The Roles Of Strategic Knowledge Leaders In A Malaysian Semiconductor Organization

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ABSTRACT:

This study aims to investigate the roles of strategic knowledge leaders in a Malaysian semiconductor manufacturing organization, with a special emphasis on engineering performance. This study provides a concept that amalgamates the use of knowledge management (KM) and strategic leadership to solve engineering problems in the particular organization. After collecting 226 survey responses, hypotheses tests were done using reliability, linear regression and multiple linear regression analysis. It was found that both KM and strategic leadership have a positive and significant effect on engineering performance in this particular organization. Although the correlation between KM and engineering performance is strong, it is still important for this organization to carry out a leadership style that combines KM and strategic leadership for further improved engineering performance. The results of this study serve as an exemplary guideline for most Malaysian semiconductor organizations who intend to refine their underlying strengths in KM practices or leadership.

Keywords: *Knowledge management, Strategic leadership, Engineering performance*

1. Introduction

Today's competitive survival of manufacturing organizations can be linked with their ability to produce products that meet or exceed customers' expectations (Ugboro and Obeng, 2000). The underlying thrust and motivation for an organization to succeed is through its strategic leadership potentials and proven successful management practices (Idris and Ali, 2008). Hence, organizations have been emphasizing on developing methods and training programmes to help their leaders and management improve product quality and exceed consumer needs (Ugboro and Obeng, 2000).

For many years, leaders have been strategically proposing ideas to enhance organizational performance, staff commitment and welfare (Puffer and McCarthy, 1996). Leaders of multinational corporations also face a predominant challenge in managing employees from a variety of cultures (Howell et al., 2003). The increasing number of multinational corporations today justifies the need for studies to be done on the importance of international strategic leadership in the multicultural aspects of these organizations (Howell et al., 2003).

However, according to Zaccaro and Horn (2003), the leadership theory has not fully lived up to its promise of helping practitioners resolve challenges that occur in organizations. They argue that many theories on leadership do not appear to be contextualized, nor do the critical factors facing leaders drive their construction.

Porter and McLaughlin (2006) argue that if a relative void still exists in the literature on the impact of the organizational context on strategic leadership, the situation would seem to be like the weather: many talking about it, but very few doing much about it insofar as empirical research is concerned. The abovementioned issues in our current industrial practices show that there is a need to identify a novel and integrated leadership style that encompasses all the fundamental areas of importance in an organization.

Hence, the purpose of this study is to determine the roles of strategic knowledge leaders in a Malaysian semiconductor manufacturing organization, with a special emphasis on engineering performance. This study provides a concept that amalgamates the use of knowledge sharing and strategic leadership to solve engineering problems in the particular organization. The study employs the use of surveys for data collection. Linear regression and multiple linear regression analyses are used for this study to determine the relationship between strategic knowledge leadership and engineering performance.

This study provides empirical evidence that explains the impactful roles of strategic knowledge leaders who combine the use of strategic leadership and knowledge management concepts for improved engineering performance in a Malaysian semiconductor organization. The results can be potentially used to develop training programmes, guidelines and industrial policies for the practice and research concerning strategic leadership and knowledge management.

2. Knowledge Management (KM)

KM is a practice that involves building on previous experiences and creating new mechanisms for exchanging knowledge (Boyle et al., 2006). It is a process that creates significance with the indefinable advantages of an organization and combines areas such as information technology, industrial engineering and organizational performance (Liebowitz, 1999). KM focuses on enabling rather than the management of knowledge (Zhengfeng et al., 2007).

According to Gold et al. (2001), an organization that can competently maintain the performance of its KM processes is capable of integrating various concepts and technologies more efficiently. Lee and Chang (2006) suggest that KM acts as a foundation for continuous improvement, especially in the new product development (NPD) processes.

It is said that Japanese organizations are successful not due to their production ability or relationships with customers, but due to their ability in organizational knowledge creation (Nonaka and Takeuchi, 1995). Organizations that have competitive KM initiatives have more superior NPD performance since the constant knowledge creation allows them to improve processes (Liu et al., 2005).

When implementing a KM approach in manufacturing organizations, engineers need to be fast in summarizing detailed information from different areas for the understanding of other departmental counterparts (Faniel and Majchrzak, 2007). This allows them to develop their cross-functional knowledge and reuse the value-added information they created for future existing processes.

3. Strategic Leadership

Strategic leadership is the capability to foresee, visualize, sustain flexibility and empower people to create strategic change (Hitt et al., 2005). Strategic leadership is important in organizations because without it, organizations can fail to attain satisfactory, much less, improved performance when confronting the challenges of the global economy (Hitt and Ireland, 1999).

Strategic leadership involves the decision-making of an organization's products/services, executive selection, resource planning, strategizing and organizational goal-setting (House and Adiya, 1997; Pechlivanidis and Katsimpra, 2003). It arises as a cooperative and participative process (Hitt et al., 2005).

Strategic leadership can also be described as an organization's key leadership skills that present strategies in nurturing the skills of employees towards achieving organizational goals (Idris and Ali, 2008). Reed et al. (2000) suggest that it is important for the commitment of strategic leaders to be established in an instructive and encouraging manner.

In order to survive in equivocal market environments, organizations need strategic leaders that are responsive, adaptable and able to create strategies and control them in an advantageous way (Yukl, 2008). Chin et al. (2002) point out that these strategic leaders should also be geared towards enhancing quality-driven initiatives and dynamically instilling customer focused goals in the middle management levels. Strategic leaders should be capable of directing the whole quality process, which involves establishing standards, setting goals and improving systems deliberated to fulfil customer requirements and improve organizational performance (Fuentes-Fuentes et al., 2006).

4. Engineering Performance

Engineering performance mainly refers to the general success of predetermined engineering project goals. The uniqueness of engineering performance in many studies is in its capability to be succinctly linked with other variables, characteristics and research models (Cho et al., 2009).

Engineering performance involves the management of factors such as time, cost, superiority, creativity and product development performance. The detailed explanation of these factors is given in Table 1.

Table 1: Factors Of Engineering Performance

Engineering Performance	Explanation	References
Time	When a decision is made, the project execution time must be short since it is a success factor in engineering performance.	(Thiry, 2002)
Cost	Delayed projects cost money and reduce customer satisfaction. This causes financial support difficulties and further slippages in project timelines to transpire.	(Kaliba et al., 2009), (Ahsan and Gunawan, 2009)
Superiority	The crucial project success factor is product superiority. In manufacturing, product superiority refers to the distribution of quality products with quality features to customers.	(Stevens et al., 1999), (Cooper, 1996)
Creativity	Creativity is an important aspect of engineering performance as it involves creative idea generation and innovation which are useful for the conceptual stages in manufacturing projects.	(Leenders et al., 2002), (Garcia and Calantone, 2002)
Product development performance	Organizations should manage risks related to developing new products because there is still a possibility of product failure. Thus, product development performance is also essential in engineering performance because it is a critical determinant in the success or failure of a project.	(Schmidt et al., 2009)

For this study, the components of KM and strategic leadership will be tested against engineering performance using statistical analysis techniques in order to determine the significance of their relationships. The following hypotheses are proposed for this study:

H1: KM affects engineering performance in a Malaysian semiconductor organization

H2: Strategic leadership affects engineering performance in a Malaysian semiconductor organization

H3: Strategic knowledge leadership affects engineering performance in a Malaysian semiconductor organization

5. Research Method

The organization chosen for this study was founded in Malacca, Malaysia in 1973. The key tasks carried out in this organization are the assembling and testing of discrete, power, memory and logic semiconductors. There are approximately 5600 workers employed in this organization. It also operates in Germany, Austria, France, Taiwan, Singapore and China with over 43,000 employees and 7200 of them involved in R&D.

The choice of this organization for the study can be justified by its recognition from the Malaysian Government in its 10th Malaysian Plan. According to the 10th Malaysian plan, this organization is a leading global company that has established a strong cluster ecosystem among other semiconductor organizations in Malaysia and has achieved progress over the past decades in terms of diversifications, development and testing. Therefore, it would be of interest to study the roles of strategic knowledge leadership in the organization’s engineering performance.

The population of this study is made up of 2100 engineers. The unit of analysis is the engineers of the organization. 2100 surveys were handed out to them. Data were collected over a period of six weeks using a seven-point Likert scale survey instrument. The response rate was 11%.

The questionnaire includes closed-ended questions from the sources identified in the literature. Close-ended questions allow respondents to make quick decisions by selecting from the options available, thereby increasing response rates (Zikmund, 2003). Using SPSS 18.0, the data collected were analyzed with reliability, linear regression and multiple linear regression analyses.

6. Results

In this study, Cronbach’s alpha was used to assess the internal consistency of the survey items. Normally, the alpha value ranges from 0 to 1. An alpha coefficient that is above 0.7 signifies high reliability (Cronbach and Shavelson, 2004; Nunnally and Bernstein, 1994). The reliability analysis shows that the Cronbach’s alphas for both strategic leadership and KM are acceptably above 0.7. In addition, the overall Cronbach’s alpha is also above 0.7 (See Table 2).

Table 2: Reliability Analysis For Strategic Knowledge Leadership

Variable	Sub-variable	Cronbach’s alpha, α	Overall cronbach’s alpha

Strategic knowledge leadership	KM	0.949	0.831
	Strategic leadership	0.921	

Linear regression analysis was used to evaluate the hypotheses H1 and H2. Table 3 presents the results of the linear regression analysis for H1. An R^2 of 0.487 is reported with this regression analysis, indicating that 48.7% of the variance in engineering performance can be explained by KM. This relationship is considered to be moderately correlated (R=0.698). KM also establishes an importance towards engineering performance with a reported β of 0.571. In addition to that, the model is significant as indicated by the ANOVA results of F (1, 225) = 212.946, p<0.001. Therefore, the effect of KM on engineering performance in this organization is positive and significant, and H1 is not rejected.

Table 3: Linear Regression Analysis For KM – Engineering Performance

Predictor	β	Std. Error	t	F	R	R^2
(Constant)	1.856	0.158	11.740	212.946***	0.698	0.487
KM	0.571	0.039	14.593***			

(Notes: *** p<0.001; N=226; Durbin Watson = 1.702)

Table 4 presents the results of the linear regression for H2. An R^2 of 0.334 is reported with this regression analysis, indicating that 33.4% of the variance in engineering performance can be explained by strategic leadership. The strength of the relationship is considered to be moderately correlated (R=0.578). Strategic leadership also establishes an importance towards engineering performance with a reported β of 0.375. Additionally, the model is significant as indicated by the ANOVA results of F (1, 225) = 112.250, p<0.001. Therefore, the effect of strategic leadership on engineering performance in this organization is positive and significant. Hence, H2 is not rejected.

Table 4: Linear Regression Analysis For Strategic Leadership – Engineering Performance

Predictor	β	Std. Error	t	F	R	R^2
(Constant)	2.387	0.167	14.320	112.250***	0.578	0.334
Strategic leadership	0.375	0.035	10.595***			

(Notes: *** p<0.001; N=226; Durbin Watson = 1.605)

A stepwise multiple linear regression analysis was conducted to evaluate H3. Table 5 presents the results of the analysis. The R^2 of 0.497 indicates that up to 49.7% of the variance in engineering performance is explained by strategic knowledge leadership. A strong correlation coefficient (R=0.705) was also obtained for this relationship. In addition to that, the model is significant as indicated by the ANOVA results of F (2, 224) = 110.306, p<0.001.

The results show that the effect of strategic knowledge leadership on engineering performance in this organization is positive and significant. Thus, H3 is not rejected. It is also important to note that the when individually tested, the correlation of KM with engineering performance appears to be higher than that of strategic leadership's correlation. However, when the two components are combined, the correlation increases.

Table 5: Multiple Linear Regression Analysis For Strategic Knowledge Leadership – Engineering Performance

Strategic Knowledge Leadership	β	Std. Error	t	F	R	R^2
(Constant)	1.769	0.162	10.898***	110.306***	0.705	0.497
KM	0.484	0.057	8.516***			
Strategic leadership	0.095	0.045	2.102*			

(Notes: * $p<0.05$; ** $p<0.01$; *** $p<0.001$; N=226; Durbin Watson = 1.721)

7. Discussion

Based on the analysis of H1 and H2, it is evident that both KM and strategic leadership have a positive and significant effect on engineering performance. It is therefore evident that both KM and strategic leadership have a potential to help improve engineering performance and generate significant value to organizations through indefinable advantages (Liebowitz, 1999; Shea and Howell, 1999; Thamhain, 2004).

Also, it was found that the relationship between KM and engineering performance is stronger (R=0.698) compared to the relationship between strategic leadership and engineering performance (R=0.578). These findings indicate that this company practices extensive and systematic documentation of their standards and processes so that they can be embodied easily into trainings, workshops and projects (Li and Hsieh, 2009; Linderman et al., 2004). However, these findings do not mean that strategic leadership is unimportant to the organization. It may be plausible that the organization is geared towards a more flexible and participative form of leadership along with the strategic planning from top management. Participative and flexible leadership styles are still important in team environments where members require constant motivation and affirmation (Drath et al., 2008; Kanji, 2008; Shea and Howell, 1999; Wang et al., 2005; Yukl, 2008).

The results for H3's evaluation showed that a combination of strategic leadership and KM can enhance the strength of the correlation with engineering performance (R=0.705). This somewhat proves that leaders of manufacturing organizations cannot simply rely on only the elements of strategy and vision to manage employees, but should also focus on knowledge sharing, teamwork and creativity (Fuentes-Fuentes et al., 2006; Garcia and Calantone, 2002; Leenders et al., 2002). With the combined emphasis of all the aforementioned factors, this semiconductor manufacturing organization can look forward to an improved engineering performance even when faced with the challenges of the global economy (Hitt et al., 2005).

8. Conclusion

The findings of this study suggest that the strategic knowledge leaders play a significant role in the engineering performance of a Malaysian semiconductor manufacturing organization. Although the literature survey in this paper conceptually indicated that leadership plays an important role in organizational performance, a factor that can lead to its collapse may be the lack of support from the employees of the organization. However, by including elements of KM in the area of strategic leadership, it is hoped that the improvement in engineering performance in manufacturing organizations can be raised to an even higher level.

It is noted that there are some limitations in this study. For example, a simultaneous modeling analysis was not carried out since the concepts developed in such a way that the components were not able to be simultaneously tested against each other. This limits the possibility of discovering more relations and effects among the dependent and independent variables. Also, a study of one organization would normally limit the generality of the results. In this case, it is still uncertain if this study would have reasonable applicability outside Malaysia.

One of the suggestions to improve this study is to conduct in-depth qualitative studies in every technology cluster of this organization to further understand its organizational context. Also, observational techniques could be employed to shed more light on this phenomenon. In addition to that, instead of using respondent-reported scales, it would be good if researchers are able to use empirical data from the organization's records e.g. sales performance, customer satisfaction, development cost etc. An empirical study across several manufacturing organizations would also improve the generalizability of this study.

Lastly, a structural equation modeling (SEM) approach using a combination of statistical data and qualitative causal assumptions can be used in order to test and estimate causal relationships. One of the available software that can be utilized for this analysis is called AMOS. Using this approach, the components for this study are able to be tested simultaneously altogether instead of the conventional method where they are linearly tested with only one component against another.

Although much remains to be learned about the developed hypotheses and relationships in this study, it is believed that a preliminary understanding of strategic knowledge leadership is now within sight, due in part of an improved understanding on how their capabilities and influence can transform the engineering performance of various manufacturing organizations in the world.

9. References

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