

## Factors and Indicators of Innovative Leadership of Private School Administrators in the Digital Era on the East Coast Southern Sub-Region of Thailand

Nirote Tongrugjun<sup>1</sup>, Niran Chullasap<sup>2</sup>, Jaras Atiwithayaporn<sup>3</sup>

### Abstract

*This article aims to study the factors and indicators of innovative leadership of private school administrators in the digital era and develop the structural model, factors, and indicators of innovative leadership of private school administrators in the digital era on the East Coast southern sub-region of Thailand and assess the congruence of the developed structural model with empirical data. The study was conducted by mixed methods and was divided into 2 phases. The first phase was to study the factors and indicators of innovative leadership of private school administrators by analyzing and synthesizing documents, concepts, theories, and research related to innovative leadership of school administrators that will lead organizations to compete in the digital era. The second phase was the research hypothesis assessment. Data was collected from a sample group of 580 school administrators and analyzed using statistics and AMOS software. The tools employed in data collection was a 5-level rating scale questionnaire with CVI, which was at 0.97, and the overall reliability value, determined from calculating Cronbach's alpha coefficient, was at 0.98. The findings are as follows 1) The factors and indicators of innovative leadership of private school administrators in the digital era comprise 6 main factors, 23 sub-factors, and 116 indicators, which can be classified as 18 indicators of innovative vision, 13 indicators of Innovative creativity, 22 indicators of teamwork and innovation participation, 17 indicators of risk management, 22 indicators of creation of an innovative organizational atmosphere, and 24 indicators of personality and innovative role performance. 2) The developed structural model on innovative leadership indicators of school administrators shows congruence with empirical data, with chi-square = 209.017 with no statistical significance ( $p = .062$ ),  $df = 179$ , Chi-square/ $df = 1.168$  (less than 2). In addition, it was found that  $GFI = .970$ ,  $AGFI = .954$ ,  $CFI = .995$ ,  $NFI = .966$ ,  $RMSEA = .017$ , and  $RMR = .004$ .*

**Keywords:** *factors and indicators, innovative leadership, private school administrators, digital era.*

### Introduction

The world in the digital age is borderless. Every organization is faced with rapid changes. This is a result of the progress of technology global economics, competition natural transformation, or the problem of labor shortage which is an important motivation for

---

<sup>1</sup> Doctor of Education Program in Educational Administration, Hatyai University, Thailand, E-mail: nirote.ton006@hu.ac.th

<sup>2</sup> Associate Prof. Dr., Faculty of Education and Liberal Arts, Hatyai University, Thailand, E-mail: nirun\_ch@hu.ac.th

<sup>3</sup> Associate Prof. Dr., Faculty of Education and Liberal Arts, Hatyai University, Thailand, E-mail: jarus\_a@hu.ac.th

leaders in various organizations. There is a need for increased creativity, learning organizational management innovations to solve problems and increase efficiency which will lead to progress and defeat competitors together with educational reform policies in the second decade whose vision is that Thai people will learn throughout their lives with quality educational reform framework is based on 4 factors: 1) developing the quality of modern Thai people, 2) developing the quality of modern teachers, 3) developing the quality of educational institutions and learning resources in the modern era, and 4) developing a new management system (Office of the Secretariat of the Education Council, 2011, p.13-31). Under the rapid changes of today's society in many aspects, including growth management, every profession must adapt greatly to lead to success and progress. Educational management is the same. It is necessary to change the approach to make education achieve the goals and objectives set out, and because the educational profession is a high-level profession, educational administrator educational institution administrators, educational supervisors, teachers, and educational personnel must be "professionals" for education to be effectively achieved. Educational institution administrators are key personnel of educational institutions and are professional leaders who must have competency, knowledge, abilities, morality, ethics, and good professional ethics. That will lead to effective and efficient educational institution administration (Roonjarern, 2014, p.7). Due to this rapid change, organizations need leaders who can respond to the changes. quickly as well.

Leadership is the process of guiding and motivating others to follow the policy to achieve the goals and objectives of the organization and is a process. That executive can stimulate the achievement of work according to the organization's objectives. Through the process of persuading members of the organization to cooperate fully to drive policy and practice toward success (Daft, R. L., 1999). The appropriate leadership to lead the organization to success in this era of change is "Innovative leadership" because innovative leadership is a synthesis of various leadership styles. To influence subordinates to make them think about producing work and creative service delivery (Adjei, 2013). Innovative leadership in the 21st century combines the concepts of 5 leadership theories: 1) Transformational Leadership, 2) Charismatic Leadership, 3) Self Leadership, 4) Visionary Leadership, and 5) Democratic Leadership are strategies for innovative leadership success, consists of 3 factors: 1) Knowledge means innovative leaders must use basic knowledge in mathematics, economics, politics, history, language and know techniques, methods, technology, processes, and regulations. Providing good knowledge and advice to operators, understanding and being aware of the problems of operators, and finding ways to deal with problems successfully. 2) Talents, Skills, and Values are (1) Talents means that innovative leaders must have a competitive advantage strategy by thinking and analyzing the situation. factors both inside and outside the organization analyzing the environment conducive to innovation Seeing the future in leadership development or having the ability from birth. but developed through learning Continuous action and repetition (2) Skills means that innovative leaders must have skills. What is the strategy for developing it to be better than before? To reduce working time, increase quality, and reduce risks from operations It is a skill that needs to be developed through the organizational learning process and can use tacit knowledge to create new methods. (3) Values mean that leaders' innovation emphasizes reasoning. believe in potential and give importance to developing and exchanging common visions. Giving advice and strengthening motivation to be successful in achieving vision and valuing new things in the organization; and 3) Willpower means that innovative leaders must have vision, foresight, and determination. want to be the best Great leaders are driven and inspired by their passion and vision (Sen and Eren, 2012). Innovative leadership, therefore suitable for leading organizations especially educational organizations to be successful in the world in the digital age.

At present, the problem situation in southern provinces on the East Coast southern sub-region of Thailand is that affects responding to rapid changes in the digital world, this

makes it an obstacle to compete with other organizations in both the public and private sectors. both problems within the area and problems from outside problems within the area include: 1) Teachers and educational personnel do not use research results and innovations to improve the quality of education. 2) Teachers and educational personnel lack sufficient language skills and technology to raise the quality of education. 3) Teachers and educational personnel have not received continuous and thorough development. 4) Personnel still lack morale in performing their duties due to structural changes. 5) Budget management is inefficient due to personnel lacking knowledge and understanding of regulations. Regulations for using the budget. 6) Procedures for carrying out the work are not clear. This causes the use of the budget to be incorrect. 7) Materials, equipment, and technology are not used effectively, resulting in a wasted budget for developing the quality of education. 8) The management system is inefficient. It is not conducive to educational development. 9) The translation of policy into practice is still inefficient. As a result, the performance of educational quality development does not reach the goal. 10) The performance monitoring and evaluation system is still ineffective. Affects the overall quality of education. 11) Students, youth, teachers, and personnel lack the necessary skills in the 21st century, which is conducive to raising the quality of education. 12) Students, youth, and youth lack discipline, the desire for knowledge, and lifelong learning. 13) The learning management process of teachers and communities in society is still not consistent with learning. that is effective and continuous throughout life. 14) Overall academic achievement still does not meet national standards. 15) Students and youth lack skills, knowledge, and abilities that affect the country's labor production (Office of Education Region 5, 2021, p.72). And external problems include: 1) High-level policies are always changing. Affects the continuation of educational development and the overall quality of education. 2) Globalization affects the adjustment of the educational management system. 3) Laws, regulations, and guidelines of a bureaucratic system with many procedures that are not conducive to educational management. 4) Problems of the family institution and social problems such as drugs, gambling, separation, or desertion Affect the development of student quality. 5) Educational law enforcement is not serious. This makes the implementation of educational reform unsuccessful and achieves its goals. 6) Liberalization of education in both formal, non-formal and a variety of informal education. 7) The system for filtering information from the Internet is inefficient. It is an obstacle to the quality development of children and youth. 8) Information database systems in the field of education, there is a lack of integration between educational agencies (Office of Education Region 5, 2021, p.74). When considering the problems that occurred, it was found that all of the above problems had various causes. And there are people affected throughout the education system. To solve problems, flexible and diverse methods must be used, consistent with Adjei (2013) who defined innovative leadership as it is a synthesis of various leadership styles to influence subordinates to make them think to produce results. and providing creative services, to lead the organization, to success, and compete with other organizations. In addition, Weiss and Legrand (2011) gave that definition Innovative leaders are leaders who can approach complex problems or opportunities, and discover new ways of doing things that have never happened before Leaders or executives must have Innovative Intelligence to help them better respond and solve problems in real situations and help create more innovation in the organization.

For the above reasons. Innovative leadership studies for school administrators, therefore, it is very important in helping to strengthen educational institution administrators. Especially administrators in private schools to have innovative leadership. This will also be beneficial to the development of the quality of education in the present era. The researcher, therefore wishes to study and develop the elements and indicators of innovative leadership of private educational institution administrators in the digital era in the southern provinces on the East Coast southern sub-region of Thailand.

## Literature Review

Innovative Leadership for the Twenty-First Century, which is the research work of Asim Şen and Erol Eren (2012). Many people throughout the world have been suffering from the problems of hunger, health, poverty, unemployment; lack of quality, liberty, and independence; and inequality, corruption, terrorism, wars, population growth, and environmental destruction. It is clear to many people that these problems can't be solved with the contemporary leadership practices that have generated them. Besides, these problems have been generated in a long time and deep in history, so they cannot be solved in a short time with incremental changes. The solution to these accumulated problems requires radical changes. This paper argues that innovative leadership practices provide such changes that enable leaders to solve these problems. Innovative leadership means introducing something new like an idea, method, technique, process, product, service, or discovery to solve current problems and satisfy people's needs at the present and in the future. Innovative leaders can solve current problems with a focus on the future. Innovative leaders have several qualities in common, such as leadership knowledge, skills, values, and talents to recognize the danger of current problems and anticipate their negative impacts on the future. They are visionary and committed to increasing peoples' economic, political, and social well-being and protecting the environment and the planet, for creating a just society. This paper provides some insights into innovative leadership practices by analyzing some of the greatest innovative leaders of the twentieth century. It is hoped that these insights may help those leaders who are trying to solve the current problems and prevent their negative impacts on the future.

A leader's ability to discover and implement innovations is crucial to adapting to changing technologies and customer preferences, enhancing employee creativity, developing new products, supporting market competitiveness, and sustaining economic growth. Gliddon and Rothwell provide an exciting and comprehensive resource for readers who are currently seeking to build success in organizations with new ideas. Innovation leadership involves synthesizing different leadership styles in organizations to influence employees to produce creative ideas, products, services, and solutions. It is a practice and an approach to organizational development and organizational change. Innovation leadership commonly includes four basic stages, which are: (a) support for idea generation, (b) identifying innovations, (c) evaluating innovations, and (d) implementation. There are two types of innovations, including (a) exploratory innovation, which involves generating brand-new ideas, and (b) value-added innovation, which involves modifying and renewing ideas that already exist. The two fundamental leadership theories that are generally necessary for innovative leadership are path-goal theory and Leader-Member Exchange theory. The key role in the practice of innovation leadership is that of the innovation leader. However, there are currently multiple perspectives on the definition of an innovation leader. An individual in an organization, a group within an organization, the organization itself, and even a community, state, or nation can be considered an innovation leader. The book explores each of these perspectives on the definition of an innovation leader. (Gliddon, 2006)

The Development of Indicators on Innovative Leadership of School Directors under Offices of Primary Education Service Areas in the Northeast of Thailand, which is the research work of Thitinan Nanthasri (2020) conducted research with the aim of 1) Developing indicators of innovative leadership among school administrators. 2) Check the consistency of the structural model of innovative leadership indicators of school administrators developed with empirical data, and 3) Create a manual for using innovative leadership indicators for school administrators. The research is a mixed method conducted in 3 phases, consisting of Phase 1: creating indicators of innovative leadership among school administrators. By analyzing documents and research, interviews with expert case studies, and creating a conceptual framework to draft indicators. Phase 2: Examining research hypotheses with empirical data. To confirm

indicators of innovative leadership among school administrators. Collect data from sample groups 721 educational institution administrators analyzed the data with a statistical package. The tool used to collect data is a 5-level evaluation scale questionnaire with a consistency index between 0.55 - 1.00, a confidence value for the entire document. Using Cronbach's alpha coefficient of 0.82, data were analyzed using confirmatory factor analysis. Phase 3: Creation of a manual for using innovative leadership indicators for school administrators. By having 5 experts evaluate the quality using a 5-level rating scale based on a Likert scale.

Enhancement of Innovative Leadership of Entrepreneurs in Processed Food Business by Jureewan Janpla (2016). This research aims to 1) Study the components of innovative leadership of entrepreneurs in the food processing business, and 2) Create a manual for developing innovative leadership of entrepreneurs in the food processing business. The population and sample include experts and entrepreneurs in the food processing business. The tools used include Semi-structured in-depth interviews, questionnaires, pre-training, and post-training tests. and a satisfaction assessment form for trainees. Data analysis methods include: Content analysis frequency analysis, percentage, mean, standard deviation, T-value test, effectiveness index analysis, and exploratory component analysis. The research results found that there are 6 components of innovative leadership for entrepreneurs in the food processing business: 1) Setting directions and strategies towards innovation, 2) Creating an atmosphere and culture that is conducive to learning, and 3) Creating networks and management. knowledge, 4) Defining teamwork structures, 5) Supporting and motivating innovation goals, and 6) Developing innovative thinking skills. The cumulative variance of all 6 components was 61.273 percent. The results of creating a handbook for developing innovative leadership for entrepreneurs in the food processing business consisted of 5 categories: 1) Innovation and innovation development, 2) Creating networks and a learning organization atmosphere, 3) Strategic management for innovative leaders, 4) Teamwork Motivation and communication, and 5) Developing innovative thinking skills. The 6 elements of innovative leadership and a guide to developing innovative leadership for entrepreneurs in processing businesses. The diet was agreed upon by experts by consensus. The results of using the manual for developing innovative leadership for entrepreneurs in Food Processing Business Section 4 Teamwork Motivation and communication Learning Unit 1: Teamwork and reducing conflict in teams. It was found that the effectiveness index was equal to .57 and the satisfaction with the training was at a high level.

Boosting innovative work behavior on local branded fashion: The evidence from Indonesia by Roy Setiawan (2020). This research aims to analyze the role of psychological empowerment as an intervening variable in the relationship between transformational leadership and employees' innovative work behavior (IWB). This research used a quantitative approach with a total of 100 employees from local branded fashion businesses in Indonesia to fill out the questionnaires. The sample was taken using a non-probability sampling technique. This study adds to innovative work behavior literature by empirically testing the mediating role of psychological empowerment on transformational leadership and innovative work behavior relationships. This study resolves the research gap between transformational leadership and innovative work behavior with the concept of psychological empowerment.

Innovative leadership attributes of school administrators in the Philippines Implications for educational management by Arlene R. Pagaura (2020). Innovative leadership is crucial in the 21st century. The success of any organization depends on the kind of leaders in managing the helm of the institution. This study determined the attributes of school administrators in the four dimensions namely: visionary, team builder, relationship builder, and risk taker. The descriptive method was employed using quantitative data. This study was conducted at Bukidnon State University, Northern Mindanao, Philippines. A total of 102 respondents participated in this study. They represented the five colleges

of the university such as the College of Arts and Sciences, College of Nursing, College of Education, College of Social Development, College of Business, and College of Social Development and Technology. The data were gathered using a researcher-structured questionnaire. The instrument was validated and the coefficient reliability of Cronbach Alpha is 0.951. Mean and Standard deviation were utilized to analyze the data. The findings revealed that the administrators agreed with their teachers considering the four indicators of innovative leadership attributes. This implies that the administrators are highly innovative. The result of the study serves as a guide for educational planners to incorporate the results of the study into regular strategic planning.

In summary, there are many forms of studying innovative leadership, including finding patterns and finding ways to use them. Find elements and indicators or find structural equations but in most cases, there must be a process for developing elements and indicators. and check the consistency of the developed structural model, components, and indicators with empirical data. The research will be a combined research method. Through a tool that is a structured interview in qualitative research. For quantitative research, the tool is a sample questionnaire. Using a 5-level rating scale based on a Likert scale, the obtained data was then used to check the consistency of the developed component structure model and indicators with empirical data by the CFA method to further confirm the accuracy of the data.

From literature review can be used to define the conceptual research framework, as shown in Figure 1.

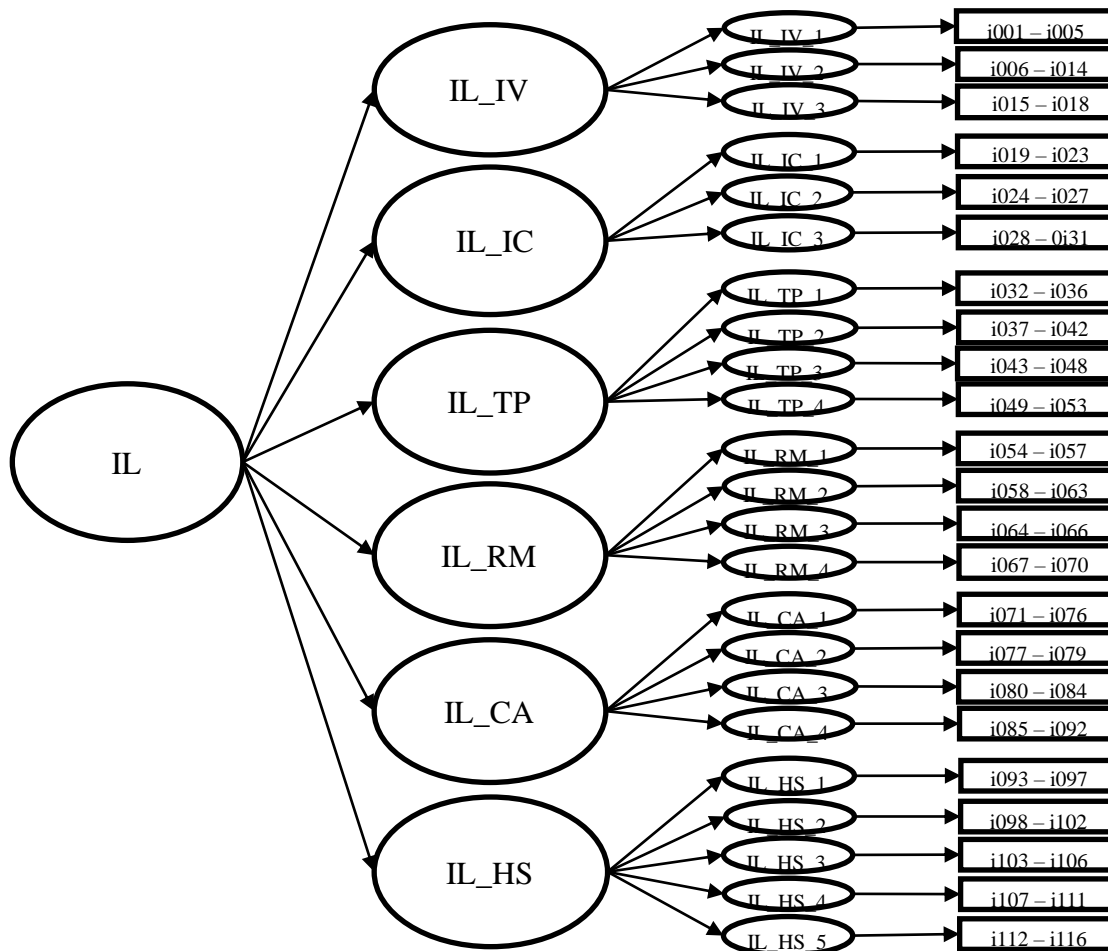


Figure 1. Research Conceptual Framework

## **Research Methods**

Factors and indicators of innovative leadership of private school administrators in the digital era on the East Coast southern sub-region of Thailand. Uses a mixed method. The qualitative method is to study the factors and indicators of innovative leadership of school administrators. By analyzing and synthesizing documents, concepts, theories, and research related to innovative leadership of school administrators that will lead organizations to compete in the digital age, and the quantitative method is to examine factors and indicators of innovative leadership of private school administrators in the digital era in the East Coast southern sub-region of Thailand. Consistent with empirical data and research hypotheses.

**Population and Samples:** The population used in this research includes private school administrators on the East Coast southern sub-region of Thailand, there are 5 provinces, consisting of Songkhla Province, Phatthalung Province, Nakhon Si Thammarat Province, Chumphon Province, and Surat Thani Province, totaling 447 schools (Office of the Permanent Secretary, Ministry of Education, 2022), considering 1 private school director and 1 administrator in another position, totaling a total population of 894 people.

For sample, in this research, the researcher determined the sample size according to the concept of Hair et al. (Hair et al. 2010, p. 101), which requires the sample size to be at least 5-10 times the observed variable. For this research, there were 116 variables to be analyzed or observed variables, so the total sample size was 580 people, proportional stratified random sampling, and simple random sampling.

**Research tools:** this is a questionnaire on the opinions of school administrators regarding the factors and indicators of innovative leadership of school administrators of private schools in the digital era on the East Coast southern sub-region of Thailand, there are 6 main factors, 23 sub-factors, and 116 indicators. The questionnaire used in the research is divided into 2 parts as follows: Part 1: General information of the respondents, consisting of gender, and job position. Highest educational qualification, and size of the educational institution, Part 2: The questionnaire is a 5-level rating scale based on the Likert's Scale format.

**Data collection:** The researcher divided data into 2 phases as follows: Phase 1: Studied factors and indicators of innovative leadership of school administrators. By analyzing and synthesizing documents, concepts, theories, and research related to innovative leadership of school administrators that will lead organizations to be competitive in the digital era. Phase 2: Examining research hypotheses with empirical data by experimenting. (Try-out) the tool with 30 educational institution administrators in schools that were not the sample and used to collect data with the sample group of educational institution administrators on the east coast southern sub-region of Thailand, there were 580 people and the results were analyzed using advanced statistical analysis using confirmatory factor analysis (CFA).

### **Data Analysis**

Data analysis of the factors and indicators of innovative leadership of school administrators of private schools in the digital era on the East Coast southern sub-region of Thailand. Contains data analysis on the appropriateness of innovative leadership indicators for school administrators. By finding the mean, standard deviation, and confirmatory factor analysis (CFA) to test the harmony of the factors structure model. and determine the weight of sub-variables used in creating indicators with empirical data from data analysis from questionnaires. Using the assessment criteria according to Table 1. and analyzing the factors and indicators of innovative leadership of school administrators of private schools in the digital era on the East Coast southern sub-region of Thailand. According to the hypothesis of the research.



Table 1. Criteria for evaluating the Conformity Index

Conformity Index	Acceptable values to be consistent	Source
Chi-square	$p < .05$	Arbuckle, (2012, p. 53) Bollen, (1989, p. 278)
Chi-square/df	$\text{Chi-square/df} \leq 3$	Schermelleh-Engel et al. (2003) Marsh (1999, p. 567)
Normed-Fit Index, Tucker-Lewis Index (TLI)	$\text{NFI} \geq .90$	Hu & Bentler, (1995, p.95) Schumaker & Lomax, (2016, p. 112)
Comparative Fit Index (CFI)	$\text{CFI} \geq .90$	Hu & Bentler, (1995, p.95) Schumaker & Lomax, (2016, p. 112)
Goodness of Fit	$\text{GFI} \geq .95$	Daire Hooper, et al., (2008)
(Adjusted) Goodness of Fit	$\text{AGFI} \geq .90$	Daire Hooper, et al., (2008)
Root Mean Square (RMR)	$\text{RMR} < .08$	Hu & Bentler, (1995, p. 90) Schumaker & Lomax, (2016, p. 112)
Root Mean Square Error of Approximation (RMSEA)	$\text{RMSEA} < .08$	Arbuckle (2012, p. 604) Browne & Cudeck, (1993, p. 146)

## Results

The researcher has summarized the research results into 2 phases as follows.

Phase 1: Study of the factors and indicators of innovative leadership of school administrators of private schools in the digital era on the East Coast southern sub-region of Thailand, the study results found that it consists of 6 main factors, 23 sub-factors, and 116 indicators.

Phase 2: Developed the structural factors and indicators of innovative leadership of school administrators of private schools in the digital era on the East Coast southern sub-region of Thailand and check consistency with empirical data.

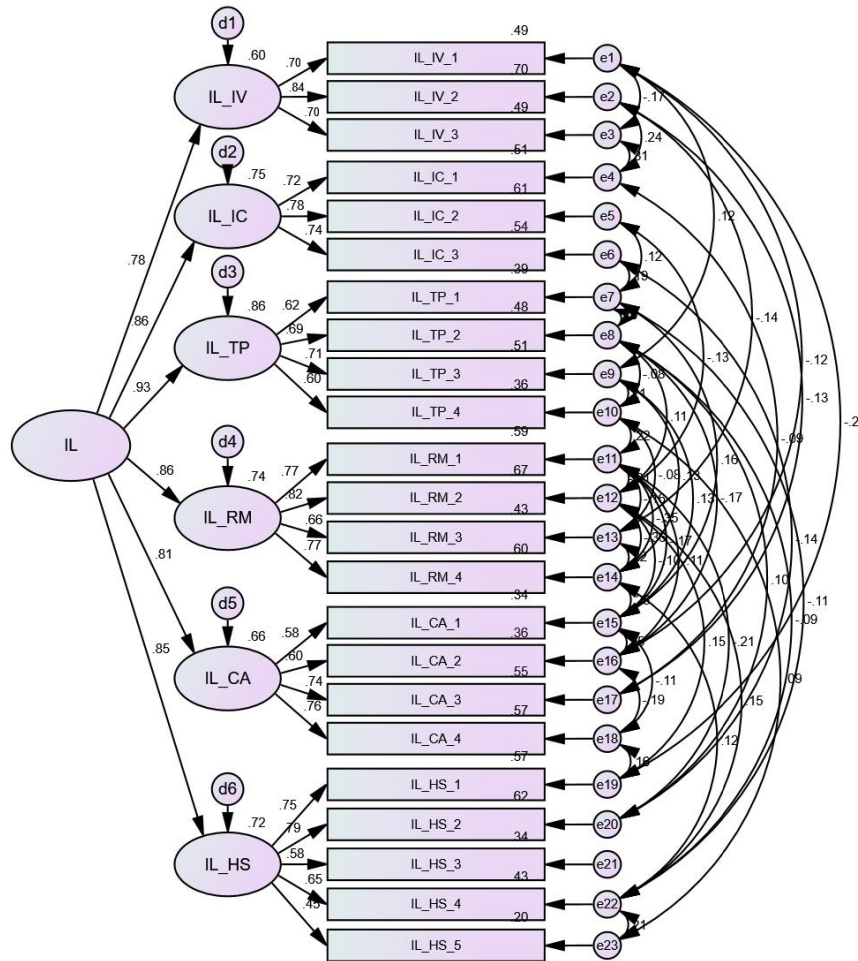
Analysis of the model this time. It is the third-order confirmatory factor analysis. The researcher separated the analysis and presented the data analysis results into 2 parts: the first was a confirmatory factor analysis to create a factor scale and the second was the second-order confirmatory factor analysis. The results of the analysis are similar to the third-order confirmatory factor analysis. Using the AMOS program to analyze the data.

1. Results of confirmatory factor analysis using the Amos program to create standard factors from 116 indicators according to all 6 sub-models: 1) Innovative Vision (IL\_IV) were found, Chi-square=134.71, df=110, Chi-square/df=1.23,  $p=.055$ , GFI=.97, AGFI=.96, CFI=.99, NFI=.95, RMR=.01, and RMSEA=.02. The factors loading of all 18 indicators are positive, ranging from 0.49 to 0.66. 2) Innovative Creativity (IL\_IC) were found, Chi-square =66.44, df=53, Chi-square/df=1.25,  $p=.102$ , GFI=.98, AGFI=.97, CFI=.99, NFI=.96, RMR=.01, and RMSEA=.02. The factors loading of all 13 indicators are positive, ranging from 0.48 to 0.68. 3) Teamwork and innovation Participation (IL\_TP) were found, Chi-square =181.09, df=158, Chi-square/df=1.11,  $p=.158$ , GFI=.97, AGFI=.96, CFI=.99, NFI=.94, RMR=.01, and RMSEA=.01. The factors loading of all 22 indicators is positive, ranging from 0.47 to 0.65. 4) Risk Management (IL\_RM) were found, Chi-square =106.91, df=90, Chi-square/df=1.19,  $p=.108$ , GFI=.98, AGFI=.96, CFI=.99, NFI=.97, RMR=.01, and RMSEA=.02. The factors loading of all 17 indicators are positive, ranging from 0.51 to 0.76. 5) Creation of an innovative organizational Atmosphere (IL\_CA) were found, Chi-square =187.20, df=163, Chi-square/df=1.15,  $p=.094$ , GFI=.97, AGFI=.95, CFI=.99, NFI=.93, RMR=.01, and RMSEA=.02. The factors loading of all 22 indicators are positive, ranging from 0.32 to 0.77. And 6) High personality and role performance Skills (IL\_HS) were found, Chi-square =230.57, df=206, Chi-square/df=1.12,  $p=.115$ , GFI=.97, AGFI=.95, CFI=.99, NFI=.94, RMR=.01,



and RMSEA=.01. The factors loading of all 24 indicators are positive, ranging from 0.31 to 0.75.

2. Results of the second-order confirmatory factor analysis of the innovative leadership of school administrators of private schools in the digital era on the East Coast southern sub-region of Thailand model, it was found to be consistent with empirical data. The results are shown in Figure 2.



Chi-square = 209.017, Chi-square/df = 1.168, df = 179, p = .062, GFI = .970, AGFI = .954, CFI = .995, NFI = .966, RMR = .004, RMSEA = .017

Figure 2. Innovative leadership model for school administrators of private schools in the digital era on the East Coast southern sub-region of Thailand.

Figure 2, showing the measurement model verification results: The results of the verification of the measurement model by corroborative component analysis revealed that the measurement model was consistent with the empirical data. It was found, Chi-square =209.017, df=179, Chi-square/df=1.168, p=.062, GFI=.970, AGFI=.954, CFI=.995, NFI=.966, RMR=.004, and RMSEA=.017, which meets the specified criteria and found that the factors loading of the main factors and sub-factors are as follows: 1) Innovative Vision (IL\_IV) has a factor loading is 0.77 consisting of sub-factors: Setting a vision (IL\_IV\_1) has a factor loading is 0.70, Creating and Communicating a Vision (IL\_IV\_2) has a factor loading is 0.83, and Executing the Vision (IL\_IV\_3) has a factor loading is 0.70. 2) Innovative Creativity (IL\_IC) has a factor loading is 0.86 consisting of sub-factors: Initiative (IL\_IC\_1) has a factor loading is 0.72, Innovative thinking (IL\_IC\_2) has a factor loading is 0.78, and Flexible thinking (IL\_IC\_3) has a factor loading is 0.74. 3) Teamwork and innovation Participation (IL\_TP) has a factor loading is 0.93 consisting of sub-factors: Setting shared goals (IL\_TP\_1) has a factor loading is 0.62, Building trust

(IL\_TP\_2) has a factor loading is 0.70, Team participation (IL\_TP\_3) has a factor loading is 0.71, and Clear role definition and work assignment (IL\_TP\_4) has a factor loading is 0.60. 4) Risk Management (IL\_RM) has a factor loading is 0.86 consisting of sub-factors: Risk assessment (IL\_RM\_1) has a factor loading is 0.77, Decision-making (IL\_RM\_2) has a factor loading is 0.82, Continuous learning (IL\_RM\_3) has a factor loading is 0.66, and Acceptance of failure (IL\_RM\_4) has a factor loading is 0.77. 5) Creation of an innovative organizational Atmosphere (IL\_CA) has a factor loading is 0.81 consisting of sub-factors: Creating an environment conducive to learning (IL\_CA\_1) has a factor loading is 0.58, Having a mentoring system (IL\_CA\_2) has a factor loading is 0.60, Promoting teaching innovation (IL\_CA\_3) has a factor loading is 0.74, and Creating and participating in professional learning communities (IL\_CA\_4) has a factor loading is 0.76. And 6) High personality and role performance Skills (IL\_HS) has a factor loading is 0.85 consisting of sub-factors: Leadership that is open to experience (IL\_HS\_1) has a factor loading is 0.75, Assertive leadership (IL\_HS\_2) has a factor loading is 0.79, Thought leadership (IL\_HS\_3) has a factor loading is 0.58, Being an organizer (IL\_HS\_4) has a factor loading is 0.65 and Being a good role model (IL\_HS\_5) has a factor loading is 0.45.

## Discussion

This research has three main issues for discussion of results according to the research objectives and research hypotheses as follows:

1. The suitability of the indicators for selection is defined in the model: From the research results, it was found that the 116 indicators had an average between 4.36-4.60 and a Coefficient of Variation (CV) between 6.96-11.26, which is an appropriate indicator that can be selected in every model. Because the mean is equal to or greater than 3.00 and the Coefficient of Variation (CV) is equal to or lower than 20%, it may be due to the research method that the researcher used to create and develop the indicators in this research. It is a method that uses an empirical definition that has a model set with theory and research as a basis to support it, according to the view of Nonglak Wiratchai (2002), which is a method that requires a solid study of theory and research. This causes the researcher to study theories and research results from various sources in a logical manner. Results are summarized using synthesis. To determine the main factors, sub-factors, and indicators are accurate and consistent with the theory and research results used as references. In addition, the researcher is aware of the recommendations that “Examining the quality of indicators under the theoretical framework, considered very important, because if the development of indicators, starting from a theoretical framework that lacks quality no matter how good the statistical methods are used. The results from development will also be inferior in quality” (Chuechan Jongsathityu and Sawang Pinmanee, 1986, cited in Wirot Sararatana, 2015) and the advice that “The study of theory and research to determine it are the factors, Sub-factors, And the indicator must take into account the validity of the content as important” (Wirot Sararattana, 2015). In addition, in research, the researcher has taken into account the quality of research operations according to the Max-Min-Con principle. According to the views of Kerlinger and Lee (2000), both in determining the sample size, and sample sampling method, including creating and developing the quality of tools for use in research correctly according to academic principles, resulting in the results of checking the suitability of all 116 indicators with averages and distribution coefficients meeting the criteria. and are suitable and can be selected in every such model
2. The consistency of the model with empirical data: From the results of the research, it was found that the model developed from theory and research was consistent with the empirical data according to the specified criteria. Both models that use confirmatory factor analysis are, the Model of Innovative Vision (IL\_IV), the Model of Innovative

Creativity (IL\_IC), the Model of Teamwork and innovation Participation (IL\_TP), the Risk Management Model (IL\_RM), the Model of Creation of an innovative organizational Atmosphere (IL\_CA), and the Model of High personality and role performance Skills (IL\_HS). The first-order confirmatory factor analysis model is the measurement model of Innovative Leadership (IL). The researcher has reasons to explain it as follows.

Theory and research are used to create models. It is a theory and research that is consistent with the expression or behavior of the sample used in the research. This may be due to the universality of theory and research, that has spread throughout the world according to globalization a world without borders according to Rouse's (2016) view is a process in which people express their ideas, and exhibit products widely around the world, including interaction, integration across cultures, governance and economics and the view of Pologeorgis (2017) that globalization is a process based on an international strategy aimed at expanding business operations on a global scale and facilitating communication around the world, due to technological advancements and developments in social, economic, political, and environmental developments. In addition, it may be due to the rapid development of technological advancements, and can easily access information, especially in the era of Digital Globalization. This is the definition of the current world where technology has developed at a rapid pace compared to the past decade (Tanaphon Srithanyaphong, 2017) which allows theories and research from one place to spread quickly and widely. As Reiche (2016) views, "We are about to enter a new era of globalization called Digital Globalization. It is an era of the influx of data and information such as ideas, research, technology, and special abilities or even outstanding activities that can be accessed all over the world" Lund and Manyika (2017) point out that the internet has become necessary for people in today's era to search for information on product consumption, or even running a business, this trend of change has occurred rapidly in both size and value in the era of "Digital Globalization" and may be considered from the diffusion of innovation according to the view of Roger (1995), the person who invented and proved the theory of diffusion of innovation theory that believes that social and cultural changes occur from the spread of new things from one society to another and that society adopts and uses this new thing is innovation, which it is both knowledge, ideas, techniques and methods, and a new technologies and the viewpoint of Kammerzelt (2017) stated that "Innovations and New Technologies are Changing the World and the Daily Lives of Every One of Us." That means Innovation and technology are changing the world and our daily lives. From the point of view of globalization views regarding the advancement of digital technology or the internet and views regarding the dissemination of innovation as mentioned above. This results in theories and research that are developed into models that are consistent with the expressions or empirical behavior of the sample groups used in the research.

3. The Factor Loading: From the research results, it was found that the weight of the factors (Factor Loading) of the factors, sub-factors, and indicators have values according to the specified criteria. This may be due to the same reason discussed above regarding the appropriateness of the indicator, that the factors, sub-factors, and indicators used in research, have been educated from various sources of theory and research. There is a synthesis for selection in the model, taking into account the validity of the content or variables studied in every step according to the view of Wirot Sararattana (2015) who said that the study of theory and research results to determine the factors, sub-factors, and indicators or main content must take into account the validity of the content. Both are in the process of determining the factors, sub-factors, and operational definitions to be used as indicators.

From the research results. Both in the case of testing the consistency of the model with empirical data and in the case of component weights. That was found to be by the specified criteria and shows that the structural relationship model of innovative leadership

indicators consisting of 6 factors, 23 sub-factors, and 116 indicators can be used for both academic and practical use with confidence in its construct validity. Research results can be supported in various cases, such as: 1) helping to gain new knowledge that is appropriate and consistent with the context of the area that can be used as a reference source for continued research or develop it to be completely better in the future. 2) Can be used for other types of research, such as structural equation modeling, research, and development, or participatory action research, etc. 3) Helps to have the ability to reduce data into a form that is easy to use, reduce data redundancy, it is a summary of information, makes it possible for the organization to use, monitor, review, and make decisions about the organization's operations and has qualifications that can be used at all levels. Whether it is an organization at the national level or in a sub-division. 4) Use it as a guideline in planning or creating criteria for evaluating effective followership for teachers under local administrative organizations. To determine strengths and weaknesses in personnel development by the problems. 5) Used as useful in monitoring missions for use in decision-making. and evaluation of operations to see to what extent the set objectives have been achieved, etc.

## References

- [1] Adjei, D. (2013). Innovation leadership management. *International Journal of ICT and Management*, 1, 103-106.
- [2] Arbuckle, J. L. (2012). *AMOS 20.0 user guide*. Crawfordville, FL: Amos Development Corporation.
- [3] Arlene R. P. (2020). Innovative leadership attributes of school administrators in the Philippines: Implications for educational management. *Interdisciplinary Research Review*, 1-7.
- [4] Bollen, K.A. (1989). *Structural Equations with Latent Variables*. NJ: Wiley.
- [5] Browne, M. W. and Cudeck, R. (1993). Alternative ways of assessing model fit. In: Bollen, K. A. & Long, J. S. (Eds.), *Testing Structural Equation Models*, Beverly Hills, CA: Sage, 136-162.
- [6] Daft, R.L. (1999). *Leadership: Theory and Practice*. Florida: The Dryden.
- [7] Gliddon, D. (2006). *Innovation Leadership*. USA: Colorado Technical University.
- [8] Hair, J., et al. (2010). *Multivariate data analysis (7th ed.)*. Upper Saddle River, New Jersey: Pearson Education International.
- [9] Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural Equation Modelling: Guidelines for Determining Model Fit. *The Electronic Journal of Business Research Methods*, 6, 53-60.
- [10] Hu, & Bentler. (1999). Cut off criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), pp. 1-55.
- [11] Janpla, J. (2016). Enhancing innovative leadership of entrepreneurs in the food processing business. *Journal of Southern Technology*, 9(1), 53-60.
- [12] Kammerzelt, A. (2017). What is technology? And why is it so important for us in everyday life? Retrieved February 3, 2018, from <https://bit.ly/2KfofGp>
- [13] Kerlinger, F. N., & Lee, H. B. (2000). *Foundations of behavioral research (4th ed.)*. Holt, NY: Harcourt College Publishers.
- [14] Lund, S. & Manyika, J. (2017). Defending digital globalization. Retrieved February 3, 2018, from <https://fam.ag/2EgaROm>
- [15] Marsh, H. W., & Hau, K.T. (1999). Confirmatory factor analysis: strategies for small sample sizes. In: *Statistical Strategies for Small Sample Size*. Sage Publications.

- [16] Nampradit, A., & Phutthaprasert, S. (2019). Innovative Leadership Development Model of Sarasas Group Executives. *NIDA Development Journal*, 59(1), 98-120
- [17] Nanthasri, T. (2020). The Development of Indicators on Innovative Leadership of School Directors under Offices of Primary Education Service Areas in the Northeast of Thailand. *Social Sciences Research and Academic Journal*, 14(3), 93-106.
- [18] Office of Education Region 5. (2019). Educational development plan for the Southern Provinces on the East Coast southern sub-region of Thailand (2020 - 2022). Retrieved October 10, 2021, from <http://www.reo5.moe.go.th/web/index.php/2009-11-17-06-54-49/2010-02-04-02-49-52/903---2020-2022>.
- [19] Office of the Secretariat of the Education Council. (2011). Strategy for the production and development of the country's manpower During the second decade of education reform 2009-2018. Bangkok: Prikwarn Graphic Co., Ltd.
- [20] Office of the Permanent Secretary, Ministry of Education. (2022). Educational information exchange service center system Ministry of Education. Retrieved August 11, 2023, from <https://exchange.moe.go.th/web/OpenData.htm?mode=openDataSearch&Ps=01>.
- [21] Pologeorgis, N. (2017). How globalization affects developed countries. Retrieved February 3, 2018, from <https://bit.ly/2HNRUF5>
- [22] Reiche, S. (2016). Digital globalization: The new era and its implications. Retrieved February 3, 2018, from <https://bit.ly/2GMfHiv>
- [23] Roger, E.M. (1995). *Diffusion of Innovations* Fourth Edition. Retrieved on January 15, 2018, from <https://www.d.umn.edu/~lrochfor/ireland/dif-of-in-ch06.pdf>
- [24] Roonjareern, T. (2014). Professionalism in organizing and managing education in the educational reform era for round 2 of reform and external assessment round 3. Bangkok: Khaofang Publishing.
- [25] Rouse, M. (2016). Globalization. Retrieved February 3, 2018, from <https://bit.ly/2MVOFYy>
- [26] Sararatana, W. (2015). *Educational administration research: concepts, practices and case studies* (4th ed.). Bangkok: Thipwisut.
- [27] Schermelleh-Engel, Moosbrugger, & Muller. (2003). Evaluating the fit of structural equation models: Tests of significance and descriptive goodness-of-fit measures. *Methods of Psychological Research Online*, 8 (2), 23-74.
- [28] Schumacker, R. E., & Lomax, R. G. (2016). *A Beginner's Guide to Structural Equation Modeling* (4th Ed.). New York: Routledge.
- [29] Sen, A., and Eren, E. (2012). Innovation Leadership for the Twenty-first Century. *Procedia-Social and Behavioral Sciences*. 41 (2012), 1-14.
- [30] Setiawan, R. (2020). Boosting innovative work behavior on local branded fashion: The evidence from Indonesia. Surabaya: University of Kristen Petra.
- [31] Srithanyaphong, T. (2017). Looking at modern globalization through the concepts of digital globalization and platform business. Retrieved February 3, 2018, from <https://www.scbeic.com/th/detail/product/3938>
- [32] Weiss, S. D. and Legand, P. C. (2011). *Innovative Intelligence*. Ontario: J. Wiley & Sons Canada, Ltd.
- [33] Wiratchai, N. (2002). *Lisreal model: statistical analysis for research* (3rd ed.). Bangkok: Chulalongkorn University Printing House.