Digital Leadership for the Chief Executive Officers (CEOs) of the Energy Industry in the Eastern Region

Pekhanang Yodmanee

Burapha University International College, Thailand

E-mail: pekhanang@go.buu.ac.th

Received March 14, 2024**; Revised** April 7, 2024**; Accepted** April 30, 2024

Abstract

This research aimed to study (1) the components of the digital leadership model among the CEOs of the energy industry in the Eastern Region. (2) To analyze the surveyed components of the digital leadership model among the CEOs of the energy industry in the Eastern region. The research is conducted using a mixed-methods approach. The sample consisted of 11 participants, including the CEOs of the energy industry and 400 employees within the Eastern Region's energy industry. They were selected by employees working in industrial estates of approximately 40,000 people by the rules and a multistage random sampling. The instrument for collecting data was group interviews conducted with CEOs in the energy industry in the Eastern Region, with 11 participants selected through purposive sampling. Open-ended questions were employed to guide these interviews. The study collects a questionnaire survey with a reliability coefficient of 0.900. Analysis data from descriptive statistics include frequency analysis, percentage analysis, mean analysis, standard deviation analysis, exploratory factor analysis, and content analysis. The research results were found as follows: 1. The research findings on the digital leadership components of the energy industry in the Eastern Region derived from 11 CEOs of the energy industry in the Eastern Region by focus group, consisting of 7 components: 1) digital vision; 2) digital knowledge and skills; 3) digital management; 4) digital culture; 5) digital collaboration network; 6) digital adaptation; and 7) digital strategy. 2. An exploratory factor analysis of the digital leadership components for CEOs was found to be suitable, encompassing digital vision, digital knowledge and skills, digital management, digital culture, digital collaboration network, digital adaptation, and digital strategy.

Keywords: digital leadership; CEOs; eastern region

Introduction

Master plan for promoting Thailand's digital economy (2018–2022) emphasizing a vision for a digital economy rooted in a society that thinks, learns quickly and empowers individuals to adapt and create opportunities from digital technology and innovation. The strategy focuses on developing the workforce's digital capabilities, starting with computational thinking skills, coding, digital invention, and platforms for digital skill development. (Master plan for promoting Thailand's digital economy 2018–2022, 2017). In the context of digital leadership among CEOs of industrial in the Eastern Region during the digital era, the study acknowledges the critical importance of leaders possessing up–to–date knowledge and leveraging technology for effective management in evolving contexts. The use of Information Communication Technology (ICT) by CEOs in the energy business is explored, highlighting its popularity and support in decision–making through data analytics and real–time insights.

The research emphasizes the role of ICT–enabled business information systems in aiding CEOs to make better operational and strategic decisions, thereby enhancing overall performance and revolutionizing business strategies. (Gatautis, 2008) Du et al. (2023) found a high perception of innovation management and a moderate perception of business strategy within the CCIC Company, with a focus on problem–solving, project selection, product development, and commercialization. To gain a competitive advantage, organizations must explore innovative approaches, involve employees in education and strategic planning, and acquire expertise in management analysis. Prioritizing work experience, knowledge, and skill acquisition is essential for organizational success while leveraging technology can further enhance efficiency and facilitate development. Satsup et al. (2024) study underscores a commendable presence of digital leadership and effective overall school management among administrators. Notably, administrators exhibit strong support for digital technology, yet there is room for improvement in their responsiveness to organizational change. The statistically significant positive correlation between digital leadership and various aspects of management, particularly in academic and budget domains, emphasizes the interconnectedness of effective leadership and successful school administration. Yasanop and Lertamornsak (2024) confirm the advanced ability of educational institution administrators to be digital leaders. This represents a comprehensive and high level of competence. The study also established a strong link between the key issues of digital leadership and the overall effectiveness of educational institutions in the Nonthaburi Secondary Educational Service Area Office. It provides valuable insights for promoting improved education administration through strategic digital leadership

practices. Cahyadi and Magda (2021) identify elements of innovation encompassing institutions, human capital and research, infrastructure, market sophistication, business sophistication, knowledge and technology outputs, and creative outputs. Competitiveness 4.0 includes institutions, infrastructure, ICT adoption, macroeconomic stability, health, skills, product market, labor market, financial system, market size, business dynamism, and innovation capability.

The research aimed to investigate the components of the digital leadership model among Chief Executive Officers (CEOs) of industrial companies in the Eastern Region. The components of the digital leadership model among the CEOs of the energy industry in the Eastern Region from 11 CEOs of the energy industry in the Eastern Region and employees working in industrial estates, approximately 40,000 people, with a sample size of 400 people with the multi-stage random sampling following Yamane's principle. The research studies the components of the digital leadership model among the CEOs of the energy industry in the Eastern Region. It analyzes the surveyed components of the digital leadership model among the CEOs of the energy industry in the Eastern Region.

Furthermore, the study delves into the influence of ICT on the decision-making process of CEOs, stressing its significant role in providing valuable insights and improving efficiency. It recognizes advanced technologies, such as data analytics, big data, machine learning, and network links, as effective tools for CEOs to make informed decisions backed by evidence-based data, gaining a competitive edge in the market. (Sreesuknam, 2021) The research also underscores the importance of real-time data through ICT for CEOs to make informed decisions (Kaewjeerasin & Suksoodkeay, 2019). Access to real-time feedback from stakeholders and customers is highlighted as essential, eliminating guesswork and contributing to improved decision-making. The analysis of real-time data through ICT is portrayed as instrumental in understanding the impact of decisions on customers, establishing accurate timetables, and assisting in future marketing initiatives and product development.

In conclusion, the study positions the availability and analysis of real-time data through ICT as a significant contributor to improved decision-making for CEOs in the Eastern Region, providing accurate, reliable, and actionable information. The research will further synthesize the components of the digital leadership model among these CEOs, outlining the traits and format relevant to the digital era.

Research Objectives

1. To study the components of the digital leadership model among the CEOs of the energy industry in the Eastern Region.

2. To analyze the surveyed components of the digital leadership model among the CEOs of the energy industry in the Eastern Region.

Literature Review

The literature reviews relevant concepts associated with digital leadership and components related to the digital leadership model of energy business administrators in the Eastern Region. The key concepts are summarized as follows:

Gilster (1997) Digital leadership involves understanding and utilizing information from various sources presented through computers and the Internet.

Martin and Grydziecki (2006) Digital leadership refers to individuals who are aware of and capable of using digital tools appropriately. They identify, access, manage, integrate, evaluate, analyze, and synthesize digital resources to create new knowledge.

Ritter (2015) Digital leadership involves the strategic use of digital strategies in managing company assets to achieve business goals. It is measurable at both organizational and individual levels.

Miller (2018) Digital leadership is a concept that focuses on improving the quality of life through the widespread use of technology.

Yusof et al. (2019) define the concept of "Digital Leadership" as school leaders who integrate digital technologies, such as mobile devices, communication applications, and websites, into sustainable education management. The transformation in the use of digital technology in this school requires leaders to blend resources, hardware, and technology.

According to Chaemchoy (2019), "Digital Leadership" refers to the behavior of managers that reflects their knowledge and understanding of using technology to promote learning management in educational institutions. They should have a vision and lead in encouraging teachers and staff involved in integrating technology into education that aligns with the context and needs of learners.

From the study on the meaning of "Digital Leadership," the researchers conclude that it refers to the ability of managers to demonstrate a digital vision in supporting resources and promoting collaboration among administrators and staff. They effectively integrate digital technology into

management in line with context and learner needs. Upon reviewing the literature, the researcher identified a theoretical framework consisting of 15 components related to the digital leadership model of energy business administrators in the Eastern Region. These components include digital knowledge, professionalism, innovation skills, digital vision, collaboration networks, communication, public relations, brand creation, digital learning environments, decision–making and problem–solving, adaptability, digital culture, empowerment strategies, management strategies, and performance measurement.

This conceptual framework will serve as a guide for the upcoming research, focusing on these components in the study of the digital leadership model.

The researcher has utilized the considerations and components mentioned by scholars and researchers to form a unified understanding of the digital leadership components of energy business administrators in the Eastern Region. These components have been grouped into the same category, resulting in 15 components that the researcher will use as a conceptual framework for the research. This conceptual framework serves as a guide for the upcoming group discussions in this research. The 15 components include:1) Digital Knowledge and Skill, 2) Professionalism, 3) Innovation skills; 4) digital vision, 5) digital collaboration networks, 6) communication, 7) public relations, 8) brand creation, 9.) digital learning environment, 10) decision–making and problem–solving, 11) adaptation to the digital era, 12) digital culture, 13) digital strategies, 14) digital management, and 15) performance measurement and evaluation.

Conceptual Framework

This research is a research study Digital Leadership component. The researcher defines the research conceptual framework based on the Digital Leadership Theory (Toduk, 2014; Broadribb, 2014; Zhu, 2014; Sullivan, 2017; Damayanti and Mirfani, 2021; Sangpho et al., 2017) The details are as follows:

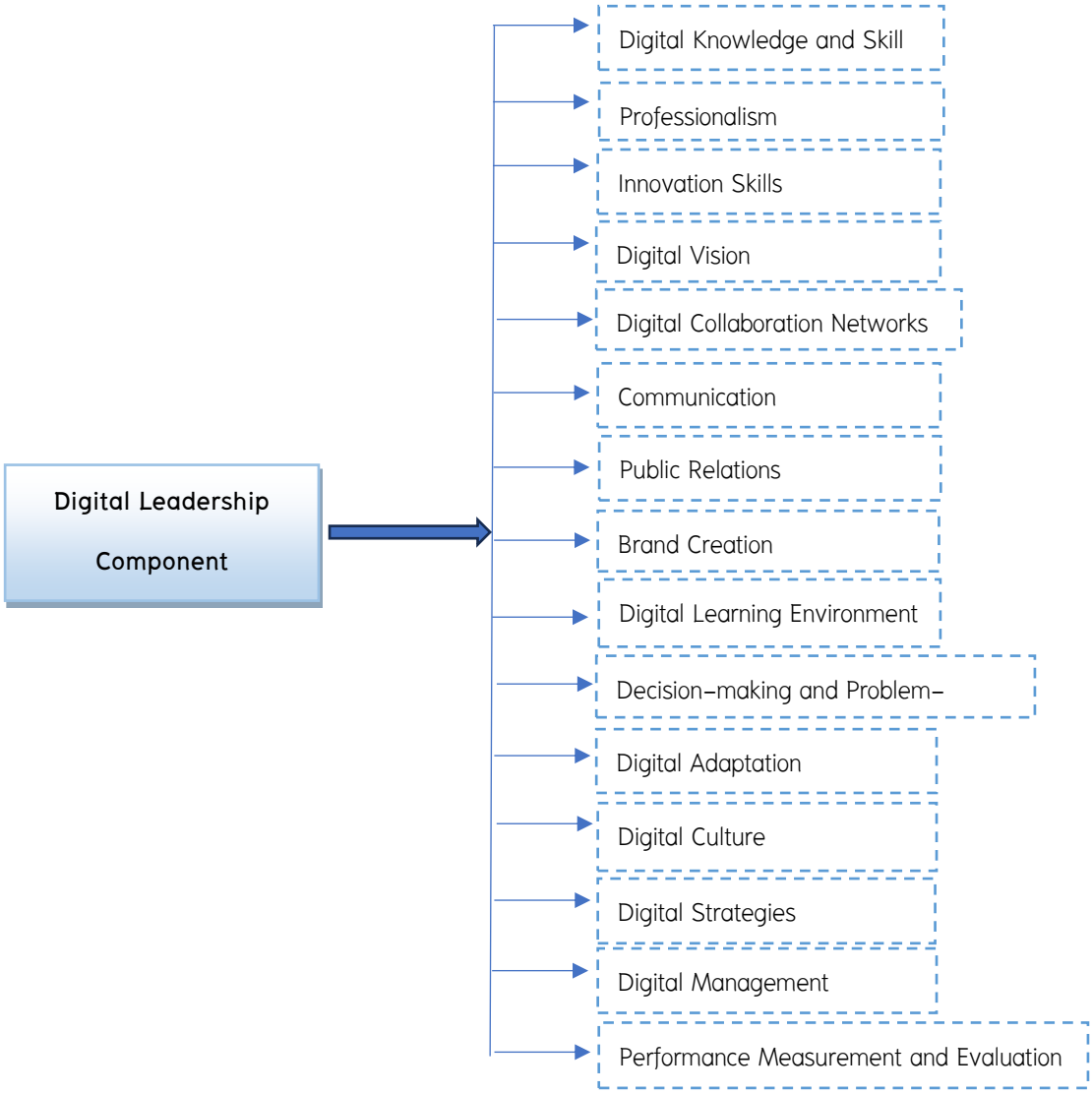


Figure 1 Conceptual Framework

Research Methodology

This research method is mixed–methods research. By conducting research according to the steps in 2 steps, each step consists of data sources and research tools. Data collection, data analysis and statistics used in data analysis are as follows:

Step 1: Qualitative research is performed to study the digital leadership components of the CEOs of the energy industry in the Eastern region. Sources of information: The key informants are 11 CEOs. So, 11 people were obtained utilizing purposive sampling.

The research tool is a question that is used as a guideline for focus group discussion about the draft elements of digital leadership for the digital leadership of the CEOs of the energy industry

in the Eastern region. data collection by conducting a group discussion via the Zoom Meeting system on December 5, 2023. Time: 1–4 p.m.

Qualitative research uses a triangulation method to examine the data. (Methodological Triangulation)

Step 2: Quantitative research aims to conduct an exploratory factor analysis to analyze the exploratory survey components of the digital leadership model among the CEOs of the energy industry in the Eastern region. The data is derived from the summarized feedback provided by the participants, including employees working in industrial estates and approximately 40,000 people, with a sample size of 400 people with multi–stage random sampling following Yamane's principle.

The instrument underwent content validity checking by experts using the Index of Item–Objective Congruence (IOC) technique. Five experts evaluated 50 items, with an IOC value ranging from 0.60 to 1.00. Two items were eliminated based on this evaluation. A try–out was conducted with the remaining items, and the internal consistency reliability was found to be 0.900.

Data collection was carried out through an electronic questionnaire distributed via Google Forms, allowing the real–time entry of responses. Data analysis involved utilizing statistical measures such as frequency, percentage, mean, standard deviation, and exploratory factor analysis to examine the survey's components.

Timeframe Scope: June 2023 – December 2023.

Research Results

The study on the components of digital leadership among energy business managers in the Eastern region revealed seven fundamental components at the basic level. These components are:

1. Digital Vision
2. Digital Knowledge and Skills
3. Digital Management
4. Digital Culture
5. Digital Collaboration Network
6. Digital Adaptation
7. Digital Strategic Planning

The exploratory factor analysis (EFA) of the components of digital leadership among the CEOs in the Eastern region, conducted as part of the quantitative research, resulted in the following findings:

1. Testing for appropriateness, sufficiency, and the matrix of inter-variable correlation, assessed using statistical tests such as KMO and Bartlett's test. The KMO value (Kaiser-Meyer-Olkin measure of sampling adequacy) approached one, indicating a high level of adequacy for factor analysis, as shown in Table 1.

Table 1 KMO and Bartlett's test of Sphericity

Kaiser-Meyer-Olkin measure of sampling adequacy	.946
Bartlett's test of sphericity Approx. Chi-Square	42995.280
df	2773
sig	0.000

Table 1 shows that the Kaiser-Meyer-Olkin (KMO) statistic has a value of .946. This indicates that the components of the digital leadership of the CEOs of the energy industry in the East region, within the basic education sector (comprising 7 components), have an adequate and suitable quantity for statistical analysis. The KMO value is greater than 0.5 and approaches 1.

2. Exploratory factor analysis was conducted to extract important components by analyzing the sample group's opinions. The extraction method used was Principal Component Analysis (PCA) with orthogonal rotation through Varimax rotation. The researcher set a criterion for selecting components with factor loadings of 0.50 or higher, representing practical significance. The selected components had eigenvalues greater than 1, and each component had three or more variables, following the Kaiser criterion. The number of components and the variance explained by the components of the digital leadership of the CEOs of the energy industry in the East region are presented in Table 2.

Table 2 Components and the variance values of the variables in the digital leadership state of the CEOs of the energy industry in the East region

Component	Initial eigenvalues			Rotation sums of squared loadings		
	Eigenvalues	% of variance	Cumulative	Eigenvalues	% of variance	Cumulative
1	45.926	61.237	61.235	11.667	15.554	15.554
2	2.746	3.663	64.899	10.826	14.433	29.990
3	2.576	3.436	68.335	9.287	12.384	42.373
4	2.343	3.126	71.458	9.145	12.193	54.567
5	1.897	2.530	73.988	7.579	10.103	64.673
6	1.714	2.286	76.273	5.684	7.576	72.250
7	1.556	2.074	78.348	4.574	6.097	78.349

The number of components and the variance values of variables in the energy industry in the Eastern region, it is found that there are 7 components. Components 1–7 can collectively explain 78.347% of the total variance.

For the components that meet the criteria of the 7 predefined components, the researcher set criteria for selecting components with factor loadings of 0.50 or higher, representing practical significance. The selected components had eigenvalues greater than 1, and each component had three or more variables. The digital leadership components of the CEOs of the energy industry in the Eastern region consist of 5 components. These components include Component 1 with 15 variables, Component 2 with 11 variables, Component 3 with 11 variables, Component 4 with 11 variables, Component 5 with 5 variables, Component 6 with 4 variables, and Component 7 with 3 variables. The remaining variables did not meet the criteria, as shown in Table 3.

Table 3 Components of the CEOs of the energy industry in the East region

Component	Names of component	Number of variables	Eigenvalues	Factor loading
1	Digital Vision	15	45.931	0.507– 744
2	Digital Knowledge and Skills	11	2.754	0.514–0.725
3	Digital Management	11	2.581	0.506–0.722
4	Digital Culture	11	2.348	0.509–0.712
5	Digital Collaboration Network	5	1.899	0.505–0.707
6	Digital Adaptation	4	1.717	0.502–0.651
7	Digital Strategic	3	1.559	0.547–0707
	Total	**60**		**0.502–0.744**

Digital components leadership; 1) Digital Vision, 2) Digital Knowledge and Skills, 3) Digital Management, 4) Digital Culture, 5) Digital Collaboration Network, 6) Digital Adaptation, 7) Digital Strategic Planning

Discussions

From the findings of the research on the digital leadership model of corporate executives, the discussion can be summarized as follows:

1. Results from research objective 1 found that the digital leadership components of energy sector executives in the Eastern region, derived from focus group discussions, consist of 7 components: 1) Digital Vision; 2) Digital Knowledge and Skills; 3) Digital Management; 4) Digital Culture; 5) Digital Collaboration Network; 6) Adaptation to the Digital Era; and 7) Digital Strategy.

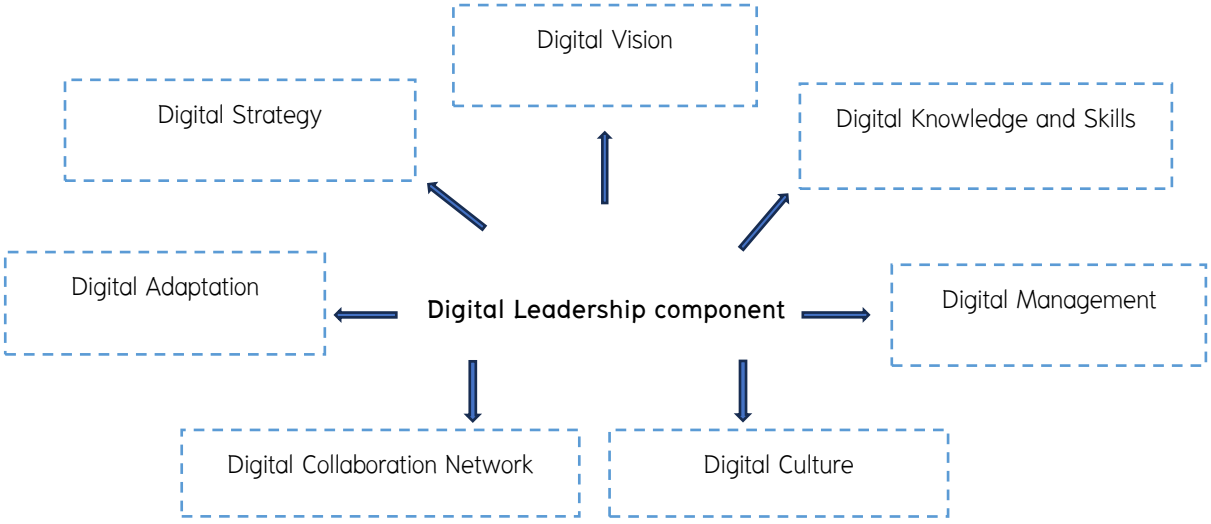
The results of this study align with research findings that are consistent with the theoretical framework and research results on digital leadership and its components, both domestically and internationally. Specifically, Component 1, Digital Vision, aligns with the works of Toduk (2014), Broadribb (2014), Zhu (2014), Sullivan (2017), Damayanti & Mirfani (2021), and Sangpho et al. (2017). Component 2, Digital Knowledge and Skills, corresponds with Toduk (2014), Kaganer et al. (2014), Broadribb (2014), Sullivan (2017), and Turan (2018). Component 3, Digital Management, agrees with Leesakul (2018). Component 4, Digital Culture, is supported by Sheninger (2014), Kaganer et al. (2014), Broadribb (2014), and Sangpho et al. (2017). Component 5, Digital Collaboration Network, matches Toduk (2014) and Sheninger (2014). Component 6, Digital

Adaptation, is consistent with Kaganer et al. (2014), Sullivan (2017), and Leesakul (2018). Lastly, Component 7, Digital Strategy, aligns with Turan (2018).

2. From the findings of part 1, the qualitative research through group discussions revealed that the digital leadership traits of corporate executives consist of 7 components: 1) Digital Vision; 2) Digital Knowledge and Skills; 3) Digital Management; 4) Digital Culture; 5) Digital Collaboration Networks; 6) Digital Adaptation; and 7) Digital Strategy. From part 2, the quantitative research through questionnaire creation found that the digital leadership components of executives in the energy sector in the Eastern region align with the qualitative research findings. However, the research discovered that the digital leadership components of corporate executives consist of the same 7 components in both qualitative and quantitative research, which are appropriate and match the context. The most critical component ranked first is Digital Vision, indicating that executives in the Eastern region's energy sector must recognize the importance of digital technology, starting with a digital perspective that envisions the future digitally to set short–term and long–term operational plans. This ensures the company has a clear, unified direction for efficient management in the eastern region's energy sector. The next important component is Digital Knowledge and Skills, showing that executives are developing digital skills and knowledge, such as internet usage, security technologies, software applications, digital media creation, collaborative technologies, and conferencing, to solve various problems in management and improve operational efficiency and speed. The following significant component is Digital Management, where executives can appropriately decide on and apply digital technologies to solve problems modernly and swiftly, addressing issues rapidly.

The digital leadership components of the energy industry in the Eastern Region, using group interviews with one participant, identified 7 components as follows: 1) Digital Vision; 2) Digital Knowledge and Skills; 3) Digital Management; 4) Digital Culture; 5) Digital Collaboration Network; 6) Digital Adaptation; and 7) Digital Strategy.

This research can be used for the benefit of both public and private sector management.



Conclusion

1. The study results of the digital leadership components of energy industrial executives in the Eastern region, using group interviews with one participant, identified 7 components as follows: 1) Digital Vision; 2) Digital Knowledge and Skills; 3) Digital Management; 4) Digital Culture; 5) Digital Collaboration Network; 6) Digital Adaptation; and 7) Digital Strategy.

2. The results of the exploratory factor analysis reveal the digital leadership state pattern of the CEOs of energy industries in the Eastern Region. It comprises 7 components as follows: 1) Digital Vision; 2) Digital Knowledge and Skills; 3) Digital Management; 4) Digital Culture; 5) Digital Collaboration Network; 6) Digital Adaptation; and 7) Digital Strategy.

Suggestions for implication

Results from research objectives found that spatial differences, structural variations, and budget disparities contribute to suboptimal digital leadership exhibited by administrators. Therefore, relevant agencies should proceed, as it is essential to conduct further research in this area. Research should be conducted to develop metrics for assessing the digital leadership capabilities of administrators affiliated with employees. It should focus on the digital leadership patterns of administrators within both public and private energy industries. The insights gained from this research can be applied to guide future developments in private sector administration.

Suggestions for future research

This research has found the digital leadership components of the energy industry in the Eastern Region. Using group interviews with one participant, we identified seven components as

follows:1) Digital Vision; 2) Digital Knowledge and Skills; 3) Digital Management; 4) Digital Culture; 5) Digital Collaboration Network; 6) Digital Adaptation; and 7) Digital Strategy. It can be applied to the public and private energy industries by focusing on the digital leadership patterns of administrators. Further research should be done on issues related to developing metrics for assessing the digital leadership capabilities of administrators affiliated with employees.

References

Benitez, J., Arenas, A., Castillo, A., & Esteves, J. (2022). Impact of Digital Leadership Capability on innovation performance: The role of platform digitization capability. *Information & Management, 59*(2), 103590.

Broadribb, K. (2014). *Digital leaders: The new technology Gurus in school.* https://wholeeducation.wordpress.com/2014/11/18/gigital-leaders-the-new-technology-gurus-in-school

Cahyadi, A., & Magda, R. (2021). Digital leadership in the economies of the G20 countries: A secondary research. *Economies, 9*(1), 32.

Chaemchoy, S. (2019). *School management in the digital era.* Chulalongkorn University.

Damayanti, F.P., & Mirfani, A.M. (2021). An Analysis of Digital Leadership in the Pandemic COVID-19 Era. *Advances in Social Science, Education, and Humanities Research, 526,* 156-159. file:///C:/Users/HP/Downloads/125952613.pdf

Du, Q., Kamkankaew, P., Thanitbenjasith, P., & Guo, H. (2023). Innovation Management of Improving Business Strategy in CCIC Company, China. *International Journal of Sociologies and Anthropologies Science Reviews*, *3*(5), 61-70.

Gatautis, R. (2008). The impact of ICT on public and private sectors in Lithuania. *Engineering Economics, 4*(59), 18-28.

Gilster, P. (1997). *Digital literacy.* John Wiley.

Kaganer, E., Sieber, S., & Zamora, J. (2014). *The 5 Keys to a Digital Mindset.* Forbes. https://www.forbes.com/sites/iese/2014/03/11/the-5-keys-to-a-digital-mindset/

Kaewjeerasin, N., & Suksoodkeay, V. (2019). *Creative leadership and educational quality of the educational opportunity expansion school in Nakhonpathom Province*[Doctoral dissertation, Silpakorn University].

Leesakul, P. (2018). *Leadership in the Digital Era.* https://today.line.me/th/pc/article/Leadership+in+digital+era

Martin, A., & Grydziecki, J. (2006). Dig Eu Lit: Concepts and tools for digital literacy development. *ITALICS; Innovation in Teaching & Learning in Information & Computer Sciences, 5*(4), 246–264. https://doi.org/10.11120/ital.2006.05040249

Master plan for promoting Thailand's digital economy (2018–2022). (2017). *Digital economy promotion agency.* https://www.depa.or.th/storage/app/media/file/depa–Promotion–Plan–Book61–65.pdf

Miller, C. (2018). digital leadership: Using the internet and social media to improve the lives, well–being, and circumstances of others. *Journal of Family and Consumer Sciences, Alexandria, 110*(1), 45–48.

Ritter, J. (2015). *Digital leadership.* https://searchcio.techtarget.com/definition/digital–leadership

Sangpho, J. et al. (2017). *Leadership in organizational management in the digital age: A case study of IT organizations and IT–related organizations in the Bangkok Metropolitan Region.* College of Innovation, Thammasat University.

Satsup, P., Cha–umpong, T., & Pakdeejit, Y. (2024). the relationship between digital leadership and administration of the secondary educational service area office Kamphaeng Phet. *Interdisciplinary Academic and Research Journal, 4*(1), 805–822. https://doi.org/10.60027/iarj.2024.273936

Sheninger, E. (2019). *Digital leadership: Changing paradigms for changing times* (2nd ed.). SAGE Publications.

Sreesuknam, K. (2021). The causal model of digital marketing strategies affects the millennial generation's decisions about electronic gadgets. *Srinakharinwirot Research and Development (Journal of Humanities and Social Sciences), 13*(26), 1–19.

Sullivan, H., & Skelcher, C. (2017). *Working across boundaries: Collaboration in public services.* Bloomsbury Publishing.

Tingsabadh, K. (2014). *Challenges of a new frontier in learning: Education 4.0.* In the academic seminar on new frontiers of learning: Education System 4.0. November 1, 2014 at Dusit Thani Hotel. Learning Innovation Center Chulalongkorn University.

Toduk, Y. (2014). 2023 Lideri–Dijital Çağın Liderlik Sırları. Istanbul, Doğan Egmont Yayınları.

Yasanop, K., & Lertamornsak, G. (2024). Digital leadership affecting the personnel administration effectiveness of school administrators in the office of secondary educational service area Nonthaburi. *Interdisciplinary Academic and Research Journal, 4*(1), 93–112. https://doi.org/10.60027/iarj.2024.271927

Yusof, M.R., Yaakob, M.F.M., & Ibrahim, M.Y. (2019). Digital leadership among school leaders in Malaysia. *International Journal of Innovative Technology and Exploring Engineering (IJITEE), 8*(9), 1481–1485.