

Continuous Improvement in an Emerging Market: Findings from Vietnam

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This study investigates the factors underpinning continuous improvement (CI) effectiveness in Vietnam. Based on survey data collected from 490 participants plus interviews and discussions with 130 business professionals with extensive knowledge of Vietnam, it identifies top management commitment as a major factor critical to the success of CI in that country. In addition, the paper highlights change agent participation as well as management and employee development as critical in facilitating CI practices in Vietnamese companies. Reward systems – though common in Vietnam – did not affect CI outcomes in the study. The reasons for this apparent anomaly need further research.

Keywords: Continuous Improvement, Quality Management, Vietnamese Management, Emerging Market Economy

JEL Classification: M1, L100

I. Introduction

Since the new millennium, Southeast Asia has had some of the fastest growing economies in the world. Among them Vietnam generated an impressive 7 per cent average growth rate between 2002-2010, and has had over 5 per cent growth every year since 2011 (Wilson, 2014). This notable growth accrues from the advantages the country offers to foreign investors. They include a young and vibrant workforce, a domestic market of over 93 million consumers, and low-cost production sites. But as Vietnam is being transformed from one of the world's poorest nations to a middle-income country, its business organizations struggle to win out against Southeast Asian economies with even lower wages while at the same time making headway against high-skill, productivity-driven growth industries in advanced economies (Berliner *et al.*, 2013). The challenge Vietnamese businesses face is to move up the production value-chain rather than lingering at the bottom as mere providers of low-cost labor.

One major route upwards is the adoption of continuous improvement (CI) practices. Broadly defined as a set of principles and activities aimed at raising the level of organization-wide performance through ongoing, systematic, and cumulative improvements (Bessant and Caffyn, 1997; Lillrank *et al.*, 2001), CI has already created tremendous value and driven competitive advantage in many companies around the world. Having long proven their worth and becoming well-established in the U.S., Japan, and Europe, CI practices have recently taken root in developing Asian countries (see, e.g., Giroud, 2007; Sohal *et al.*, 1989; Yeung *et al.*, 2005). The experience there suggests that the adoption and skillful management of CI by Vietnamese organizations will

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be critical to their future success in avoiding the twin economic threats from lower-cost firms in newly developing nations and competitive improvement-oriented companies elsewhere. As Philip Crosby has noted, "Nothing is more important to the prosperity of a developing nation than quality" (Djerdjour and Patel, 2000, p. 25).

The study reported here investigated the management of CI in Vietnam with the aim of examining the factors that led to its effectiveness. The research and its analysis are based on 490 questionnaires of managers, supervisors, and employees plus interviews and discussions with 130 executives, managers, and individuals who have extensive knowledge of the country.

II. Literature Review

CI comprises approaches such as quality control circles, total quality management (TQM), and six sigma, as well as productivity improvement mechanisms such as lean and employee idea systems. CI practices have been fundamental to building and sustaining competitive advantage (Garvin, 1987), improving product and service quality (Nair, 2006; Naveh and Erez, 2004; Rungtusanatham, 2001; Schroeder *et al.*, 2005), and enhancing operational performance (Anderson *et al.*, 1995; Choi and Eboch, 1998; Dow *et al.*, 1999; Samson and Terziovski, 1999).

The literature review identified a number of frameworks established by eminent researchers in quality and CI. Saraph *et al.* (1989) developed an instrument to measure critical constructs of quality management: role of management leadership and quality policy, role of the quality department, training, product/service design, supplier quality management, process management, quality data and reporting, and employee relations. Building on Saraph *et al.*'s (1989) work, Flynn *et al.* (1994) identified seven dimensions of quality management including top management support, quality information, process management, product design, work force management, supplier involvement, and customer involvement. Ahire *et al.* (1996) determined that quality management can be viewed as a combination of top management commitment, customer focus, supplier quality management, design quality management, benchmarking, statistical process control usage, internal quality information usage, employee empowerment, employee involvement, employee training, product quality, and supplier performance. These three studies provided a strong composite set of constructs and associated scales for further research in quality and CI.

Building on prominent studies (Ahire *et al.*, 1996; Benson *et al.*, 1991; Black and Porter, 1996; Flynn *et al.*, 1994; Saraph *et al.*, 1989), Jain and Tabak (2002) elicited a common set of quality constructs that represents an integrated and holistic approach to TQM in India. They found significant differences in perceptions of TQM implementation across managerial levels in Indian firms (Jain and Tabak, 2002). While top and middle managers focused on employee training, employee empowerment and relations, and teamwork, junior managers perceived that top management commitment was the most important element in successful implementations.

Based on these same studies (e.g., Ahire *et al.*, 1996; Benson *et al.*, 1991; Black and Porter, 1996; Flynn *et al.*, 1994; Saraph *et al.*, 1989), Brah *et al.* (2000) determined eleven constructs of TQM implementation in service firms in Singapore. The authors suggest that while customer focus and quality improvement rewards can be attributed to some TQM tools, the key to TQM success lies in top management support, employee empowerment, and employee involvement (Brah *et al.*, 2000). Similarly, Sohail and Hoong (2003) investigated six constructs of TQM implementation used in Malaysia and identified customer management and satisfaction as most important to the

success of TQM in ISO 9000-registered firms and strategy planning as critical to non-registered firms (Sohail and Hoong, 2003).

From self-assessment programs including the European Business Model of Excellence, the Malcolm Baldrige National Quality Award (MBNQA), the Asia-Pacific Business Excellence Standard, and the Vietnam Quality Award, Hoang *et al.* (2006) identified eleven factors to measure the implementation of TQM and its relationship to innovation in Vietnam. They concluded that top management commitment, employee involvement, employee empowerment, process management, and an open, trusting organizational culture positively impacted innovation performance in the Vietnamese companies they surveyed (Hoang *et al.*, 2006).

The frameworks developed by Saraph *et al.* (1989) and MBNQA (Steeple, 1993) led Rao *et al.* (1997) to identify eight constructs of quality, which they used to compare quality management practices in China, India, and Mexico. The authors found that irrespective of the country and length of the organization's quality experience, top management support is a significant factor influencing strategic quality planning, human resource development, supplier quality, quality results, and customer orientation practices (Rao *et al.*, 1997).

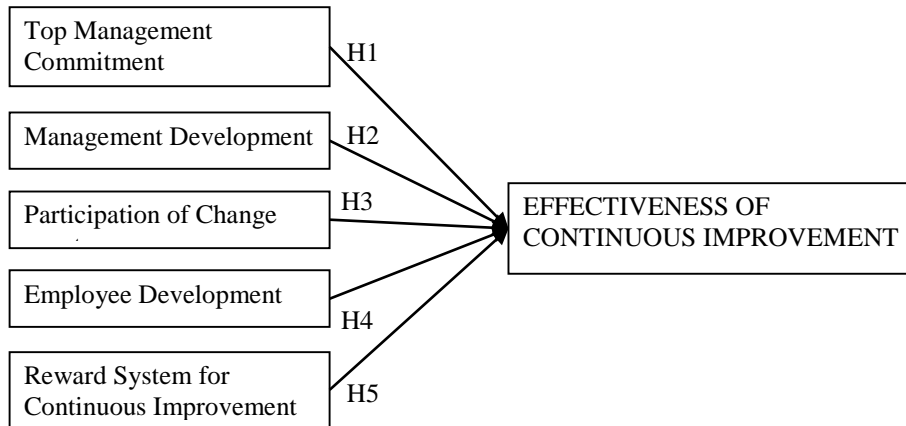
These researchers have emphasized somewhat different sets of organizational requirements for effective CI depending on the context in which they worked; however, all agree on people-based requirements: top management (e.g., commitment, support), employees (e.g., education, training, involvement, empowerment, relations), and customers (e.g., focus, orientation, involvement, satisfaction). The research suggests that a people-related subset of critical factors promoting CI effectiveness holds across cultures.

The analyses of CI effectiveness reviewed above served as the theoretical foundation for the research model in this study, while interviews and discussions with 130 business, management, and cultural experts in Vietnam helped to narrow the focus of the study in order to identify the factors most relevant to this country.

This study proposes a theoretical framework to explain CI in Vietnam (see Figure 1). The premise of this framework is that top management commitment is necessary for CI effectiveness. Deming (1986), Juran (1986), and Garvin (1983) have stressed the importance of senior management commitment in achieving high levels of CI and quality performance. The study divided human resource development into two factors: management development and employee development. Management development – for supervisors as well as for managers at all levels – is highly important for CI implementation and equally for sustainability (Jørgensen *et al.*, 2007). Researchers (Gryna, 1991; Leonard and Sasser, 1982; Steeples, 1993) have found that in addition to forming a solid base for CI, education and training – if consistently updated and reinforced – give employees the knowledge, information, and skills to meet their overall work and personal objectives. In addition, the study included a factor only occasionally recognized in the literature: the participation of change agents or steering committees to lead and facilitate CI initiatives. Striving to implement and maintain high levels of CI depends not only on developing managers, but also on forming a multilevel steering committee or guiding coalition with interlinked memberships to coordinate the direction of CI initiatives (Anand *et al.*, 2009; Goetsch and Davis, 1995; Kotter, 1995). Huang and Lin (2002) found that quality steering teams in Taiwanese companies played a critical role in planning, directing, and managing the implementation of TQM. Sohal *et al.*'s study (1989) indicated that steering committees, composed of senior managers from each functional group, ensured a strong backing for total quality control programs. Success depends also on the extent of the reward system for continuous improvement. Rewards help rally

employees' commitment and participation in CI, provide momentum and enthusiasm for CI initiatives, and positively affect a firm's performance (Crosby, 1979; Dale, 2003).

Figure 1: Research Framework of Continuous Improvement



The hypotheses are as follow:

H1: The level of top management commitment is positively associated with CI effectiveness.

H2: The level of management development is positively associated with CI effectiveness.

H3: The level of participation of change agents is positively associated with CI effectiveness.

H4: The level of employee development is positively associated with CI effectiveness.

H5: The extent to which structured rewards are used for continuous improvement is positively associated with CI effectiveness.

III. Methodology

To test the hypotheses, a survey was administered to middle managers, supervisors, and frontline employees in six leading companies that have implemented one or more CI practices. Based on the interviews and discussions with 130 executives, managers, and other knowledgeable people in Vietnam, the author compiled a list of potential companies. A number of business leaders, the Vietnam Chamber of Commerce and Industry, and the FPT School of Business (formerly known as the Hanoi School of Business), the author's host institutions, helped provide introductions to these companies which are located in two of Vietnam's biggest business hubs, Ho Chi Minh City and Hanoi.

The unit of analysis was the individual level because employees, supervisors, and middle managers are the most directly affected by CI practices and so are likely to be most knowledgeable about their organization's CI efforts, and to have information and opinions about constructs in this study. It would have been ideal to study a random selection of individuals. However, a convenience sample was used for three main reasons. First, Vietnamese people are highly unlikely to answer a questionnaire unless they know the researchers and understand how the information will be used (Hoang *et al.*, 2010; Nguyen and Bryant, 2004). Second, it is very difficult to directly contact frontline employees in any company in Vietnam because these firms are more accustomed to operating in an extremely guarded and secretive manner (Nguyen and Robinson, 2015). The author's host institutions therefore provided high-level official endorsement of the research, which encouraged senior managers to allow access to their employees. The third advantage of this particular convenience sample is that the participants were generally knowledgeable about their

own organization's CI efforts. They had information and opinions on the issues directly and indirectly affecting the quality of implementation and its ultimate sustainability.

Whenever possible, the study instrument relied upon measures adapted from previously tested scales (Ahire *et al.*, 1996; Jain and Tabak, 2002; Saraph *et al.*, 1989). (See Appendix A for a list of the items.) The scale for measuring reward systems for continuous improvement was developed from Robinson and Schroeder's (2006) work on high-performance idea systems. The scale for participation of change agents was based on the works of Kotter (1995) and Sohal *et al.* (1989). The questionnaire also included five items of CI effectiveness adapted from Choi and Liker (1995).

The survey was written in English and then translated into Vietnamese. Standard Vietnamese is based on the dialect of Hanoi, but the country also has several regional dialects. To prevent respondents from outside Hanoi misunderstanding the survey, great care was taken to involve translators who spoke the three most distinct dialects of Vietnam (those from the north, south, and central regions). The survey was first translated by a native Vietnamese English teacher living in the Ho Chi Minh City area (southern region). This version was then edited for clarity and accuracy by a native Vietnamese academic from Hanoi (northern region). Finally, this version was edited again by a Vietnamese-American who spoke the dialect of the central region. The Vietnamese version of the survey was then refined by a panel of ten CI experts, five from Ho Chi Minh City and five from Hanoi, who reviewed it for understandability and clarity. There were minor changes and corrections to the survey such as grammatical errors.

The location of the organization was one of the two measured control variables because the northern and southern regions of Vietnam differ considerably. They have long been divided by war and foreign occupation, so their managerial values, modes of operation, work attitudes, and behaviors vary in ways that could create disparities in the implementation, sustainment, and effectiveness of CI (Ralston *et al.*, 1999). The other measured control variable was the type of business ownership (state-owned enterprise, non-state enterprise, or foreign-invested enterprise). This variable is potentially important because management systems may vary greatly across different forms of business ownerships, which in turn can affect a firm's CI practices.

The items used a six-point Likert scale where respondents were asked to give their perception of CI at their organization ranging from 1 (strongly disagree) to 6 (strongly agree) or to give their perception of the level of CI effectiveness at their organization on a scale of 1 to 6 (1 is least favorable and 6 is most favorable). Like other Asian respondents in China, Hong Kong, and Japan (Gehrt *et al.*, 2007; Shiomi and Loo, 1999; Si and Cullen, 1998), Vietnamese respondents are more likely to choose the middle response categories than Western respondents, so this study used an even number scale to dissuade Vietnamese respondents from giving neutral opinions.

The preparation and planning for the survey took one year including meeting with senior managers to get permissions, developing and translating the survey, sending a draft of the survey for review by the quality or lean manager, and ironing out the details of when and how the survey would be administered to the respondents. At each company, hard copies of the survey were given to the quality or lean manager, who then administered it to 100 line employees and supervisors, and to 10 managers. A total of 660 surveys were given out, and 490 people responded (a response rate of 74 percent). The high response rate may be on account of the firms' lean/quality managers being the ones to administer the questionnaire, thus providing official endorsement of the research and an empowering environment that encouraged employees to participate and respond candidly. It took over one month to administer and collect the surveys.

IV. Analysis

To ensure the unidimensionality of the scales, an exploratory factor analysis (principal components method with varimax rotation) for each construct was performed. An indicator item was deleted if (1) it loaded on more than two factors or its factor loadings were smaller than 0.5 (Johnson and Wichern, 1998); (2) if there were cross-loadings higher than 0.40 (Hair *et al.*, 1998); or (3) if it did not load on the factor it was designed to measure (Chen and Paulraj, 2004). For one or more of these reasons six items were removed – the fourth and fifth items of Management Development; the second item of Employee Development; the first item of Reward System for Continuous Improvement; and the first and third items of Continuous Improvement Effectiveness (refer to Appendix A). This analysis is consistent with other studies including those of CI and quality (see, e.g., Hoang *et al.*, 2006; Hoang *et al.*, 2010; Flynn *et al.*, 1994; Lemieux-Charles *et al.*, 2002; Olatunji *et al.*, 2007). While the removal of these items did not significantly alter the content of the scale in this study, it is important to refine the instrument in future studies.

The internal consistency was satisfactory for the six dimensions. All alpha measures were larger than the threshold value recommended by Nunnally (1978) and Flynn *et al.* (1990), suggesting that the constructs are reliable. (See Appendix B.)

Following the suggestion of O'Leary-Kelly, we assessed the convergent validity by using confirmatory factor analysis (CFA). The model fit the data well based on threshold values suggested by Hu and Bentler (1998) ($\chi^2/df = 1032.5$, $TLI = 0.936$, $RMSEA = 0.054$, $CFI = 0.944$). All factor loadings in the CFA model are greater than 0.5 and the t-values are significantly greater than 2.0, ensuring convergent validity.

Hierarchical multiple regression was used to examine the effects of top management commitment, management development, participation of change agents, employee development, and reward system for continuous improvement on CI effectiveness (see Table 1).

Hypothesis 1 predicted a positive relationship between top management commitment and CI effectiveness. Consistent with this prediction, this hypothesis was supported ($\beta = 0.15$, $p < 0.01$).

Hypothesis 2 predicted a positive association between management development and CI effectiveness. The regression results support this prediction ($\beta = 0.20$, $p < 0.001$).

Hypothesis 3 predicted a positive relationship between the participation of change agents and CI effectiveness. This hypothesis was supported ($\beta = 0.26$, $p < 0.001$).

Hypothesis 4 predicted a positive association between employee development and CI effectiveness. This hypothesis was supported ($\beta = 0.21$, $p < 0.001$).

Hypothesis 5 predicted a positive relationship between reward system for continuous improvement and CI effectiveness. This hypothesis was *not* supported ($\beta = 0.07$, ns).

Table 1: Regression Analysis with CI Effectiveness as the Dependent Variable

Variables	Model 1	Model 2
Controls		
D1	.29***	.07
D2	.33***	.17***
Location	-.30***	-.06
Main Effects		
Top Management Commitment		.15**
Management Development		.20***
Participation of Change Agents		.26***
Employee Development		.21***
Reward System for Continuous Improvement		.07
R^2 (adjusted)	.08	.60
R^2	.09	.60
<i>F-value change</i>	15.75	90.91

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

To investigate the effect of the control variables, dummy variables were created as suggested by Aiken and West (1991). For type of business ownership, state-owned enterprise was used as the control group. The dummy variables were coded as D1 equals 1 for non-state enterprise, 0 otherwise; D2 equals 1 for foreign-invested enterprise and 0 otherwise. For location, Hanoi was coded as 0, and Ho Chi Minh City was coded as 1. This study found that respondents from foreign-invested enterprises (FIE) were more likely than respondents from state-owned enterprises to find CI effective.

V. Discussion

The issue of CI performance is important to both academics and practitioners. This research has argued that Vietnamese organizations should adopt CI to avoid the business and economic consequences of continuing to be no more than a provider of low-cost labor. We identify the theoretical implications for academics investigating the application of CI techniques in Asian emerging market economies, and offer recommendations for practitioners who are grappling with the issue of designing effective CI practices in Vietnam.

Regarding control variables, this study found that respondents from foreign-invested enterprises (FOE) rather than those from state-owned enterprises were more likely to find CI effective. This result supported the argument that the type of business ownership highly impacted CI effectiveness in Vietnamese organizations. FOEs have considerable exposure to global best practices, and they have the resources to transfer these practices to emerging markets. Foreign partners in FOEs are often the backbone of joint-ventures in transitional economies, providing the necessary knowledge and skills to compete in international markets (Dhanaraj *et al.*, 2004; Lane *et al.*, 2001). In Vietnam's garment industry, for example, foreign partners have facilitated international market access and transmitted fashion and design know-how to Vietnamese exporters

(Hill, 2000). Moreover, China's huge inflow of FOEs has brought modern technology into the country as well as management expertise in fields such as TQM (Tuan and Ng., 1998).

This research tested five hypotheses, and found four that were supported. The results showed that top management commitment has a positive effect on CI effectiveness, suggesting that senior managers are critical to promoting an organization-wide CI culture, establishing and communicating clear CI objectives, encouraging employee participation in CI, guiding CI through personal involvement, and allocating resources to support CI initiatives throughout the organization. This finding was not a surprise: previous researchers have identified the importance of top managers' commitment to the successful implementation of TQM in Vietnamese firms (Hoang *et al.*, 2010). However, the interviews and discussions revealed that Vietnam's strong top-down culture obstructs any organization's CI efforts unless senior managers approve and facilitate CI. For example, the interviewees asserted that the level of top management's commitment, involvement, and skills and the resources senior managers provide to drive initiatives were the most important success factors of the Factory Improvement Programme, which was established in 2002 by the International Labour Organization (ILO) to help manufacturers improve compliance and working conditions and promote competitiveness. (The Factory Improvement Programme was replaced in 2009 with Better Work Vietnam, a partnership program between the ILO and the International Finance Corporation with similar objectives.)

While top management commitment is necessary, in Vietnam it is not a sufficient condition for CI effectiveness. Success also depends on the participation of change agents, the level of management development, and the level of employee development. The participation of change agents is especially important in Vietnamese companies because the Vietnamese sense of self is tied to family, friends, and society rather than to work, and Vietnamese culture values harmony and favors consensus-oriented decision making (Shultz *et al.*, 2000). Moreover, past economic and political systems have created a culture of collectivism and hierarchy, so people rarely take independent action and usually conform to avoid conflict. For these reasons, in Vietnam two to three respected change agents who are well-liked, respected, influential, and persuasive are needed to serve as liaisons between senior managers, middle managers, and frontline employees. Their functions are to communicate the objectives, delegate the work, enforce the initiatives, and ease any anxiety regarding the change effort. Furthermore, the interviewees suggested that change agents can help overcome the unwillingness of frontline employees to offer improvement ideas that implicitly suggest that management has not done its job. Change agents provide not only a forum for dialogue and cooperation, but also implement improvement initiatives – an outcome realized because they have the authority to approve recommended changes.

The study also found that management development has a positive influence on CI effectiveness. This was corroborated by the interviewees who asserted the importance and value of managers who have extensive knowledge of and training in CI principles and techniques, and who are committed to ongoing improvement by actively coaching, promoting, and sustaining CI initiatives. The interviews also suggest that CI education and training would give Vietnamese managers the knowledge and skills to operate their companies in a global economy and help move their firms up the production value-chain.

This study found that employee development positively influences CI effectiveness. The interviews and discussions suggest that to get excellent CI results employees should be given work-skills training to help them do their jobs. Also, an employee idea system that encourages staff members to find and fix problems by offering improvement suggestions should be developed. This research contributes by looking into the multiple facets of employee development, such as

employee idea systems, which impact CI effectiveness. According to Liker (2004), all manufacturing and service companies that want long-term success must become learning enterprises. To do so, they have to expand their employees' thinking beyond the specific tools (e.g. 5S, just-in-time) and develop a world-class workforce of knowledgeable, creative, and active problem-solvers who are capable of implementing world-class processes.

Reward systems are common in Vietnam. Employers regularly use them to increase company morale and productivity as well as to promote employee attendance, punctuality, skills, and retention. Management often uses rewards to encourage employees to put their improvement ideas in suggestion boxes, which are long-established and widespread in Vietnam. A committee picks out ideas good enough to implement, assigns staff members to carry out the implementation, and gives the employee a reward if the idea is accepted. This tradition of rewarding employees for their suggestions indicated that a reward system would be necessary to promote continuous improvement, hence our initial prediction. On the contrary, however, a reward system did not significantly influence CI effectiveness. One reason for this discrepancy could be that the reward systems in the respondents' companies were often poorly conceived and might therefore have caused problems that undermined CI efforts. For example, during the interviews and discussions, a number of executives mentioned that while employees could earn a monetary reward if management liked their ideas, they could also be punished for ideas that management regarded as "bad."

Yet considering that rewards are engrained in the Vietnamese work environment, this research finding should not suggest that firms avoid rewarding their people for their ideas or other contributions to CI. As Robinson and Schroeder (2014) recommend, organizations should not set up a separate system of rewards for individual ideas – as many suggestion-box systems do – because it misaligns management's objectives and employees' goals. Rather, they note that in a high-performance organization, improvement ideas are a part of everyone's job and are treated as any other important aspect of performance. Ideas should therefore be evaluated using the organization's existing mechanisms for rewarding its people. One example is linking employees' bonuses to their idea performance.

While it was surprising not to observe a positive relationship between a reward system for CI and its effectiveness, this is a significant finding. Future research could explore this dimension by including other tests to better understand how CI effectiveness changes depending on the type and management of the reward system in Vietnamese organizations.

VI. Conclusion and Future Research Directions

The paper contributes to the understanding of CI by identifying the crucial importance of change agent participation as well as top management commitment, together with management and employee development, in facilitating CI practices. The findings of this study highlight the factors that appear to influence successful CI sustainability, in some instances confirming that factors potentiating CI in Vietnam are similar to those identified in studies of other emerging Asian economies. Broadening this research to cover other emerging market economies in Southeast Asia would enable scholars to build theories and develop new models of international business management.

This study has two main limitations. First, the study used a convenience sample based on the approachability of the businesses. While a convenience sample was not the ideal, it was the best option for this study in Vietnam, where having a personal relationship is crucial for gaining access

to companies and obtaining a sufficient number of responses. Even though the interviews, discussions, and survey responses enabled the triangulation of the data, the findings must be interpreted with caution because they derive from a convenient sample. Finally, given the multiple facets of CI, it is not possible to include all factors that determine its effectiveness in a single model. However, limitations related to missing variables could be addressed in future studies. Future research should also empirically conduct a longitudinal study of CI to evaluate the effect of time on the factors affecting CI sustainability.

As practitioners grapple with the issue of designing effective CI practices in Vietnam, they urgently need an improved understanding of what *works*, what *does not*, and *why*. The findings of this study clarify the use and effectiveness of CI in Vietnamese companies and suggest ways in which they can enhance their CI efforts. As companies in Vietnam open up more in the coming years, further research on the efforts of Vietnamese management to introduce CI and other quality initiatives will be valuable to both Vietnamese organizations and the international business community.

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Appendix A: List of items

Top Management Commitment (Ahire *et al.*, 1996; Jain and Tabak, 2002)

1. Top management (e.g., general manager, deputy, director, senior manager) promotes an organization-wide culture that is committed to continuous improvement.
2. Top management establishes and communicates clear continuous improvement objectives.
3. Top management is personally involved in guiding continuous improvement throughout the organization.
4. Top management allocates resources (e.g., financial, human) to support CI initiatives.
5. Top management encourages employee involvement in continuous improvement.

Management Development (Jain and Tabak, 2002; Saraph *et al.*, 1989)

1. Managers in the organization have extensive knowledge of continuous improvement principles and techniques.
2. Managers are committed to ongoing improvement by actively coaching, encouraging, and promoting continuous improvement initiatives.
3. Continuous improvement-related training is given to managers and supervisors throughout the organization.
4. When frontline employees have work problems, managers and supervisors are readily available to help employees solve them.
5. When frontline employees have work problems, managers and supervisors are effective in solving them.

Participation of Change Agents (Kotter, 1995; Sohal *et al.*, 1989)

1. Managers who lead continuous improvement initiatives are well-liked, respected, and influential.
2. Managers who lead continuous improvement initiatives enhance the communication among people in different levels of the organization (e.g., senior managers, middle managers, and frontline employees).
3. Managers who lead continuous improvement initiatives are effective in delegating the continuous improvement work.
4. Managers who lead continuous improvement initiatives are effective in promoting continuous improvement throughout the organization.
5. Managers who lead continuous improvement initiatives are effective in facilitating improvement programs.

Employee Development (Ahire *et al.*, 1996; Jain and Tabak, 2002)

1. Frontline employees are provided with work-skills training necessary to help them effectively do their jobs.
2. Frontline employees are provided with continuous improvement-related training.
3. The organization has an effective employee idea system or suggestion system.
4. Frontline employees are encouraged to give improvement suggestions.
5. Frontline employees are encouraged to find and fix problems.

Reward System for Continuous Improvement (Robinson and Schroeder, 2006)

1. Rewards are based on performance measures reflecting the organization's continuous improvement objectives.
2. Rewards are given equitably according to the collective impact of everyone's ideas.
3. Rewards are distributed to employees according to clear and publicly-stated rules.
4. The reward system is integrated into the way the organization is run.
5. The organization has a reward system based on plant productivity.
6. The reward system is effective in achieving continuous improvement.

Continuous Improvement Effectiveness (Choi and Liker, 1995)

1. Level of continuous improvement accomplishment.
2. Level of continuous improvement philosophy taking hold.
3. Level of waste elimination.
4. Level of sustainability of continuous improvement.
5. Overall impact of continuous improvement.

Appendix B: Alpha Measures

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Factor analysis for top management commitment.	Cronbach's Alpha = 0.912
1. Top management promotes an organization-wide culture that is committed to continuous improvement.	0.723
2. Top management establishes and communicates clear continuous improvement objectives throughout the organization.	0.720
3. Top management is personally involved in guiding continuous improvement initiatives throughout the organization.	0.706
4. Top management allocates resources to support continuous improvement initiatives throughout the organization.	0.682
5. Top management encourages employee involvement in continuous improvement.	0.671
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Factor analysis for management development.	Cronbach's Alpha = 0.836
1. Managers in the organization have extensive knowledge of continuous improvement principles and techniques.	0.737
2. Managers are committed to ongoing improvement by actively coaching, encouraging, and promoting continuous improvement initiatives.	0.633
3. Continuous improvement-related training is given to managers and supervisors throughout the organization.	0.645
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Factor analysis for participation of change agents.	Cronbach's Alpha = 0.928
1. Managers who lead continuous improvement initiatives are well-liked, respected, and influential.	0.652
2. Managers who lead continuous improvement initiatives enhance the communication among people in different levels of the organization.	0.678
3. Managers who lead continuous improvement initiatives are effective in delegating the CI work.	0.657
4. Managers who lead continuous improvement initiatives are effective in promoting CI throughout the organization.	0.701
5. Managers who lead continuous improvement initiatives are effective in facilitating improvement programs.	0.683
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Factor analysis for employee development.	Cronbach's Alpha = 0.827
1. Frontline employees are provided with work-skills training necessary to help them effectively do their jobs.	0.561
2. The organization has an effective employee idea system or suggestion system.	0.721
3. Frontline employees are encouraged to give improvement suggestions.	0.842
4. Frontline employees are encouraged to find and fix problems.	0.708

Factor analysis for reward system for continuous improvement. Cronbach's Alpha = 0.878

1. Rewards are given equitably according to the collective impact of everyone's ideas.	0.693
2. Rewards are distributed to employees according to clear and publicly-stated rules.	0.753
3. The reward system is integrated into the way the organization is run.	0.708
4. The organization has a reward system based on plant productivity.	0.731
5. The reward system is effective in achieving continuous improvement.	0.654