

A STUDY OF CONFIRMATORY FACTOR ANALYSIS OF SUSTAINABLE LEADERSHIP FOR VOCATIONAL EDUCATION

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ABSTRACT

This study aims to test of the internal structure for a sustainable leadership and validate a measurement model of sustainable leadership for Vocational Education in Thailand. Sample was 404 vocational college administrators derived from multistage sampling method. The measurement model consists of the following: sustainable leadership matters; sustainable leadership lasts; sustainable leadership spreads; justice in sustainable leadership and doing no harm to others; the recognition and promotion of diversity; sustainable development; and respecting, honoring and learning from the best experiences. The confirmatory factor analysis was employed as an analytical technique for the proposed model. The results show that sustainable development indicator makes the highest contribution to sustainable leadership, that vocational school administrators have to responsible for resource management and conservation; they must establish and nurture a favorable environment within the organization and encourage constant evolution through the development of the skills and abilities of the members of the organization.

Keywords: Sustainable leadership, vocational education, confirmatory factor analysis, sustainable development

INTRODUCTION

In order to survive and remain competitive in an increasingly borderless world, organizations must develop and maintain sustainable practices. Thus, organizations worldwide have recognized the importance of sustainability and given it priority as a key strategic goal (Siegel, 2009). Sustainability as a general principle has gained widespread acceptance, and its principles can be highly relevant for organizations and their missions. It is now recognized that initiatives in sustainable development are necessary to facilitate continual organizational evolution, taking into account the long-term sustainability of the organization and the integration of clear, shared perspectives (David, Cheri, & Nathan, 2011).

A crucial aspect of sustainable development in the organizational context is sustainable leadership. It is evident from recent literature that leadership should be people-centered and resource-based, and there has been much discussion of a need for a new paradigm relevant to leadership development within organizations (Casserley & Critchley, 2010; Crew, 2010; Hewison & Griffiths, 2004). Nevertheless, there has been a general failure on the part of organizations to modify their perspective on leadership accordingly and to take advantage of the possibilities and opportunities arising from the adoption of successful leadership development (Crew, 2010). For organizations, the concept of sustainable leadership incorporates all of these considerations and advocates a shift in emphasis away from the traditional (Casserley & Critchley, 2010; Crew, 2010).

The concept of sustainable leadership can be applied in many different contexts. In particular, Davies (2007), Fullan (2005), Hargreaves and Fink (2006), and Lambert (2011) all explore the concept of sustainable leadership at an organizational level in the educational sector. In this era of globalization and rapid change, it is vital that school administrators have a deep understanding of and play an active role in human resource development. In order for sustainability to become a whole-school approach, a change in the school culture is necessary (Ilisko, Skrinda, & Micule, 2014). This in turn requires sustainable leadership (Ilisko & Badyanova, 2014). However, as the concept of sustainable leadership is still in its infancy (Lambert, 2011), there exist few guiding factors for its implementation.

This research examines the emerging literature on sustainable leadership with an aim to developing a confirmatory factor analysis based on elements of sustainable leadership in the educational context. The

research utilizes these elements as the foundation of its analysis of the characteristics of vocational college administrators. In addition, the research aims to determine whether the sustainable leadership model is applicable to college administrators. In other words, the model aims to inform theoretical and practical instruction management as a set of guidelines for the further development of sustainable leadership among vocational college administrators and other organizational.

LITERATURE REVIEW

Leadership

Leadership is a term with a broad range of meaning. In general, leadership implies the ability to motivate subordinates and influence their attitudes and behavior so as to encourage cooperation in the achievement of organizational goals. Leadership is a key factor not only in corporate and general management but also in education. Stogdill (1974) defines leadership in terms of a relationship between the work of group members: leadership involves participation in operations and enhances the ability of groups to accomplish organizational goals. Bass (1985) and Bass and Riggio (2006) characterize the role of leaders as the focus of the group: leaders, through their individual personality, encourage others to cooperate using incentives rather than force, and their influence is a powerful tool for shaping the behavior of group members. The roles and responsibilities of leaders involve a variety of initiatives for achieving innovation. Stoner and Freeman (1989) state that leadership involves guiding the processes and influencing the activities of members of the group. Hersey, Blanchard and Johnson (1996) define leadership as the process used to inspire individuals or groups to achieve appropriate targets for the given circumstances, while Lipham (1998) characterizes leadership as a process that creates initiatives or new structures. Leadership, then, aims to achieve the objectives and goals of the organization or to change these purposes and goals.

Hellriegel, Slocum and Woodman (2001) define leadership in terms of development goals and vision: this involves not only the implementation of goals and vision but also the fostering of values that promote them. Leadership involves both making decisions and influencing others to accept them. Yukl (2010) advocates the concept of "new leadership", which refers to the process of influencing others through contact that fosters mutual understanding, leads to willing cooperation, and supports the efforts of individuals or groups of people to achieve targets cooperatively. Thus, leadership requires attention to organizational vision, values, and culture. Leaders must be actively involved and committed to achieving the desired leadership effects in order to achieve effective results for the organization.

Leadership and sustainability also depend on values that are rooted in ethics. Environmental and social awareness are key features of sustainable leadership, which requires integrity in behavior and values for the continued development of sustainable growth. Knowles, Twomey, Davis, and Abdul-Ali (2009) maintain that the principles of sustainable development require a focus on leadership that protects and fosters the principles of sustainability.

Sustainable leadership implies courage in maintaining a beneficial social and economic environment for future generations. Leadership for sustainability benefits both leaders and followers, and indeed all social, environmental and economic stakeholders affected by the actions of individuals and organizations. Given the crucial contribution of education to sustainable development, school administrators must understand and play a role in human resource development in this era of globalized innovation and rapidly-developing competition. Leadership by vocational education administrators requires the ability to communicate in order to build effective and successful educational institutions. In turn, organizational change and long-term sustainability through corporate leadership requires vocational education leadership to equip future generations with the skills and knowledge required for sustainable leadership.

Concept of Sustainable Leadership

Sustainable leadership is a newly defined term in organizational leadership research (Hargreaves, 2007; Lambert, 2012). Sustainable leadership is based upon the notion of ethical leadership (Brown & Trevino, 2006), but extends its area of application by claiming that it is ethical that we take into consideration the needs of a wider range of stakeholders', including future generations and the natural environment. In essence, sustainable leadership is distinguished by pursuing the value of sustainability at the individual, organizational, social and ecological level for both current and future generations (Olivier, 2012).

Sustainable leadership focuses on relationships between people and resources not only within the organization but also in the organization's social and natural context. It does no harm to and actively improves the surrounding environment. It does no harm to and actively finds ways to share knowledge and resources with the local community. Sustainable leadership is not self-centered; it is socially just. By exercising justice in the

development of existing resources, sustainable leadership promotes cohesive diversity. Just as strong ecosystems are bio-diverse, strong organizations promote diversity and avoid the standardization that weakens learning, adaptability and resilience in the face of unexpected changes and threats. Rather, sustainable leadership fosters and learns from diversity in teaching and learning and stimulates progress by creating cohesion and networking among its richly varying components. Sustainable leadership develops and does not deplete material and human resources. It recognizes and rewards the organization's leadership talent in earlier rather than later career stages. Sustainable leadership takes care of its leaders by encouraging them to take care of themselves. It renews people's energy. Sustainable leadership is prudent and resourceful leadership that wastes neither its money nor its people.

Thus, sustainable leadership must incorporate ethical values and take into consideration social and environmental issues. Lambert (2012) develops a model for sustainable leadership to be implemented as a tool for organizational capacity building in education institutions. The model consists of six components including capacity building in staff, strategic distribution, consolidation, building long term objectives from short term targets, diversity and conservation.

The concept of sustainability must be central to the mission of the organization, and initiatives in sustainable development must continue to make organizational changes. The sustainability of the organization in the long term must be recognized to create an integrated perspective (David, Cheri, & Nathan, 2011). Sustainable leadership preserves and advances the most valuable aspects of life over time, from one leader to the next. As Collins and Porras (1994) remind us, 'all leaders, no matter how charismatic or visionary, eventually die'. The challenges of leadership succession, of leading across and beyond individual leaders over time, are at the very heart of sustainable leadership and educational change. Sustainable leadership sustains as well as depends on the leadership of others. In a complex world, no one leader, institution or nation can control everything without help. Sustainable leadership must therefore embrace distributed leadership by stimulating leadership in others.

Finally, sustainable leadership honors and learns from the best of the past to create an even better future. Amidst the chaos of change, sustainable leadership is steadfast in preserving and renewing its long-standing purposes (Hargreaves & Fink, 2004). Administrators must lead and implement ideas with integrity if they are to foster the sustainability of the organization (Knowles, Twomey, Davis, & Abdul-Ali, 2009). Much change theory is change without a past or a memory. Sustainable leadership, in contrast, revisits and revives organizational memories and honors the wisdom of their bearers as a way to learn from, preserve, and then move beyond the best of the past (Davies, 2007; Fullan, 2005; Hargreaves & Fink, 2006; Lambert, 2011).

The concept of sustainable leadership is of great significance for educators. In the educational context, sustainable leadership is leadership for learning and leadership for caring for and among others; it is a creative and learning mode of leadership that preserves, protects and promotes in education practices that sustain and enrich human life (Hargreaves & Fink, 2004). While creating a learning environment that would promote interest toward the sustainability, the importance for building a shared vision and for the form and content of sustainability (Salite, 2008). Education, in turn, lays the foundation for sustainable leadership in future generations. The role of education in fostering sustainable development is recognized by global institutions under the rubric of Education for Sustainable Development (ESD). Since the UN General Assembly declared 2005–2014 to be the UN Decade of Education for Sustainable Development (UNDESD), a number of UN agencies, NGOs, regional bodies, and partner networks have engaged in activities supportive of ESD. However, the experiences of these organizations have shown that successful implementation of ESD requires further research if policy commitments are to be made (UNESCO 2007, 2009). ESD aims to help people to develop the attitudes, skills, and knowledge required to make informed decisions for the benefit of themselves and others both now and in the future, and to act upon these decisions (UNESCO 2012). ESD promotes sustainable thinking and acting. It enables children and adults to make decisions and at the same time understand how those decisions affect future generations and the life of others. Similarly, ESD aims to inspire a new generation of responsible citizens by promoting, through education, the knowledge, skills, values, perspectives and practices essential to a sustainable future (Bell, 2016).

METHODOLOGY

This quantitative research aims to study the components of sustainable leadership and confirmatory factors analysis of sustainable leadership in vocational education. The questionnaire was used to examine the behavior of the administrators in vocational education institution. This measurement model of sustainable leadership base on Kline, (2011).

Participants

The study was conducted in a vocational education, selected by multi-stage sampling according to the proportion of population numbers of vocational education administrators from 413 public institutions. 404 (84.17%) questionnaires were completed and returned. Of these participants, the great majority were male (79%), more than 45 years old (78%), and had at least 15 years of work experience (82%) and 5 years of administration experience (74%).

Procedure

The data utilized in this study were obtained by the researcher by means of a closed questionnaire. The tools used in the research and quality audit consisted of a sustainable leadership expression questionnaire based on Hargreave and Fink's (2006) concept of sustainable leadership, and shows the meanings and indicators of sustainable leadership. The following are details of characteristics of sustainable leadership as indicated from the components above (Table 1).

Table 1: Components, Meanings and Indicators of Sustainable Leadership

| Components | Meaning | Indicator |
|---|---|---|
| 1) Sustainable leadership matters | School administrators create and learn to maintain, protect and promote sustainable education. This includes morals, ethics, lifelong learning and the creation of opportunities for staff to develop their capabilities. | <ol style="list-style-type: none"> 1) creativity and learning 2) preservation, protection and promotion of sustainable education 3) creation of ethics 4) learning and wider lifelong education 5) opportunities for staff and capacity development |
| 2) Sustainable leadership lasts | School administrators ensure continuity by maintaining sustainable leadership. | <ol style="list-style-type: none"> 1) transferring of leadership 2) creating a line of leadership succession 3) keeping and maintaining sustainable leadership |
| 3) Sustainable leadership spreads | School administrators develop the leadership structure, convey leadership strategies, invite opinions and share decision-making, encourage the involvement of stakeholders, and share responsibility. | <ol style="list-style-type: none"> 1) leadership development 2) transferring leadership strategies 3) exchange of opinions and share decision-making 4) participation of stakeholders and delegation of responsibility |
| 4) Justice in sustainable leadership | Just administrators do no harm to others, are enthusiastic to improve the environment, and share knowledge and available resources in the best interest of society. | <ol style="list-style-type: none"> 1) having justice 2) no harm to others 3) enthusiasm to improve the environment 4) sharing of knowledge and available resources 5) uphold the interests of the public and society |
| 5) Recognize and promote cohesive diversity | School administrators understand and promote diversity and create standard criteria for all. They learn to adapt and be flexible to changing threats and promote awareness and learn from variety. | <ol style="list-style-type: none"> 1) understanding and promoting diversity 2) creating a standardized basis 3) learning and adapting to changes and threats 4) promoting awareness and learning from diversity |
| 6) Sustainable development of human resources | School administrators create and promote a favorable environment. They encourage the organization to be constantly evolving and support their subordinates through the development of skills and abilities. | <ol style="list-style-type: none"> 1) creating, maintaining and promoting a favorable environment within the organization 2) encouraging the organization to constantly evolve 3) developing the skills and abilities of the members of the organization 4) making returns 5) having support for the process of leading subordinates |

| | | |
|--|--|--|
| 7) Respecting, honoring and learning from the best experiences | School administrators are to respect others, learn lessons from experience, and maintain and repurpose goals to respect and honor all members in the organization. | 6) having intelligence 1) respecting others 2) learning from experience 3) maintaining and repurposing corporate goals 4) respecting and honoring the wisdom of people in the organization |
|--|--|--|

(From: Applied in Hargreaves & Fink, 2006)

The instrument used for data collection was a Likert-scale questionnaire sent to respondents. Items concerning the behaviors of sustainable leadership of vocational education administrators were based on the concepts of Hargreaves and Fink (2006) with a rating scale of 5 levels: most, much, moderate, little, and least.

There were 37 items in total. The sustainable leadership questionnaire consisted of seven components (labeled STL1 – STL7): the importance of sustainable leadership (STL1); ensuring that leadership remains sustainable (STL2); the distribution of sustainable leadership (STL3); justice in sustainable leadership and doing no harm to others (STL4); the recognition and promotion of diversity (STL5); sustainable development (STL6); and respecting, honoring and learning from the best experiences (STL7). The questionnaire was developed by means of the Index of Item Congruence (IOC), the index varied from .67 to 1.00. The disposition component of the sustainable leadership questionnaire was tested for reliability in terms of internal consistency based on a Conbrach's coefficient of .964.

Data Analysis

Data analysis was conducted and sustainable leadership (STL) was analyzed as a latent variable determined by the seven observed-variable indicators (STL1-STL7) corresponding to the sustainable leadership components listed above. The results were analyzed by means of Confirmatory Factor Analysis (CFA). AMOS version 23 was used to perform the CFA of the sustainable leadership questionnaire analyzing the fit of models and its respective parameter estimates. CFA is a multivariate analysis used to test concepts based on multiple measured indicators (Tabachnick & Fidell, 2007). It is not a method for identifying structural factors, but rather a method to confirm the existence of a specific structural factor (Raykov & Marcoulides, 2000). One of the advantages of Confirmatory Factor Analysis is its flexibility when applied to a complex hypothetical model. Estimation methods used in Confirmatory Factor Analysis involve a maximum likelihood factor that can determine the optimal value of the factor loading. A valid indicator is said to be convergent if the loading value on standard regression weight is greater than .5 or $p < \alpha = .05$, the chi-squared (χ^2) value is small, the significance probability is greater than .05 ($p > .05$), the CMIN/DF is less than 3.00, RMSEA is less than .08, the GFI is greater than .90, the AGFI is greater than .90, and the CFI greater than .90 (Kline, 2011).

RESULTS

The analysis of sustainable leadership among vocational college administrators yields the following correlations. Table 2 shows the correlation coefficient among the seven observed variables. Twenty-one pairs had a correlation between .561 and .764, a result that is statistically significant at the .01 level ($p < .01$). Every pair shows a positive correlation between variable relevance. The correlation coefficients of the variables with the highest scores, .764, correspond to the relationship between sustainable development (STL6) and respecting, honoring and learning from the best experiences (STL7) and to the relationship between the recognition and promotion of diversity (STL5) and the development and maintenance of resources (STL6). A lower correlation (.750) was found between the importance of sustainable leadership (STL1) and ensuring that leadership remains sustainable (STL2). The coefficients of the variables associated with the lowest correlation (.650) is the relationship between ensuring that leadership remains sustainable (STL2) and justice in sustainable leadership and doing no harm to others (STL4).

Table 2: Descriptive Statistics and Zero-order Correlations (n=404).

| observed variable | Correlations | | | | | | | | |
|-------------------|--------------|-------|------|--------|--------|--------|--------|--------|--------|
| | \bar{x} | SD | STL1 | STL2 | STL3 | STL4 | STL5 | STL6 | STL7 |
| STL1 | 4.475 | .4909 | - | .750** | .749** | .619** | .670** | .732** | .644** |
| STL2 | 4.396 | .4857 | | - | .716** | .561** | .657** | .692** | .624** |
| STL3 | 4.423 | .4739 | | | - | .671** | .722** | .721** | .626** |
| STL4 | 4.542 | .4268 | | | | - | .671** | .674** | .640** |
| STL5 | 4.411 | .4631 | | | | | - | .764** | .666** |
| STL6 | 4.426 | .4855 | | | | | | - | .764** |
| STL7 | 4.391 | .4351 | | | | | | | - |

** $p < .01$

The analysis of sustainable leadership among vocational college administrators indicating confirmation of the variable components of sustainable leadership. The chi-square = 6.768, $df = 6$, $p = .343$ shows a chi-square value not significantly different from zero; $\chi^2 / df = 1.128$, which is less than three. The GFI (= .995), AGFI (= .978), RMSEA (= .018) and CFI (=1.000) indices indicate that the model is in harmony with the empirical data or theoretical construct validity. The weights of the variable component of the observed variables are all positive and non-zero. The observed sustainable development variables range from a high of 0.876 (STL6) to a low of 0.767 (STL7) (Table 3). All loading factors are significant ($p = 0.000$). These outputs indicate that convergent validity requirements are fully met.

Table 3: Confirmation of the variable components of sustainable leadership (STL) (n=404)

| Latent Variable | Observe Variable | Factors analysis of sustainable leadership | | | | Reliability |
|-----------------|------------------|--|-------|--------|-------|-------------|
| | | b_{sc} | S.E. | t | p | |
| STL | STL1 | .836 | .059 | 16.449 | .000 | .964 |
| | STL2 | .780 | .064 | 15.829 | .000 | |
| | STL3 | .834 | .059 | 17.327 | .000 | |
| | STL4 | .781 | .051 | 17.225 | .000 | |
| | STL5 | .862 | .060 | 18.151 | .000 | |
| | STL6 | .876 | .051 | 22.225 | .000 | |
| | STL7 | .767 | <- -> | <- -> | <- -> | |

Notes: $p < .01$, b_{sc} – the coefficient of standard factor loading, <- -> parameters no report is S.E., t and p

The test results of the measurement model using the complete program can be seen in Table 4. The construct measurement model testing using CFA was performed for more than one round. In this case, the model was adjusted using modification indices (Arbuckle & Wothke, 1999). The aim was to produce a construct measurement model with goodness of fit indices fulfilling the requirements or cut-off. The output of the goodness of fit index calculation on the construct measurement model, which displays the seven criteria used to assess the appropriateness of the model. The results indicate that the model is acceptable that is, there is a match between the model and the data.

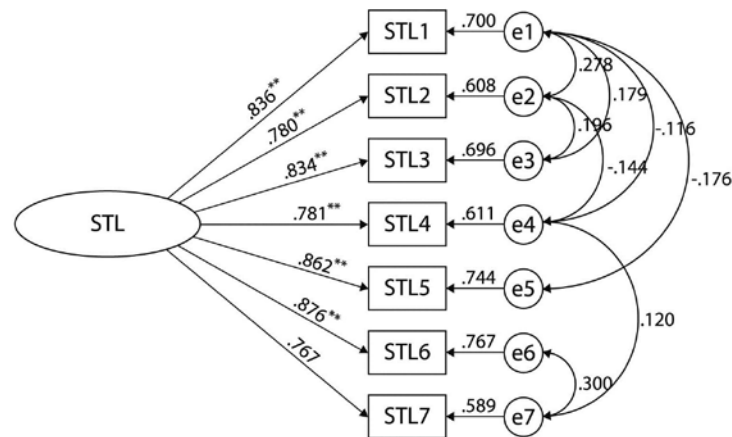
Table 4: Test Results for the Measurement Model of Sustainable Leadership

| Criteria | Cut-off Value | Results | Status |
|------------------------------|----------------------|---------|----------|
| Chi-square | expected to be small | 6.678 | - |
| Significance Probability (p) | > .05 | .343 | Good fit |
| CMIN/DF (χ^2/df) | < 3.00 | 1.125 | Good fit |
| GFI | > .90 | .995 | Good fit |
| AGFI | > .90 | .978 | Good fit |
| RMSEA | < .08 | .018 | Good fit |
| CFI | > .90 | 1.00 | Good fit |

*Based on Kline, (2011)

Table 3 indicates that the overall fitness index yields a chi-square value with a sum of 6.678 ($p=.343$), indicating a confirmed goodness of fit status. Other indices, namely CMIN/DF (χ^2/df), GFI, AGFI, RMSEA and CFI also show a confirmed goodness of fit status. Overall, the construct measurement model can be declared as having been validated. Further, CFA was used to test the construct validation, namely the convergent validity. The convergent validity of the construct measurement model was tested based on the loading factor (Kline, 2011). The loading factors are shown in Table 2, and the measurement model is portrayed graphically in Figure 1.

Figure 1: Measurement model of Sustainable leadership



Chi-square = 6.678, df= 6, p value = .343, χ^2/df = 1.125, GFI = .995, AGFI = .978, RMSEA = .018, CFI = 1.000

DISCUSSION

The results of the confirmatory factor analysis of the sustainable leadership model for vocational college administrators indicate that the sustainable leadership model is consistent with empirical data: chi-square = 6.678, df = 6, p = .343 ($p > .05$ indicates consistency), CMIN/DF (χ^2/df) = 1.125 (acceptable levels are lower than 3.00), RMSEA = .018, (acceptable levels approach 0.00), CFI = 1.000, GFI = .995, AGFI = .978 (acceptable levels approach 1.00)(Kline, 2011), and the coefficient of standard factor loading ranges from .767 to .876. The coefficient of standard factor loading of variables was different from zero with a statistical significance of .05 ($p < .05$). The factor analysis of sustainable leadership for vocational college administrators also show that the sustainable leadership model is consistent with empirical data: the coefficient of standard factor loading of variables was different from zero with statistical significance of .01 ($p < .01$). The highest level variable was sustainable development (STL6, b_{sc} = .876) followed by recognition and promotion of diversity (STL5, b_{sc} = .862) and the lowest factor loading variable was respecting, honoring and learning from the best experiences (STL7, b_{sc} = .767). The obtained analysis was used to verify the sustainable leadership for vocational college administrators as a fundamental data for establishing and promoting sustainable leadership to exist and to be able to manage human resources, budget and academic affairs in institutions (Lambert, 2011; 2012). The vocational school administrators are responsible for resource management and conservation; they must establish and nurture a favorable environment within the organization and encourage constant evolution through the development of the skills and abilities of the members of the organization, their cleverness and wit supporting their process of leading subordinates. Building capacity and creating involvement and development of strategic measures of success (Davies, 2007). Therefore, the vocational school institutions need to conceive of sustainable leadership as something that lasts beyond the tenure of any one person. This could mean ensuring selection criteria for new leaders incorporate a commitment to the values and changes the incumbent leader and staff have put in place. In addition, the distribution of leadership will ensure there are people within the institution who can sustain a change agenda over time.

CONCLUSION

The results indicate that the measurement model of sustainable leadership of vocational college administrators is an appropriate and valid model: its components (the importance of sustainable leadership; ensuring that leadership remains sustainable; the distribution of sustainable leadership; justice in sustainable leadership and doing no harm to others; the recognition and promotion of diversity; sustainable development; and respecting, honoring and learning from the best experiences) are convergent, discriminable, valid and reliable. The loading values are all higher than 0.5, and are statistically significant ($p < 0.01$). The research indicates that the sustainable development indicator makes the highest contribution to sustainable leadership by vocational college administrators. Overall, the results indicate that the proposed sustainable leadership model was consistent with empirical data. It may therefore be of use in the development of guidelines for sustainable leadership, especially in the educational sphere.

This study investigated only the opinions of vocational education administrators, did not study the opinions of both teachers and stakeholders. The acquisition of the information on sustainable leadership may not be comprehensive. The future research should study the opinion of both teachers and stakeholders. In addition, this

research is for public vocational institutions only. Therefore, it should be studied in private vocational institutions for the acquisition of sustainable leadership of the executives are more complete.

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