

# Total Quality Management (TQM) is the Lifeline of an Organization's Sustainable Development: Leadership is the Impetus to Change

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**Abstract:** *With the development of globalization, it is critical for organizations to deal with and balance the challenge of environmental complexity and internal resource scarcity. This study considers TQM as a factor linking the internal and external factors of an organization, and transformational leadership as the impetus to promote and coordinate these internal-external elements, so that the firm can obtain a sustainable competitive advantage. The research surveyed 228 samples and used Structural Equation Modelling (SEM) and discriminant analysis to examine the data. The results indicate that TQM positively affects transformational leadership and sustainable competitive advantage. Transformational leadership affects sustainable competitive advantage.*

**Keywords:** *Total Quality Management (TQM); Transformational Leadership (TL); Sustainable Competitive Advantage (SCA); Structural Equation Modelling (SEM).*

## 1. INTRODUCTION

Total quality management (TQM) is a widespread managerial philosophy, and TQM system uses the IPO (Input-Processing-Output) concept model to show the relationships between the factors in a TQM system and the participants (Wang et al., 2012). TQM-linked practice helps enhance an organization's sustainable competitive advantage by enhancing its managerial competencies (Webley & Cartwright, 1996). TQM focuses on continuous process improvement (Chang, 2005), and the real contributors to the successful implementation requires up port from the highest levels of management (Doeleman et al., 2012; Jaca & Psomas, 2015)

However, previous studies mostly focused on the critical dimensions of TQM and their effects on organizational performance (Wiele et al, 2000; Talib et al, 2010), and the conclusions of these studies remained paradoxical and in

conflict, with most such works being static studies which also limited their reliability.

According to the complex resource-based view (Complex-RBV theory) (Colbert, 2004), external environmental factors and internal resources, together constitute the two aspects of an organization's sustainable competitive advantage. The complexity of external environment provides opportunities and threats, and internal resources provide the foundation for timely responses to these. The match between these two ultimately determines the competitiveness of the organization and its sustainability (Akemi, 2013).

Complexity describes systematic relationships that are both independent and interdependent (Colbert, 2004). The RBV (Resource-Based View) is an approach to obtaining competitive advantages that emerged in 1980s and 1990s (Prahalad and Hamel, 1990; Barney, 1991). Complex-RBV links the external and internal elements of organization and focuses on the complex processes that build system-level resources over time. Management actions based on this complexity can influence the organizational system and help it to build and leverage strategic resources (Dóci & Hofmans, 2015).

Transformational leadership is the most important part of human resources, and it should lead to continuous improvements to the organization so that it can obtain a truly sustainable competitive advantage (Dóci & Hofmans, 2015). Top management thus needs transformational leadership skills in any TQM implementation (Richard, 2000).

This paper considers that the appropriate application and practice of strategic resources in relation to TQM can bring a real sustainable competitive advantage, and that transformational leadership is at the heart of successful TQM implementation.

The purpose of this study is to examine two issues: (1) the relationships among TQM, transformational leadership and sustainable competitive advantage; (2) whether transformational leadership fosters sustainable competitive advantage.

## **2. LITERATURE REVIEW**

### **2.1 TQM factors and results in relation to C-RBV theory**

The factors of TQM can be subdivided into two groups (Black & Porter, 1996; Arturo et al, 2014). One group are external factors (soft aspects), such as internal/external cooperation, customer focus, employee fulfillment, and learning. The other aspect refers to the internal elements of the design, implementation and improvement of a managerial system (technical factors or hard aspects), such as process management and continuous improvement.

The complex-RBV was first put forward by Barry Colbert, Elizabeth Kurucz and David Wheeler in 2004. Based on this theory, managing sustainability depends critically on building internal capacity and strategic resources with respect to managing organizational connectivity, commitment, culture and capabilities. The internal paradox of the RBV rests in the contention that in order to shield resources from scrutiny and imitation by competitors, and thereby protect and sustain a competitive advantage, the nature and composition of the resource must remain

causally ambiguous, to the degree that its origins may remain a mystery – even to the firm possessing it (Colbert et al, 2005). This logical conundrum was resolved by the extension of the RBV by employing concepts from the science of complexity, and thus combining living systems principles and the concept of the sustainable organization (Colbert et al, 2005).

A large number of recent studies focus on the critical dimensions of the TQM and their impacts on organizational performance (Wiele et al, 2000; Talib et al, 2010). But the conclusions of these works remain paradoxical and in conflict, and most are static studies, which also limits their reliability. In this sense, C-RBV theoretical model supports dynamic research into TQM, and covers both the related internal and external factors.

## **2.2 Total quality management (TQM) and sustainable competitive advantage**

### *2-2-1 Total quality management (TQM)*

The idea of Total Quality Management (TQM) grew out of the early 1980's in the USA (Khanam et al., 2016). It is a pity that the USA rejected its principles and the Japanese adopted the philosophy under the guidance of W. Edward Deming (Suby et al., 2013). According to Deming, TQM is a management philosophy that makes use of a particular set of principles, practices and techniques to expand business and profits that provides a change to enhance productivity by avoiding rework, rejects, waste, customer complaints and high costs. TQM has been constantly enriched and developed based on the work of many researchers.

TQM is composed of three terms of Total, Quality and Management (Witcher, 1990), and is the art of managing the whole company to achieve the excellence (Dale, 2015; Carol & Glen, 2003).

Sashkin and Kiser (1993), Gaither (1996) and Dean and Bowen (1994) considered TQM as a philosophy or an approach to management, characterized by principles, practices, and techniques, and also defined it as an organization-wide philosophy requiring all employees at every level to focus their efforts to help improve each business activity of the organization (Sirias et al, 2001).

Some scholars give definitions of TQM from the perspective of mechanisms and outcomes. For example, Wiele et al. (2000) and Talib et al. (2011) defined TQM as the fulfillment of customer needs and the continuous improvements in quality, making it the responsibility of every employee.

This review shows that different approach to TQM have led to various definitions of the term. In general terms, TQM is a way to enhance the traditional way of doing business. It can be a managerial philosophy (Sureshchandar et al., 2001), an organizational perception and culture (Michael et al., 1997), a technique and working mechanism (Dean & Bowen 1994), and also a process, practice (Kanji and Wallace 2000) and outcome (Wiele, Dale & Williams 2000; Talib, Rahman & Qureshi, 2011).

### *2-2-2 Sustainable competitive advantage (SCA)*

According to Wade and Hulland (2004), the concept of competitive advantage is rooted in the logic of value creation and distribution. Sustainability has traditionally been defined as a condition in which a "firm's competitive

advantage resists erosion by competitor behavior" (Porter,1985). In Porter's view, strategic management should be concerned with building and sustaining competitive advantage.

Supporters of the RBV of the firm(Barney, 1991) originally introduced the notion of inability to replicate to this context, saying that a competitive advantage is sustained only if it continues to exist after efforts to duplicate that advantage have ceased. More recent definitions of the construct recognized that sustained competitive advantage accrued when competitors faced significant challenges in acquiring, developing, and using the resources underlying the value creating strategy" (Ross et al. 1996).

Ten Have et al. (2003) examined why large, complex organizations were capable of excellence over the long-term, and formulated four guiding concepts as the basis for a distinctive approach to organizing a firm (Doelemana et al.,2012).

These earlier studies show that competitive advantage is the ability to stay ahead of present or potential competition. They also show that the resources held by a firm and the business strategy it adopts will have a profound impact on the ability to obtain and sustain a competitive advantage.

TQM has become the critical tool when firms pursue a competitive advantage (Sureshchandar et al., 2001). TQM focuses on continuous process improvement (Wang et al., 2012) and is a proven technique to guarantee survival competitive markets.

The creation of knowledge through TQM-linked activities helps the deployment of distinctive competencies at the heart of the organization (Belen &Tena, 2001).Therefore, this study suggests that TQM has a positive effect on a firm's sustainable competitive advantage, and thus the following hypothesis is proposed.

*H<sub>1</sub>*: Total quality management (TQM) positively relates to sustainable competitive advantage (SCA).

### **2.3 Transformational leadership(TL)**

Continuous improvement of products and processes is a core theme in the TQM literature, which stresses on the ongoing monitoring of potential problems, studying work processes, and the development of employees to better deal with any problems that arise (Michael et al., 1997; Sirias et al, 2001). TQM activities stimulate the emergence of transformational leadership(Huang et al, 2005).

Transformational leadership is a different leadership style to transactional leadership (Doci & Hofmans, 2015). Transformational leadership emphasizes the symbolic behavior of a leader (e.g., inspirational, visionary messages and values), as opposed to the economic transactions between the leader and employees (Avolio, 1999; Judge & Piccolo, 2004).

Transformational leaders focus employee attention on the long-term goals of the group or organization, and instill a sense of higher purpose in them (Bono & Judge, 2003; Dvir et al., 2002).To date, research on transformational leadership has, to a certain extent, focused on the beneficial consequences in relations to employees, including improved well-being, self-efficacy, creativity, job satisfaction, reduced burnout, emotional exhaustion, and stress (for a review, see Doci et al.,2015).

Transformational leadership also generates competitive advantages for an organization as a whole, as it boosts job performance and organizational success (Tsai et al., 2009; Waldman et al., 2004; Walumbwa et al., 2008) and improves branch-level financial performance and sales results (Barling et al., 1996). In summary, transformational leadership is widely considered to be an effective strategy for managing the changing environment faced by modern organizations.

Much attention has paid to the conditions or contexts under which transformational leadership behaviors improve work outcomes (Doci & Hofmans, 2015). Transformational leadership is a type of leadership style that can inspire positive changes in employees, and Bass (1998) found that transformational leadership was particularly powerful and could help move followers beyond what was expected. Transformational leadership, used for predicting leadership effectiveness in individual, group, and organization levels, also has positive effects on leadership effectiveness and performance (Hur, Berg & Wilderom, 2011). Transformational leaders can strongly influence the team environment, and encourage subordinates to work for the common goal by changing their attitudes and values (Bass, Jung, & Berson, 2003). Moving to transformational leadership is thus trend in businesses around the (Burns, 2003).

Anupam Das (2010) made an analysis of three applications of TQM in the government sector, and showed the importance of leadership. TQM requires a special type of leadership (Zairi, 1994). Leadership in the context of TQM is not about power, authority and control, but is more about empowerment, recognition, coaching and developing others so that they can satisfy customers and build a strong competitive advantage. One element of transformational leadership which may be especially applicable to TQM is intellectual stimulation (Bass, 1985).

At the organizational level, TQM practice, as a part of organizational culture (Sharma, 2006), shaped the TQM-oriented organizational culture and promotes organizational change, and this a change in leadership style. In line with this analysis, the next hypothesis is put forward:

*H<sub>2</sub>*: Total quality management (TQM) positively relates to transformational leadership (TL).

Several studies have identified leadership as a promoter of TQM, and noted that leadership is crucial to the success of any effort toward changing the operational philosophy of a company (Sumukadas, 2006). Without leadership from the top management, the behavior of the employees is unlikely to change. The influence of top management leadership has an effect on other quality attributes. According to the research findings of Anupam Das (2010), it is necessary for top management to perform as leaders when implementing TQM.

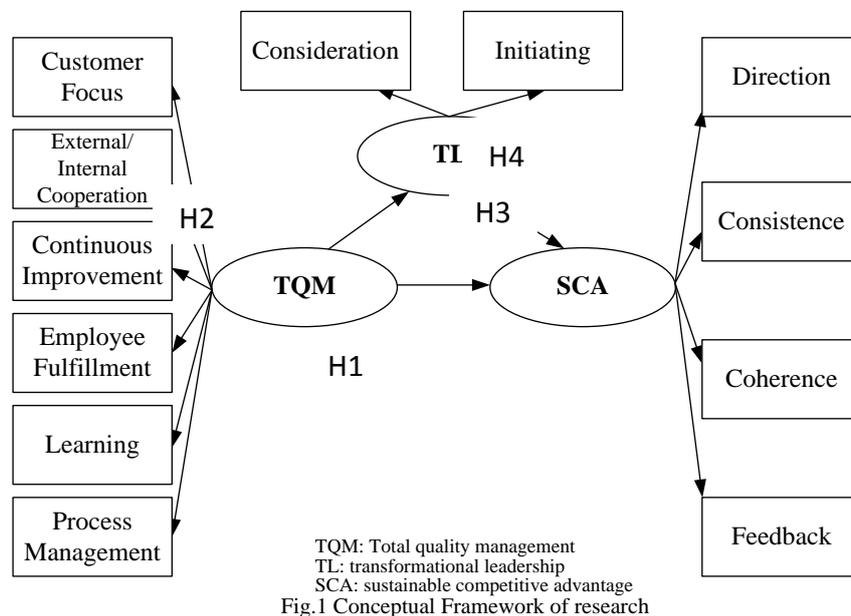
Empirical studies have also shown a significantly positive relationship between transformational leadership and efficiency. Walter and Bruch (2010) showed that at the organizational level, transformational leadership behaviors create a transformational leadership climate and that this can encourage positive behaviors among staff. Transformational leadership has been identified as an important catalyst to encourage change, providing an inspiring vision that can lead to better outcomes (Tichy & Devanna, 1986). It can thus be seen that transformational

leadership greatly affects organizational outcomes. In practice, Ashkanasy et al. (2000) argued that transformational leaders possessed special qualities, including the ability to communicate enthusiasm and vision, a positive outlook, intuitive insight, and emotional competency (Psyc INFO, Database Record (c) 2016 APA).

TQM-linked activity helps the deployment of distinctive competencies (Ana et al., 2001). Superior performance outcomes and superiority in production resources can be reflected in a competitive advantage (Day and Wesley, 1988). TQM implementation means management commitment, ability to change, continuous training and education, use of empowerment and teamwork, and giving adequate attention to internal and external customers (Bester field, 2003). Transformational leaders are able to inspire the followers to change their expectations, perceptions, and motivations, and thus to work towards common goals. Successfully implemented strategies will help a firm to achieve superior performance (Passemaid & Calantone, 2000; Reed & Fillippi, 1990). It is thus suggested that transformational leadership can promote sustainable performance via TQM, and strengthen the effects of the TQM on organizational outcomes. Therefore, if a transformational leader adopts TQM, employees will become stimulated and carry out more effective activities. As a result, TQM exists as a mediating variable between transformational leadership and sustainable competitive advantage. Therefore, the following hypotheses are proposed in this study.

*H<sub>3</sub>*: Transformational leadership positively relates to sustainable competitive advantage.

Figure 1 presents the conceptual framework of this research, and depicts the main research stream of this study.



### 3. METHODOLOGY

#### 3.1. Questionnaire development and pilot test

Testing above hypotheses requires data on TQM, transformational leadership and sustainable competitive advantage. The main method employed in this study is a survey research using multiple items. The authors firstly

meet several times with scholars, experts and managers to analyze and determine what should be included to reflect the existing constructs in the survey. These activities were based on three principles. First, the questions should reflect the features necessary for organization and be easily understood by the respondents. Second, the questions should help organizations outperform their competitors and obtain sustainable competitive advantages in a changing and complex marketplace. Third, the survey should be as concise as possible. Based on the above principles, three questionnaires were selected from Wang (2012), Kathleen L. McFadden (2009), and H.J. Doeleman (2012), and the items adapted to meet the needs of this study. Table 1 lists the constructs, definitions and sources of scales used in this work.

The questionnaire was first written in English edition. However, since the survey was conducted in Chinese, managers and academics were invited to examine the translation, with back-translation being adopted to ensure consistency.

**Table 1:** *Construct measurement*

<b>Construct</b>	<b>Construct definition</b>	<b>Construct source</b>
Total quality management	The organization adopts customer focus, internal/external cooperation, continuous improvement, employee fulfillment, learning and process management.	Wang, C. H. (2012)
Transformational leadership	Leaders have the sense of mission, vision, optimism and enthusiasm, emphasize implementation, and show the considerate and initiating behavior.	Kathleen L. McFadden (2009)
Sustainable competitive	The organization wins the best condition in direction, advantage consistency, coherence and feedback.	H.J. Doeleman (2012)

required to respond appropriately and at last the final draft of the questionnaire was also examined to ensure that it would be understood by the respondents,

The survey was then pilot-tested with 100 employees at all levels of a firm to find any possible problems. The results showed that all the variables had reliabilities exceeding the standard value of 0.7, suggested by Hair et al. (1998), and one item that did not significantly contribute to the reliability was eliminated.

The formal questionnaire assessed TQM with six sub-dimensions and 19 items, transformational leadership with two sub-dimensions and eight items, and sustainable competitive advantage with four sub-dimensions and 11 items. The questionnaire had a total of 38 items, as shown in Appendix A. Items were measured on a seven-point Likert-type scale, ranging from strongly disagree to strongly agree.

### **3.2. Sample and data collection**

The samples used in this study were collected from Southern Taiwan Science Park in Tainan City. All 132 respondents were all working for manufacturers. Since the numbers of computer peripheral and other industry manufacturers were too low (See Table 2), this study focused on five industries, namely, integrated circuits, communications, photo voltaics, the precision machinery, and biotech, with a total of 129 respondents. A total of 10 copies of the questionnaire were sent to each vendor, with a total of 400 in all, and 47 responses were obtained from

integrated circuit firms, 34 from the communications industry, 112 from the optoelectronic industry, 99 from the precision machinery industry, and 105 from biotech industry (see Table 2).

**Table 2:** *Distribution of samples*

Total No.	Division				
	Integrated circuits	Communications industry	Photovoltaic industry	Precision machinery	Biotech industry
Vendors:129	15	11	36	32	34
Respondents: 400	47	34	112	99	105

The questionnaires are sent to the Tainan Technology Industrial Park Service Center and at the same time a sampling plan is provided. Personalized cover letters and a pre-paid envelope accompanying the questionnaire ensured confidentiality of the responses. Furthermore, to encourage high participation, respondents are offered an executive summary of the study findings on the completion of the research. The effective sample size is 228, and the overall response rate was 57% (228/400). The sample size of 228 is adequate for models with three constructs, following the recommendations of Hair et al. (2006).

In any types of survey research, non-response bias should be tested. This study adopts the approach used by Armstrong and Overton (1977) for non-response bias in mail surveys and assuming non-respondents to be late respondents. The data set is divided into two parts according to the number of days from initial mailing until receipt of the returned questionnaire. Early respondents are compared with late respondents in terms of the questionnaire items contained in each scales, and the t-test procedure indicates no significant differences between the early and the late respondent groups, showing that non-response bias is not a problem and does not influence the study findings.

## 4. RESULTS AND ANALYSIS

### 4.1. Reliability and validity analyses

Two-step structural equation modeling is employed for model testing. Maximum likelihood is used for all parameter estimates using Amos21. First confirmatory factor analysis (CFA) was conducted to evaluate the model used to measure the modeled constructs. CFA enables testing of the reliability, convergent validity and discriminate validity of the measurement model. The reliability and internal validity of the measurement model were examined by calculating the composite reliability (CR) and average variance extracted (AVE).

Table 3 shows that all the constructs have acceptable composite reliability coefficients, since they exceed 0.6 (Bagozzi & Yi, 1988; Hair et al., 1998). The AVE of each measure accounts for more than 50% of the variance, as suggested by Bagozzi and Yi (1988), and indicates that the variance captured by the construct exceeds that due to the measurement error (Fornell & Larcker, 1981). Therefore, the measurement model has adequate internal validity.

**Table 3: Construct reliability and convergent validity**

Construct	Number of items	SFL <sup>a</sup> (min-max)	t-Value <sup>a</sup> (min-max)	$\alpha^a$	CR <sup>a</sup>	AVE <sup>a</sup>
Total quality management (2nd order CFA)	6	0.62-0.93	15.71-21.45	0.96	0.93	0.69
Customer focus (TQM1)	3	0.76-0.88	22.58-30.29	0.85	0.86	0.66
Internal/external cooperation (TQM2)	2	0.81-0.90	12.10-18.29	0.84	0.83	0.72
Continuous improvement (TQM3)	3	0.77-0.86	14.70-22.71	0.86	0.86	0.67
Employee fulfillment (TQM4)	3	0.76-0.81	116.49-17.63	0.83	0.83	0.61
Learning (TQM5)	4	0.83-0.86	17.05-19.47	0.90	0.90	0.72
Process management (TQM6)	4	0.75-0.87	20.58-27.81	0.89	0.89	0.66
Transformational leadership (2nd order CFA)	2	0.91-0.93	15.58-19.74	0.95	0.92	0.85
Consideration (TL1)	3	0.81-0.91	15.49-16.75	0.89	0.89	0.73
Initiating (TL2)	5	0.83-0.88	19.31-23.44	0.93	0.93	0.74
Sustainable competitive advantage (2nd order CFA)	4	0.89-0.93	14.98-17.19	0.97	0.95	0.84
Direction (SCA1)	2	0.87-0.91	17.04-17.21	0.88	0.88	0.79
Consistency (SCA2)	2	0.89-0.90	18.55-20.14	0.89	0.89	0.80
Coherence (SCA3)	4	0.82-0.90	16.72-20.24	0.91	0.92	0.74
Feedback (SCA4)	3	0.86-0.91	14.49-20.29	0.91	0.92	0.79

a SFL, standardized factor loading;  $\alpha$ , Cronbach's  $\alpha$  coefficient; CR, composite reliability; AVE, average variance extracted

Convergent validity measures the correlation between two observed variables to measure the same construct, and is expected when the estimated pattern coefficient on the underlying construct factor of the estimated pattern of each coefficient is significant. All the items have factor loadings exceeding 0.45 (Jöreskog & Sörbom, 1996). Table 3 lists the convergent validity results for each latent variable. The standardized factor loadings of each sub-dimension all exceed 0.45 and are significant. Convergent validity was thus achieved for all the study constructs. Discriminant validity was assessed using the approach suggested by Fornell and Larcker (1981). Examining the AVE for each of the latent constructs and comparing this with the squared correlations among the constructs revealed that the shared variance among any two constructs (that is, the square of their inter-correlation) was always less than the average variance explained by the construct, suggesting discriminant validity. Table 4 lists the discriminant validity result. This study found that all the measures exhibit construct validity. Based on the reliability and validity analyses, the construct scale appears to exhibit satisfactory measurement qualities and is thus adequate.

**Table 4: Discriminate validity coefficient<sup>a</sup>**

	TQM1	TQM2	TQM3	TQM4	TQM5	TQM6	TL1	TL2	SCA1	SCA2	SCA3	SCA4
TQM1	<b>0.82</b>											
TQM2	0.56**	<b>0.85</b>										
TQM3	0.57**	0.80**	<b>0.85</b>									
TQM4	0.52**	0.72**	0.77**	<b>0.78</b>								
TQM5	0.54**	0.78**	0.81**	0.82**	<b>0.84</b>							

TQM6	0.55**	0.64**	0.72**	0.65**	0.76**	<b>0.81</b>						
TL1	0.51**	0.71**	0.72**	0.71**	0.76**	0.66**	<b>0.86</b>					
TL2	0.59**	0.69**	0.76**	0.72**	0.77**	0.74**	0.84**	<b>0.86</b>				
SCA1	0.48**	0.65**	0.69**	0.66**	0.75**	0.71**	0.75**	0.76**	<b>0.89</b>			
SCA2	0.53**	0.67**	0.72**	0.68**	0.79**	0.72**	0.80**	0.80**	0.89**	<b>0.90</b>		
SCA3	0.58**	0.69**	0.74**	0.74**	0.80**	0.73**	0.77**	0.83**	0.83**	0.84**	<b>0.86</b>	
SCA4	0.50**	0.67**	0.72**	0.74**	0.77**	0.63**	0.75**	0.76**	0.80**	0.80**	0.85**	<b>0.89</b>

a Diagonal elements (bold) are the square root of average variance extracted (AVE) between the constructs and their measures. Off-diagonal elements are correlations between constructs.

**4.2. Structural model and hypotheses testing**

4.2.1 Structural model testing

The simultaneous maximum-likelihood-estimation procedures are used for examining the hypothesized relationships among TQM, transformational leadership and sustainable competitive advantage. Figure 2 and Table 5 show that the structural model exhibits a better fit with the data, with the fit indices of Root Mean Square Error of Approximation (RMSEA), Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), and Comparative Fit Index(CFI) mostly meeting the respective benchmarks(Bagozzi & Yi,1988;Hair et al.,1998).

4.2.2 Hypotheses testing

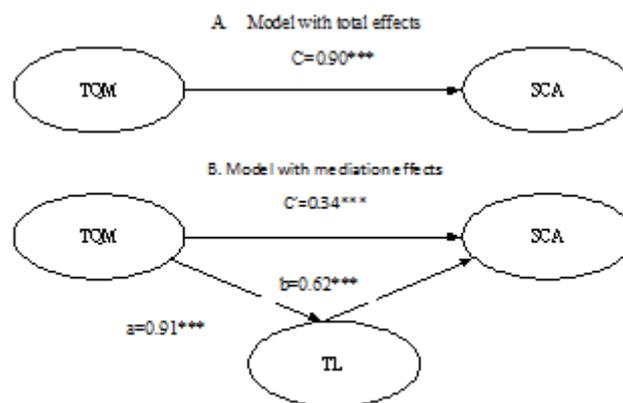


Fig 2: Path diagram of the research and structural model

Fig 2: Path diagram of the research and structural model.

Note: \* $p < 0.05$ , \*\*\* $p < 0.001$

**Table 5: Testing indicators of the model**

Test statistic		Standard values	Test Result	Model fit(Y/N)
Absolute Fitness Index	$\chi^2$	$P \geq \alpha$ value	150.341	N
	$\chi^2/df$	1~5	2.95	Y
	GFI	>0.9	0.91	Y
	AGFI	>0.9	0.850	N

	RMR	<0.08	0.021	Y
	RMSEA	<0.08	0.093	N
Baseline Comparison	NFI	>0.9	0.952	Y
	CFI	>0.9	0.967	Y
	RFI	>0.9	0.938	Y
	IFI	>0.9	0.968	Y
Parsimony-Adjusted Measures	PNFI	>0.5	0.736	Y
	PGFI	>0.5	0.585	Y

Figure 2 and Table 6 show the path coefficients for the model and their significance. Regarding the hypotheses tests, all of the hypothesized relationships are supported for the estimated structural model.

TQM significantly and positively affects both sustainable competitive advantage (path coefficient TQM to SCA = 0.34) and transformational leadership (path coefficient TQM to TL = 0.91). Furthermore, transformational leadership also significantly and positively affects sustainable competitive advantage path coefficient TL to SCA = 0.62). Therefore, H1, H2 and H3 are supported.

**Table 6:** Path coefficient testing

Hypothesis	Path	Hypothesis relation	Path value	Y/N
H1	TQM→SCA	Positive	0.34	Y(Supported)
H2	TQM→TL	Positive	0.91	Y(Supported)
H3	TL→SCA	Positive	0.62	Y(Supported)

## 5. DISCUSSION, CONCLUSIONS, IMPLICATIONS AND LIMITATIONS

### 5.1. Discussion and conclusions

The present study investigates the relations among TQM, transformational leadership and organizational sustainable competitive advantage. The results indicate that TQM-linked activity should have significant effects on organizational sustainable competitive advantage when transformational leadership actions are adopted. Based on a review of the literature, this study proposed H1–H3 and the analytical results support all of the hypotheses. Specially, the results show the following conclusions.

First, TQM positively affects organizational sustainable competitive advantage (Sureshchandar et al., 2001; Wang et al., 2012; Ana et al., 2001; Lietal., 2007) among manufacturers based at Tainan Industrial Park. This may be because TQM-linked factors, such as internal/external cooperation, which improves the organizational business environment, reduce the complexity of the business context (Reed<sup>a</sup>, 2000); or employee fulfillment and learning play critical roles in building a link between an organization’s quality management strategy and its ability to create and maintain a competitive advantage (Kimmerling, 1993; Reed, 2000).

Second, while many studies describe how transformational leadership affects TQM, few consider how TQM influences transformational leadership. This study finds that TQM has positive effects on transformational

leadership (direct effect coefficient/path coefficient=0.91). These results are consistent with those obtained by Puffer and McCarthy (1996) who stress that the top management's ability to create a vision and promote change is at the heart of a successful TQM implementation.

Third, transformational leadership fosters an organization's sustainable competitive advantage. This means that when an organization has adopted TQM it must also adopt a transformational leadership. That is to say, strategy decides structure, and structure follows strategy. Then, when the TQM strategy and transformational leadership are combined, employees will be more motivated and proactive, while the organization will have a clear goal that is easier to achieve in practice. Finally, due to the emphasis on continuous improvement, the quality of management activities will also be improved, and thus the organization can be optimized and maintain its competitive advantage.

### **5.2. Managerial practice implications**

First, TQM positively affects an organization's sustainable competitive advantage. TQM organizations can achieve a sustainable competitive advantage via customer focus, internal/external cooperation, continuous improvement, employee fulfillment, learning and process management. The results of this study also show that manufacturers at Tainan Industrial Park work to identify the areas of TQM in which they invest, and the areas requiring improvement. However, the degree to implement the basic elements of TQM influences business performance (Powell, 1995). In this study, elements of TQM, such as continuous improvement (factor loading=0.92), employee fulfillment (factor loading=0.90) and learning (factor loading=0.94) are most important for a firm's TQM practice. Manufacturers must effectively reinforce these elements, such as by creating a strong learning atmosphere, providing enough incentives and opportunities for employees to learn and strengthening system management and innovation.

Second, transformational leadership fosters firm sustainable competitive advantage. Manufacturers in Tainan Industrial Park area aware that changes in leadership style and activities are important for organizational excellence. Manufacturers must thus shape positive values; advocate optimism and enthusiasm, strengthen the work vision, mission and confidence of employees.

Third, TQM identifiably affects transformational leadership TQM means transforming the traditional managerial style, including leadership style, and thus managers must work to change proactively, keeping a balance between initiating and consideration.

### **5.3. Research limitations and future research directions**

This study has the following limitations. First, the questionnaire in this study is translated from English and used in a Chinese context. Although the contents of the questionnaire are modified based on this, the main structure is retained. Future studies may thus create scales based on Chinese culture.

Secondly, the data are collected from one scientific industrial park in Tainan, which limits the generalizability of the results. Future studies may enlarge the sample in order to strengthen the generalizability of the conclusions.

Thirdly, this study is based on cross-sectional data, and thus this work did not examine if TQM or transformational

leadership positively affects long-term organizational sustainable competitive advantage. A major gap exists in the related literature with regard to longitudinal studies. This study thus suggests that subsequent researchers perform longitudinal studies based on long-term observations or interviews regarding actual implementations to provide further insights regarding probable causations in this context.

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