge creation process (Nonaka et al., 2000, 2006), has been identified as an important factor affecting innovation (Love & Mansury, 2007; Romijn & Albaladejo, 2002). This research attested the impact of network involvement on organizational learning and innovation capability and then indirectly influences operational performance. In this study, network involvement not only includes the relationship with R&D institutions but also involves the relationships with professional associations and consulting firms (Mol & Birkinshaw, 2009). This relationship brings information and knowledge from other external sources such as professional information sources and experts into organizations.

Figure 1 indicates that network involvement strongly impacts organizational learning ($\beta = 0.556$) as observed in several other studies (Caloghirou et al., 2004; Powell, 1998; Sun & Anderson, 2010). This means knowledge from the extra-organizational network is crucial in the knowledge creation process in power generation companies. This implied that power generation companies have to take advantage of the external network to maximize the benefit of external knowledge for organization development.

This study showed the strong direct and mediating role of innovation capability (Table 4). This means that the external and organizational knowledge has to be transformed into organizational capability (particularly innovation capability in this case) to utilize to get an outcome. The transformational strength of external expertise and organizational knowledge into innovation capability are higher with stronger top management support. This was confirmed by the positive moderating role of top management support with the relationship between network involvement, organizational learning, and innovation capability, as observed in the research of et al. (2006) (Table 3). The support of a top manager certainly plays an important role in creating a favorable environment for knowledge absorption from external sources, therefore improving the learning outcome from external sources (Von Krogh et al., 2012). This implies the positive moderating effect of top management support on the relationship between network involvement and innovation capability as proved in this research context.

This research shows that the contextual factors have effects on the operational performance of the power generation companies. As observed from the experimental results, the company age has a negative impact on the operating performance of the power generation firms at a 90% significant level. The negative impact ($\beta = -0.123$) might be explained according to the deterioration of technological systems over time. Nonetheless, the company age introduces a positive moderating effect on the relationship between innovation capability and operational performance ($\beta = 0.180$). This means that the longer a power generation company operates, the greater contribution of innovation to operational performance this company gains. This can be explained by the accumulation of knowledge during operating time through organizational learning (Hsiu-Fen, 2007) and absorbing of knowledge from external sources (Caloghirou et al., 2004) to enhance the innovation capability of the firm.

The results of this research also indicate that the impact of top management support is different for power generation companies with different types of possession. Multi-Group Analysis (MGA) analysis for different firms' possession types shows that top management support of fully state-owned power generation firms did not have a significant impact on the innovation capability of the firms, while

these factors showed significant influences on innovation capability of other types of power generation firms. This implies that the company structure and policies of fully state-owned power generation firms might not encourage organizational learning and the process of knowledge accumulation within firms.

4.2.2. Implications

This research has several implications for practice. Firstly, in the power generation field in Vietnam, top management support, network involvement, and organizational learning have very important impacts on innovation capability and operational performance. Top managers of power generation companies have to pay more attention to these factors to enhance the operational performance of their companies.

Secondly, in the power generation field of Vietnam, which is dominated by state-owned companies, top management support still shows its significant role. This factor showed not only a direct positive impact on innovation capability but also had a strong moderating role in the relationship between organizational learning and innovation capability. However, the results recommend that it has something to do with fully state-owned power generation companies to realize the effect of top management support on the innovation capability of these firms.

Thirdly, innovation capability played a central role in impacting the operational performance of power generation companies in this research, therefore, this factor has to be received high attention from power generation companies' management.

Finally, we have seen that the age of power generation companies may deteriorate the firm performance and this process can be reversed by enhancing the innovation capability of the firms through learning from internal and external sources.

5. Conclusion

Power generation companies in Vietnam have been dominated by state-owned firms and companies in which the state is the major shareholder (owning more than 50%). In practice, this type of company is important to the Electricity of Vietnam and has not received much attention from innovation literature. Thus, in this research, we examined the effects of innovation and learning-related factors in such companies. This study attested the impacts of organizational learning, network involvement on innovation capability, and operational performance and the interactions between some of these factors in the power generation field of Vietnam.

This study also proved the strong role of top management support as a moderator between organizational learning, network involvement, and innovation capability. The direct impact of top management support had been considered by several scholars (Aragón-Correa et al., 2007; Vaccaro et al., 2012), but the moderating effect of top management support was explicitly authenticated in this research. In this research, we also attested the mediating impact of innovation capability between organizational learning, network involvement, and operational performance.

This research also reveals the impacts of contextual factors (company age and company possession type) on the interactions in the proposed model. The influences of these contextual factors are interesting and should be noted in practice to enhance the operation of the power generation companies in Vietnam.

This research still has some limitations, which can be done in further studies. Firstly, we are interested in the role of different types of innovation (management and technological innovation) in the power generation field. Secondly, increasing the sample size might provide stronger support for our research. Thirdly, it is interesting if we can verify the differences in subjective performance using secondary data.

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