The Influence of Leadership Styles by Male and Female Supervisors on Operating Performance: A Listed Semiconductor Company in Taiwan as an Example

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ABSTRACT

This paper intends to explore the influence of leadership styles by male and female supervisors on the operating performance of a listed semiconductor company in Taiwan. Convenience sampling is adopted on the department supervisors (managers and above) of this listed semiconductor company in Taiwan. The statistical analysis technique used in this paper is two-factor ANCOVA (two independent variables, one dependent variable and one covariate variable). The research findings suggest: (1) Leadership styles and supervisor genders have significant moderating effects on operating performances; (2) Transformational leadership (leadership style 1) by male supervisors exhibits greater influence on the post-test operating performances compared with transactional leadership (leadership style 2) and charismatic leadership (leadership style 3). Meanwhile, transformational leadership (leadership style 1) by female supervisors reports greater influence on post-test operating performances than transactional leadership (leadership style 2). Moreover, the transactional leadership by female supervisors (leadership style 2) has more influence over post-test operating performances than charismatic leadership (leadership style 3); and (3) for all the three leadership styles, male supervisors show more influence than female supervisors. These findings can serve as a reference to the management of other listed semiconductor companies in Taiwan.

Keywords: leadership style, operating performance, quasi experiment

RESEARCH MOTIVATIONS AND PURPOSES

In the context of technology advances and international division of labour, Taiwan has established a complete value chain, technological competences and global logistics and become a key player in the global electronics industry. In fact, semiconductor is still on the top of Taiwan’s agenda for economic development. It is an industry of high capital and technology intensity. Among all the major countries with semiconductor industry, Taiwan is the only one with a structure of vertical division. Science parks were established under policy support to boost the industry’s production efficiency by creating clustering effects. In fact, Taiwan’s semiconductor industry has become a success story in the world. The industry has a complete supply chain and its competitiveness is unparalleled in terms of efficiency and cost. All these factors contribute to the vibrant development of IC design houses (Peng, 2009).

The semiconductor industry is highly capital-intensive. To ensure core competitive advantage in the knowledge economy with constant changes, it is necessary to enhance organizational performances with appropriate leadership styles and high job satisfactions among employees. A large number of academic studies over the past decade examine the relationship between leadership styles and organizational performances. In fact, organizational performances underpin the sustainability of competitive advantages.
The first motivation of this paper is to explore whether leadership styles in the semiconductor industry can vary along with operating performances.

The rising concern for gender equity has increased the percentage of females promoted to managerial positions (marking a distinctive contrast from the past), particularly in the electronics industry in Taiwan. The second motivation of this paper is to examine whether there are differences in leadership styles by male and female supervisors and whether this contributes to varying influence on operating performances.

In sum, this paper evaluates the influence of leadership styles and supervisor genders on the operating performance of a listed semiconductor company in Taiwan.

The research purposes are as follows:
(1) To understand whether there are any significant interactions between leadership styles and supervisor genders concerning the influence of operating performances;
(2) To examine whether male supervisors and female supervisors of the same leadership style report different influence on post-test operating performances (exclusive of pilot test operating performances);
(3) To investigate whether the three leadership styles by male supervisors and female supervisors have different levels of influence on post-test operating performances (exclusive of pilot test operating performances).

LITERATURE REVIEW

Definition of Leadership and Leadership Styles

(A) Definition of leadership

According to the operational definition of leadership in this paper, leadership is the ability to influence an organization or a group of people to achieve a common goal by inspiring the members of the organization and giving them confidence. This is based on the following definitions:

Robbins (2001) stated that leadership is the ability to influence an organization or a group of people to achieve a shared goal.

Dubrin (2001) defined leadership as the ability to inspire organizational members by giving them confidence to achieve the organizational goal.

Fry (2003) described leadership as the utilization of methods and strategies to inspire organizational members so that they could develop their potential and achieve growth.

According to Bruce and Kathleen (2005), leaders acknowledge the diversity of organizational members. Leaderships seek to achieve the common goals and values of an organization through innovations and non-destructive methods. Leaders may utilize internal resources and support such as training and education to guide organizational members to achieve growth and attain organizational goals.

(B) Leadership styles

This paper divides leadership styles into three types: (1) transformational leadership: leaders interact and transact with subordinates via mutual benefits to achieve results; (2) transactional leadership: leaders pursue organizational goals by changing organizational cultures and structures, in the context of strategic management; and (3) charismatic Leadership: through personal charms and capabilities, leaders influence, inspire and encourage subordinates to work hard toward the organizational goals.

These three leadership styles are based on the following literature:

Mintzberg(1998) believed that leaders adopt the methods most suitable to the prevalent business
dynamics and organizational needs, rather than the leadership styles most natural to their own personalities. After conservations with the top 160 business decision-makers around the world, Farkas and Wetlaufer (1996) generalized four superior leadership styles: (1) strategy approach: strategic allocations and management from top down, with a focus on the creation and formulation of mid-to-long-term plans and the confirmation of feasibility of such plans; (2) people-asset approach: time and efforts spent on human resources planning and recruitment, with a focus on corporate cultures and values, solidarity among employees and career development of employees; (3) expertise approach: identification and development of the strongest core competences into competitive advantages; (4) control or box approach: dual focus on financials and corporate philosophy by establishing game rules and control mechanisms to ensure the results meeting with the expectations of customers and employees.

House (1971) posited that leadership is the guidance to subordinates in the path toward goals. Leaderships choose from the best leadership styles most effective to subordinates so that subordinates achieve personal and organizational targets. These four leadership styles are: (1) directive leadership: leaders provide instructions related to work and manage the process with specific policies and guidelines. The job roles and work standards of team members are determined after conservations with leaderships; (2) supportive leadership: leaders care about the needs of their subordinates and treat all the employees in a friendly, approach and equal manner; (3) participative leadership: leaders consult with subordinates via conservations or actions and take into account their suggestions before decisions; (4) achievement-oriented leadership: leaderships set up challenging goals, expect their teams to perform and make sure team members are aware (Hsu, 2007). Cheng (2011) divided leadership styles into: (1) transactional leadership; (2) faire leadership; (3) authority leadership; (4) transformational leadership; and (5) situational leadership.

The earliest definition of transactional leadership is Chester Irving Barnard’s inducement-contribution theory and belief in system equilibrium. The theory contends that leadership’s power stems from influence, so as to convince subordinates that contributions and rewards are fair and reasonable. The loyalty and commitment to leaderships is also based on the principle of mutual benefits, i.e. the source of leadership (Chang, 1998).

Bass (1985) also indicated that transactional leadership operates on the quid-pro-quo (this for that) basis: rewards and punishments, management by exception and positive/negative feedback. In sum, transactional leadership is characterized with conditional rewards and interventionist management (Chang, 2002).

Li (2002) suggested that leadership styles can be classified into the following: (1) transactional leadership: leaders enable subordinates to understand their own roles so as to accomplish the assigned tasks; (2) faire leadership: leaderships avoid the responsibilities of decision making so that employees must complete work and achieve organizational goals on their own, often by seeking assistance from colleagues or reaching out to people outside the organization; and (3) transformational leadership: leaders inspire subordinates to pursue excellence. It is a process to expand and elevate the spiritual level and psychological needs of subordinates (Bass, 1985).

According to Lin (2003), transformational leadership is to influence organizational members and to empower them so that they can achieve targets in an autonomous manner. This is the transformation for employees to change their attitudes and presumptions and establish commitment to organization or goals (Yukl, 1994; Sun, 2000; Lin & Wu, 1998). It is also a process for leaders to change organizational cultures and structures as part of strategic management toward the organizational goals (Schein, 1992; Yukl, 1994; Lin & Wu, 1998).
Transformational leadership was first mentioned by Burns (1978). Many scholars subsequently conducted similar studies but the best results were from B. M. Bass. In the examination of the relationship between transformational leadership and transactional leadership, B. M. Bass thinks these two are surely different but not mutually exclusive. He even argues that transformational leadership is the combination of charismatic leadership and transactional leadership (Sun, 2000).

House (1971) believed charismatic leaders influence followers by changing values and aligning goals so as to achieve organizational targets and commitments. This is about putting the organizational goals in front of the personal interests of employees. Therefore, the quality of leadership can be measured with the following metrics: (1) the followers believe the leader’s belief is correct; (2) the followers share a similar belief with the leader; (3) the followers embrace their leader without hesitation; (4) the followers admire their leader; (5) the followers are happy to obey the instructions from their leader; (6) the followers are wholeheartedly committed to the organization’s mission statements; (7) the followers have great expectations for the organization’s performances; and (8) the followers believe they contribute to the organization’s goals (Chang, 2002). Meanwhile, Max Weber argues that charismatic authority is about the gifts and personalities of the leaders, in combination with the vision created with the personal will of the leaders so as to influence the followers. This type of leaders is great with communication by leveraging their charismatic influence in the handling of organizational problems. Charismatic leadership is a combination of attribution theory and the trait theory of leadership (Lin, 2003).

OPERATING PERFORMANCES

This paper measures operating performances with (1) financial performances; and (2) job satisfaction of employees.

Definition and Constructs of Financial Performances

(A) Definition of financial performances

The operational definition of financial performances in this paper is based on Lin (2013) that the narrowest definition of operating performances are simple financial metrics to reflect the achievement of economic goals. The frequently used profitability indicators are ROI, ROS, ROE and EPS.

(B) Measurement of financial performances

The use of EPS to measure financial performances is based on Huang (2008), Ling & Hong (2010) and Lin (Johnson Lin) (2013). Below is the summary of the literature in relation to financial performances as a construct.

Lin (2013) indicated that financial performances are the narrowest definition of operating performances. Simple financial metrics are used to reflect the achievement of economic goals. Frequently seen indicators include revenue growth, profitability (e.g. ROI, ROS and ROE), EPS and other enterprise value multiples.

Ling & Hong (2010) stated that a robust approach to measure financial performances should include metrics associated with growth and profitability. For example, earnings per share (EPS) should be above the industry average. Return on equity (ROE) and return on assets (ROA) are also frequently used metrics (Huang, 2008). The above literature is a summary of the financial performance construct in this paper.

Definition and Construct of Employees’ Job Satisfaction

(A) Definition of employees’ job satisfaction

Robbins (1994) believed that job satisfaction is a general attitude toward work. It is the gap
between what they deserve and what they actually receive.

Davis (1997) described job satisfaction as the level of employees’ preferences for work. If the job characteristics are suitable to the employee, job satisfaction arises.

Hsu (1977) posited that job satisfaction is a feeling or an emotional response to work and relevant factors. The level of job satisfactions depends on the difference between the actual rewards and the expected rewards.

Wu, Pan & Ting (1980) indicated that job satisfaction is the sum of the differences between expected satisfactions and actual satisfactions.

To sum up the above, this paper refers to Davis (1997) and defines employees’ job satisfaction as the degree of preferences for job and the level of satisfaction with the gap between deserved rewards and actual rewards.

(B) Measurement of Employees’ Job Satisfaction

Vroom (1964) thought that job satisfaction consists of seven constructs, i.e. organizations, promotions, job descriptions, line managers, monetary compensations, work environments and colleagues.

This paper adopts the Job Descriptive Index (JDI) developed by Smith, Kendell & Hulin (1969) for the definition of job satisfaction. Simple, concise and most widely used by follow-up studies, this definition consists of five constructs: work, promotion, salary, supervisors and colleagues. This paper defines job satisfaction as the emotional response to these five constructs and hence the measurement of job satisfaction is based on these five constructs proposed by Smith et al (1969).

RESEARCH FRAMEWORK AND HYPOTHESIS

This paper develops the following research framework and hypotheses based on the abovementioned purposes and literature review.

Research Framework

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Dependent Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Leadership style</td>
<td>Post-test operating performances:</td>
</tr>
<tr>
<td>(2) Gender</td>
<td>(1) Financial performances</td>
</tr>
<tr>
<td></td>
<td>(2) Job satisfaction of employees</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Covariate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot-test operating performances:</td>
</tr>
<tr>
<td>(1) Financial performances</td>
</tr>
<tr>
<td>(2) Job satisfaction of employees</td>
</tr>
</tbody>
</table>

Figure 1: Research Framework

Hypotheses

This paper develops the following three hypotheses:

\( H_1 \): Leadership styles and genders have significant interactions in the influence over operating performances;

\( H_2 \): Male supervisors and female supervisors of the same leadership style report different influence on post-test operating performances (exclusive of pilot test operating performances);

\( H_3 \): The three leadership styles by male supervisors and female supervisors have different levels of influence on post-test operating performances (exclusive of pilot test operating performances).
METHODOLOGY

Sampling Method and Questionnaire Design

This paper employs convenience sampling by conducting in-depth interviewing supervisors (managers and above) of a listed semiconductor company in Taiwan and issuing a questionnaire survey to entry-level employees on their levels of job satisfaction. A total of 50 expert questionnaires were issued as the pilot test. The questionnaire was modified based on the feedback from experts in order to conduct the post test. A total of 450 formal questionnaires were released, with an effective sample size of 368 recovered, at a recovery rate of 81.78%.

The measurement of the questionnaire is based on the Likert scale, with five points indicating “agree very much” and one point indicating “strongly disagree”. A high score suggests a high level of agreement and vice versa.

The design of the questionnaire section regarding leadership styles is an improvement and modification of the constructs developed by Li (2002), Sun (2000) and Lin (2003). There are a total of six questions.

The section on operating performances consists of two parts: (1) financial performances based on the indicators developed by Huang (2008), Ling & Hong (2010) and Lin (2013), and EPS and ROE used as the financial metrics, with a total of six questions; and (2) job satisfaction of employees based on the five constructs developed by Smith et al (1969), with a total of ten questions.

Quasi-Experimental Design Method

This paper employs the quasi-experiment method by referring the leadership styles and genders of the supervisors of a listed company as the two independent variables. During the last three years before its public offering, the company was known for faire leadership by both its male and female supervisors. The influence of this leadership style on the company’s operating performance is deemed as the pilot-test operating performance, i.e. a covariate in the research model. The company’s supervisors start to use the three different leadership styles post IPO so the operating performances during the first three years post IPO is the post-test operating performances, i.e. the only dependent variable in the research model.

This paper measures operating performances with financial metrics and job satisfaction of employees. The former data is sourced from Taiwan Economic Journal (TEJ) and the latter from the questionnaire survey.

Statistical Analytical Tools

(1) This paper uses Cronbach α coefficients to evaluate the reliability of the questionnaire and expert validity (a.k.a. content validity) to assess the validity of the questionnaire.

(2) Statistical Analytic Methods

This paper conducts a two-factor ANCOVA statistical study (with two independent variables, one dependent variable and one covariate variable). The two factors are the two independent variables, genders (a) and leadership styles (b). The covariate (c) is the pilot-test operating performances. The dependent variable (y) is the post-test operating performances. The research purposes are as follows: (1) to understand whether there are any significant interactions between leadership styles and supervisor genders concerning the influence of operating performances; (2) to examine whether male supervisors and female supervisors of the same leadership style report different influence on post-test operating performances (exclusive of pilot test operating performances); and (3) to investigate whether the three leadership styles by male supervisors and female supervisors have different levels of influence on
post-test operating performances (exclusive of pilot test operating performances). Before the covariance analysis, it is necessary to conduct a test on the coefficient homogeneity in order to ensure the appropriateness of the two-factor ANCOVA method. Meanwhile, if the F statistics in the covariance analysis turns out to be statistically significant, it is necessary to conduct an ex-post comparison on the basis of adjusted means to identify the pair with significant differences. Finally, in the choosing of the covariate, this paper takes into account the following three considerations: (1) it is only related to the dependent variable, not an experimental variable; (2) if the coefficient between any two covariates is above .08, only one of them is chosen as the covariate; and (3) a larger number of covariates should be used if the sample pool is small and vice versa. With a larger number of covariates, it is easier to control the moderating variable and ensure the accuracy of statistical tests (Bryman & Cramer, 1997; Wu, 2014).

### RESEARCH FINDINGS AND ANALYSIS

The Cronbach α coefficients for both the sections on leadership styles and operating performances are above 0.8, indicating good reliability of the questionnaire. As Table 1 shows, the expert questionnaire has sufficient content validity. The collation and analysis on Excel data suggests that there is significant interaction between leadership styles and genders in the influence over operating performances (Tables 2&3). According to Table 4, male supervisors exert greater influence than female supervisors on post-test operating performances in all the three leadership styles. Among male supervisors, transformational leadership (Leadership Style 1) exhibits greater influence on the post-test operating performances than transactional leadership (Leadership Style 2) and charismatic leadership (Leadership Style 3). Among female supervisors, transformational leadership (Leadership Style 1) has stronger influence on the post-test operating performance than transactional leadership (Leadership Style 2) and transactional leadership (Leadership Style 2) reports greater influence on the post-test operating performance than charismatic leadership (Leadership Style 3).

| Table 1: Reliability Analysis on Leadership Style and Operating Performance Sections of Questionnaire |
|--------------------------------------------------|---------------------------------|-----------------------------|
| Reliability analysis                             | Construct                      | Cronbach α coefficient     |
| Questionnaire on Leadership Styles and Operating Performances | Leadership Style | 0.851                      |
|                                                  | Financial Performance           | 0.863                      |
|                                                  | Job Satisfaction of Employees   | 0.812                      |
|                                                  | TOTAL MEASUREMENT               | 0.842                      |

<p>| Table 2: Adjusted Means                          |
|-----------------------------------------------|------------------|------------------|------------------|</p>
<table>
<thead>
<tr>
<th>Gender</th>
<th>Leadership Style</th>
<th>Leadership Style 1</th>
<th>Leadership Style 2</th>
<th>Leadership Style 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males (a1)</td>
<td>25.334</td>
<td>16.825</td>
<td>19.091</td>
<td></td>
</tr>
<tr>
<td>Females (a2)</td>
<td>23.835</td>
<td>20.076</td>
<td>12.339</td>
<td></td>
</tr>
</tbody>
</table>
Table 3: Covariance Analysis on Influence of Genders and Leadership Styles on Post-Test Operating Performances

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Eta Squared</th>
<th>Observed Power(a)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Covariate</td>
<td>189.500</td>
<td>1</td>
<td>189.500</td>
<td>34.455</td>
<td>.670</td>
<td>1.000</td>
</tr>
<tr>
<td>Gender</td>
<td>16.648</td>
<td>1</td>
<td>16.648</td>
<td>3.027</td>
<td>.151</td>
<td>.375</td>
</tr>
<tr>
<td>Leadership Style</td>
<td>322.439</td>
<td>2</td>
<td>161.220</td>
<td>29.313</td>
<td>.775</td>
<td>.1000</td>
</tr>
<tr>
<td>Interaction</td>
<td>98.473</td>
<td>2</td>
<td>49.237</td>
<td>8.952</td>
<td>.513</td>
<td>.942</td>
</tr>
<tr>
<td>Error</td>
<td>93.500</td>
<td>17</td>
<td>5.500</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*P<0.05  **P<0.01  ***P<0.001

Table 4: Simple Main Effects of Genders and Leadership Styles on Post-Test Operating Performances

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>Ex-post comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Factor (gender)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b1 (Leadership Style 1)</td>
<td>81.23</td>
<td>1</td>
<td>81.23</td>
<td>14.21***</td>
<td>Male &gt; female</td>
</tr>
<tr>
<td>b2 (Leadership Style 2)</td>
<td>83.31</td>
<td>1</td>
<td>83.31</td>
<td>15.23***</td>
<td>Male &gt; female</td>
</tr>
<tr>
<td>b3 (Leadership Style 3)</td>
<td>86.64</td>
<td>1</td>
<td>86.64</td>
<td>16.26***</td>
<td>Male &gt; female</td>
</tr>
<tr>
<td>B Factor (Leadership Style)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| a1 (males)          | 147.45 | 2   | 73.72 | 13.40*** | Leadership Style 1 > Leadership Style 2  
                      |       |     |      |      | Leadership Style 1 > Leadership Style 3 |
| a2 (females)        | 242.40 | 2   | 121.20 | 22.04*** | Leadership Style 1 > Leadership Style 3  
                      |       |     |      |      | Leadership Style 2 > Leadership Style 3 |
| Error               | 93.50  | 17  | 5.50  |      |                                     |

*P<0.05  **P<0.01  ***P<0.001

Tables 2, 3 and 4 suggest that all the three hypotheses are supported.

CONCLUSIONS AND SUGGESTIONS

Conclusions
Based on the above findings, this paper derives the following conclusions:
(1) There is significant interaction between leadership styles and supervisor genders concerning the influence of operating performances.
(2) Male supervisors exert greater influence than female supervisors on post-test operating performances in all the three leadership styles.
(3) Among male supervisors, transformational leadership (Leadership Style 1) exhibits greater influence on the post-test operating performances than transactional leadership (Leadership Style 2) and charismatic leadership (Leadership Style 3). Among female supervisors, transformational leadership (Leadership Style 1) has stronger influence on the post-test operating performance than transactional leadership (Leadership Style 2) and transactional leadership (Leadership Style 2) reports greater influence on the post-test operating performance than charismatic leadership (Leadership Style 3).

Research Limitations
This paper strives to accomplish all stages of research tasks as robust as possible but suffers from the following limitations:
(1) This paper employs convenience sampling. This generates a higher recovery rate of effective questions but may lead to sampling bias.
Due to research resources limitation, this paper only examines a listed semiconductor company in Taiwan, instead of all the listed semiconductor companies in Taiwan.

There is extensive literature in Taiwan and overseas addressing the research constructs in this paper. However, the adoption of the quasi-experiment method and the two-factor ANCOVA statistical study are an innovation by this paper.

**Suggestions to Follow-up Studies**

This paper conducts interviews with the supervisors and runs a survey on the entry-level employees of a listed semiconductor company in Taiwan. Future studies may expand the sample pool or examine different industries for comparisons and contrasts of the research results.

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