

Strategic Digital Leadership in the Private Sector for Digital Transformation Towards Enabling Sustainable Digital Economy in Thailand

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This research aims to find competencies required for strategic digital leadership (SDL) in the private sector for digital transformation (DT) towards enabling sustainable digital economy (SDE) development in Thailand and relationship among these three key components. The research was conducted by applying both qualitative and quantitative approaches using structural equation modeling (SEM) methodology and analysis with 328 samples from representatives in the organizations in private sector. From the study, it founds out that, in private sector, 1) SDL impacts on DT (Loading Factor (FL = 0.59), 2) DT impacts on SDE (FL = 0.70), 3) SDL has least impact on SDE (FL = 0.14), 4) Strategic leadership competency plays major roles in SDL (FL = 1.00) and 5) Ethics which is the newly proposed pillar in this research besides the current existing ones which are economy, society and environment also has impact to SDE (FL = 0.88) and 6) Operation process is the mostly important factor on DT (FL = 0.90). The innovative study of this research could be very useful to private sector management level and government policy makers on building up the right key competencies related to the needs of private organizations for strategic digital leaders to digitally transform the organizations which could successfully bring the organizations' sustainable digital economy at the end. Most importantly, the leader could not alone and directly drive the organizations to achieve the sustainable digital economy, however, the systematic digital transformation implemented with the right strategic digital leadership competencies is certainly required.

Keywords: *Digital transformation, strategic leadership, digital leadership, sustainable digital economy.*

1. INTRODUCTION

Digital transformation is on the agenda of all contemporary organizations as technological innovation accelerates and continues to influence everyday life and business (Henriette, 2016; Morakanyane et al., 2017; Nadeem et al., 2018; Stoffers et al., 2018). Digital transformation, also called digitalization, can be described as a technology-enabled disruptive change process that affects every aspect of the organization and ultimately enables business improvement (Henriette, 2016; Morakanyane et al., 2017; Verhoef et al., 2021). Such a transformation extends beyond mere technological change; it affects the organization and its processes as a whole. In addition to strategic, organizational, and cultural challenges, it also brings leadership and management challenges (Klein, 2020; Tabrizi et al., 2019; Henriette, 2016; Karimi & Walter, 2015; Selandar & Jarvenpaa, 2016; Kaivo-Oja et al., 2017; Mirhosseini et al., 2020).

However, for digital transformation, the technology is only part of this complex phenomenon which besides technology, researchers have identified organizational aspects, such as the structure of the organization (Selandar & Jarvenpaa, 2016), culture of the organization, processes of the organization and strategy of the organization (Matt et al., 2015). This includes the notion that IT is not only the means to support change, but rather processes, people, policies, and especially leadership need to be fundamentally changed to accomplish digital transformation in the private sector (Mergel et al., 2018). Therefore, digital transformation brings leadership and management challenges which the way businesses operate in the varieties of technologies today has led leadership to realize that they cannot continue using their traditional leadership competencies in this present digital era (Selandar & Jarvenpaa, 2016; Kane et al., 2015b).

Even though, digital disruption has been regarded as difficult to identify and understand at times, due to its complexity and the rapid advances in technology, nevertheless, its implications on leadership not being taken into account, resulting in the lack of research (Tiekam, 2019). This thus stressing how little is known about digital transformation, and more importantly, leadership (Schwarz Müller et al., 2018). In addition, a lack of research in the field of digital leadership skills and digital transformation has clearly been indicated by scholarly research by Provost et al. (2018), Schwarz Müller et al. (2018) and Khan (2016) and industry research conducted by Deloitte, McKinsey, and MIT Sloan (Deloitte, 2017). There is a need for this type of study as not much research has been conducted in the combined field of leadership skills and digital transformation, as is indicated by Dubru (2018).

This is also true for the private sector, hence, especially in this research, the study on the strategic digital leadership for digital transformation in the private sector in Thailand will be explored. In addition, the research will expand the scope of study on the relationship among strategic digital leadership, digital transformation in private sector and sustainable digital economy in Thailand. Hence the research objectives will be as followings:

1. To find the key strategic digital leadership competencies for digital transformation in the private sector towards sustainable digital economy in Thailand.
2. To find the key outcomes from digital transformation in private sector.
3. To find relationship of strategic digital leadership competency, digital transformation in private sector and sustainable digital economy in Thailand.

2. LITERATURE REVIEW

2.1 Leadership

Leadership is defined as “individual traits, leader behavior, interaction patterns, role relationships, follower perceptions, influence over followers, influence on task goals, and influence on organizational culture.” (Yukl, 2010). Leadership is therefore considered to be about influencing people or a group of people to achieve a common goal (Breuer & Szillat, 2019).

2.2 Digital Leadership

Digital leadership can be defined by its contributions and how it functions in a knowledge society. El Sawy et al. (2016) define digital leadership as when leaders do what is right strategically to ensure the success of digitalization for the organization and its business environment. According to Goethals et al. (2003), digital leaders stand out from other leaders as they require a combination of new skills, attitudes, knowledge, and different experiences. Digital leaders need a vision for what they want to achieve, must be in search locally and globally for solutions, must have a passion for what they do, and must possess a hunger for constant learning from both their competitors and their peers (Lindgren & van Veenstra, 2018).

2.3 Competency

In the research of Spencer and Spencer (1993), the Iceberg Model explains a better understanding of various competency categories. The authors emphasized that it is often difficult for an organization to know whether an individual possesses these five competencies i.e., skills, knowledge, self-concept, traits and motives and that some characteristics are difficult to acquire by training. Hence, they used the analogy of the iceberg. The characteristics at the bottom of the iceberg are more hidden and more difficult to develop. According to the Iceberg Model, knowledge and skills tend to be visible and relatively surface characteristics of individuals, whereas traits and motives are deeper and more central to personality. Self-concept characteristics fall somewhere in between. Hidden and visible competencies play different roles in the job. Hidden competencies are the behavioral competencies that drive an individual performance in a job, whereas visible competencies tend to be the technical competencies required by employers (Spencer and Spencer, 1993).



Figure 1: Spencer and Spencer Iceberg Model (Spencer and Spencer. 1993).

In the competency model for the information technology workforce, Ho and Frampton (2010) emphasize IT knowledge and skills to achieve work objectives. However, management and HR researchers also believe that traits and motivations are just as influential in competently and successfully performing in a position (Boyatzis, 1982). The study of Ho and Frampton (2010) also defines expected competencies by professional IT architects as the followings.

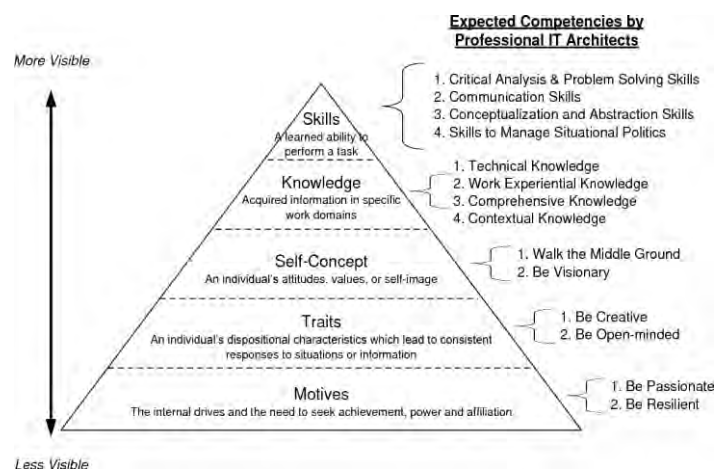


Figure 2: Competency Model for the Information Technology Workforce (Adapted from (Spencer and Spencer, 1993; Ho and Frampton, 2010).

More visible competencies:

1. Skills (A learned ability to perform a task): Critical analysis and problem-solving skills, communication skills, conceptualization and abstraction skills and skills to manage situational politics.
2. Knowledge (Acquired information in specific work domains): Technical knowledge, work experiential knowledge, comprehensive knowledge, contextual knowledge.
3. Self-Concept (An individual's attitudes, values, or self-image): Walk the middle ground, be visionary.

Less visible competencies:

1. Traits (An individual's dispositional characteristics which lead to consistent responses to situations or information): Be creative, be open-minded.
2. Motives (The internal drives and the need to seek achievement, power and affiliation): Be passionate, be resilient.

2.4 Digital Leadership Competency in EU Model

The European Commission has the ambition to ensure that Europe can be a global leader for skills and talent for digital and key enabling technologies. Against this background, the European Commission started the e-Leadership skills initiative in 2013. The Commission has recently commissioned a consortium of partners around empirica (www.empirica.com) to develop a proposal for an agenda on “Leadership Skills for the High-Tech Economy” and develop in the e-Leadership Triangle consisting of strategic leadership, business leadership and digital technology leadership as detailed below (Radman, 2020).

The e-Leadership triangle consists of 3 parts as follows:

1. Strategic Leadership: Lead inter-disciplinary staff and influence stakeholders across boundaries. This competency consists of, but not limited to, forecasting needs for information including holistic view, understanding customer needs, solution orientation, communication, creativity, independence learner, team leading, cultures and internalization.
2. Business Savvy: Innovate business and operating models, delivering value to organizations. This competency consists of, but not limited to, customer relations and sales, partnership establishment, business development, organization change, project management, process optimization, strategic mastering, agile methodology, business analytics, market analysis and financial skills.
3. Digital Savvy: Envision and drive change for business performance, exploiting digital technology trends as innovation opportunities. This competency consists of, but not limited to, Big Data Analytics and tools, cloud computing and virtualization, mobile application and development, complex business systems, web development and tools, IT architecture and platform architecture, security skills, ERP systems and social media.

The details of e-Leadership competencies are illustrated in Figure 3.



Figure 3: EU e-Leadership Competency Model.

2.5 Digital Transformation needs Digital Leadership

Leadership's role in digital transformation is crucial to every aspect, as it decides the strategy, culture, and skills of its employees and plays a key role in the decision making to take the organization forward in this digital age. Therefore, digital transformation is not about the technologies alone, a key component is the leadership and the digital leadership skills required to drive successful digital transformation through organizations. Digital leadership has been defined as, "doing the right things for the strategic success of digitalization for the enterprise and its business ecosystem" (El Sawy et al., 2016).

In addition, Kane et al. (2015a) and Kohnke (2018) brings to the forefront the fact that digital transformation is not only about technology, but also in the implementation of a clearly defined strategy and leadership to drive the right culture to change and adapt to the new. Having the right and risk-averse culture is challenging and requires leadership to have a different mind-set when it comes to new ways in digital transformation. According to Sainger (2018), "Digital transformation is not possible without a leader who creates the platform for it and drives stakeholders towards action. It is the leader who gives a thoughtful application of technology to drive a sustainable business success".

In addition, as elaborated by Tiekam (2019), traditional leadership skills such as cognitive skills, business skills, interpersonal skills, and strategic skills were relevant for successful digital transformation. Furthermore, the key digital leadership skills identified as necessary include an understanding of technology, a leader's ability to learn from failure, resilience and the ability to stand up for one's beliefs, and the ability to collaborate (Goretti & Lejeune, 2019). Finally, during research done in 2015 on US management professionals, it was discovered that successful digital transformation is more concerned with strategy, culture, and people development than with technology.

This point is further elaborated by Kane et al. (2015b) on the factors that contribute to the success of digital transformation, such as strategy, the maturity of the organization, the talent that the organization has in terms of skills, the culture of the organization and leadership have been highlighted as key attributes to successful digital transformation. In conclusion, a strategy is as much more important than technology to go through digital transformation and leaders establish strategies. By showing examples, leaders will be able to direct all their employees in the right direction. Hence with the Spencer and Spencer’s Iceberg Competency Model, the Ho et al.’s Competency Model for the Information Technology Workforce, the EU e-Leadership Model and the required competencies of digital leadership mentioned above, the proposed strategic digital leadership competencies in the private sector could be presented as in the Table 1.

Table 1: Strategic digital leadership competencies in private sector

Strategic Digital Leadership Competencies		
Strategic Leadership Capability	Business Capability	Digital Capability
Holistic Thinking and Strategic Thinking Skills	Business Process Analytic and Business Development	Digital Technology Utilization for Sustainable Development and Human Resource Development
Planning and Organizing Skills	Marketing Analytics, Strategic Marketing Management and Customers/Sales Relationship Management	Digital Technology Applications e.g. IoT, Cloud, Social, AR/VR for Cybersecurity Management
Analytical Thinking and Critical Thinking Skills	Project Management for Fast Changing Digital Technology Environment	Digital Technology Development e.g. Cloud, AR, VR, AI and Blockchain for Enterprise Resource Planning (ERP) and Business Operation
Problem Solving and Decision Making Skills	Business Process Management for Sustainable Development	Web Design and Development for Mobile Products/Services Applications
Human Resource Development and Interpersonal Skills	Enterprise Architecture for Complex Business Systems	IT/Digital Platform for Business Operation
Motivation and Team Leading Skills	Organization Changes for Business Process Efficiency Improvement	
Self-control and Personal Motivation Skills		
Initiative and Creativity and Innovation Skills		
Integrity and Moral and Ethics Skills		

2.6 Digital Transformation

Berman (2012) defines digitalization as “a set of complementary activities—reshaping customer value propositions and transforming their operations using digital technologies for greater customer interaction and collaboration”. In addition, digital transformation refers to a process where IT is applied in different areas of the organization with the intent to improve their operations. In the same vein, Shaughnessy (2018) describes digital transformation as an organization-wide endeavor which involves a variety of technical and cultural changes.

In the other aspect, digital transformation refers to firms’ use of such technologies as social media, mobile, analytics, artificial intelligence, cloud, blockchain, and Internet of Things (IoTs) technologies or embedded/implanted devices that are integrated into all parts of business or an organization with the aim of maximizing customer experience, enabling the design and adoption of new business models, changing on how business operates and value is delivered and creating

major business improvements such as enhancing customer experience, streamlining operations, or creating new business models (Horlacher et al., 2016; Singh & Hess, 2017; Hess, 2016; Westerman, 2014a; Kohnke, 2018; Warner & Wäger, 2019).

2.7 Digital Transformation in Organization Strategy, Business model and Organization Infrastructure, Operation Process, Customer Experience and New Growth

Therefore, digital transformation can be defined as a radical rethinking of using technology to change organization strategy, business models and organization structure, operational processes, customer experience and new revenue growth which leading to changes of organization, significant impact for customers, partners, and employees including profitability, customer satisfaction, increased operational efficiency, convenience and the same high-quality technical standard, increased business agility, increased employee productivity, competitive advantage and strategic differentiations (Boulton, 2018; Nahrkhalaji, 2018; Ezeokoli, 2016).

As noted above, digital transformation in terms of organization strategy includes improvement of strategy and operations of private sector organizations (Henriette, 2016; Greif, 2020) and improvement of analysis, financial planning, work follow-up, and report (Ahmed et al., 2020). Digital transformation in the aspects of changing business model and organization structure includes establishment and improvement of digital infrastructure for service readiness (Viola, 2018; Galani, 2020; Mesquita et al., 2019; Coltman et al., 2015; Goepf and Avila, 2015), set up of a new digital department to respond to the needs of clients and external organizations (Berghaus & Back, 2016; Osmundsen et al., 2018) and increase of collaboration and empowerment for private sector employees for better services to clients and external organizations (Schwarz Müller et al., 2018; Anthony et al., 2019; Henriette, 2016).

Digital transformation with regard to operation process comprises increase of efficiency in work processes or procedures and business administration in private sector operation for clients services (Schalmo & Rusnjak, 2017; Čorejová et al., 2016), development of digital technology workforce competency (Osmundsen et al., 2018; Galani, 2020; Dredge et al., 2018), reduction of gap in using digital technology for better services to clients and external organizations (Piccinini et al., 2015) and increase of engagement, relationship and loyalty of employees to their organizations (Winasis et al., 2020; Hickey & Morris, 2018).

Digital transformation concerning customer experience covers utilization of digital technology such as mobile applications to correspond to clients and external organizations (Tomičić Furjan et al., 2020), increase of service usage and accessibility to services for clients and external organizations (Genzorova et al., 2019), creation of products/services directly correspond to requirements of clients and external organizations for better satisfaction and relationship (Lichtenthaler, 2017; Guinan et al., 2019), and increase of choices and decisions on products/services for clients and external organizations (Čorejová et al., 2016; Nahrkhalaji et al., 2018).

Digital transformation in the matter of new growth involves increase of opportunity to provide services and ability to develop and bring to market on new services for clients and external organizations (Galani, 2020), create of competitive advantage for the private organizations (Osmundsen et al., 2018), increase of revenue and growth increase of ability of organization to create innovation, enhancement of online/e-Commerce service capability for clients and improvement of business strength of the organizations (Kutnjak et al., 2019, Nwankpa & Roumani, 2016).

With the background information and researches above, the digital transformation in the private sector could be concluded in the Table 2 as listed below.

Table 2: Digital transformation in private sector

Organization Strategy	Digital Transformation			New Growth
	Changing/Repositioning Business Model and Organization Structure/Core	Operation Process	User Experience	
Strategy planning and operation improvement	Digital infrastructure for service readiness	Business process, business administration and customer services efficiency improvement	Mobile applications to correspond to clients and external organizations	Marketing and products/services development improvement
Financial planning, analysis and Report Improvement	Digital technology unit setup for clients and external organizations	Digital technology workforce competency development	Services usage and accessibility improvement for clients and external organizations	Competitive advantage
	Collaboration and empowerment for Employees for better services to clients and external organizations	Digital gap reduction for better services to clients and external organizations	Products/services directly correspond to requirements of clients and external organizations and better customer satisfaction and relationship	Revenue increase and organization growth
		Employee relationship and loyalty to organization improvement	Better choices and decision on products/services to clients and external organizations	Organization Innovation Improvement
				Online/e-Commerce improvement
				Organization business strength improvement

2.8 Sustainable Development Goals

In September 2015, Heads of State and Government agreed to set the world on a path towards sustainable development through the adoption of the 2030 Agenda for sustainable Development. This agenda includes 17 SDGs which set out quantitative objectives across the social, economic, and environmental dimensions of sustainable development – all to be achieved by 2030 (Matte et al., 2015). The goals provide a framework for shared action “for people, planet and prosperity,” to be implemented by “all countries and all stakeholders, acting in collaborative partnership.”

The 17 SDGs form a cohesive and integrated package of global aspirations the world commits to achieving by 2030 by addressing the most pressing global challenges of our time, calling upon collaborative partnerships across and between countries to balance the three dimensions of sustainable development - economic growth, environmental sustainability, and social inclusion. The 17 SDGs components are shown below and in Figure 4.



Figure 4: The Sustainable Development Goals (SDGs) (Matte et al., 2015)

With the ICT capabilities to solve the issues on the three aspects of sustainability including economy, society and environment mentioned in the previous section, the ICT/digital technology such as Cloud, Big Data, Analytics, Social, Mobility and Security-enabled world will be key players for cleaner, healthier and more prosperous, with greater opportunities for individuals everywhere as aimed in the SDGs.

2.9 Digital Economy

The term “Digital Economy” refers specifically to the recent and still largely unrealized transformation of all sectors of the economy by the computer-enabled digitization of information (Bukht & Heeks, 2017). Digital economy is the recent way of doing business with the help of ICT, especially the internet. It is a new economy represented by the inclusion of technology and digital information. The digital economy is a dominant force in today’s economy, and is sometimes called the new economy or the internet economy. There is an opportunity for a country to transform the economy and to contribute to the development of the digital economy (Garifova, 2015; Zekanovic-Korona & Grzunov, 2014; Lazovic & Đuričković, 2014). In addition, the true “Digital Economy” – defined as “that part of economic output derived solely or primarily from digital technologies with a business model based on digital goods or services” – consists of the digital sector plus emerging digital and platform services. The digital economy accounts for something like 1.5% of employment in developing countries as an overall average and makes up around 5% of global GDP and 3% of global employment (Heeks, 2018).

2.10 Sustainable Digital Economy

The growth and maturation of the digital world, where an increasing scale of individual and communal activities are being recorded, digitized, and analyzed for future technological improvement, is creating unique opportunities to enhance social and environmental well-being and further improve global standards of living while preserving and improving environmental health for future generation (Kuhlman & Farrington, 2010; Estevez, 2013). A sustainable digital economy will depend on rapidly evolving governance frameworks that enable societies to anticipate and shape the impact of emerging technologies and react quickly to changing conditions as per Burma, Z. A. (2016).

Besides the conventional 3 pillars to support sustainability which are economy, society and environment, ethics as the proposed 4th pillar of the sustainability in this research could also help maintain sustainability, particularly, as we are in the digital technology age, sustainable and ethical ideas to electronic currencies can help reduce emissions with greater awareness of the population in their financial transactions (Pinto & Menengola, 2021). In addition, according to Luppicini (2009), the ethical use of Genetics, Robotics, Artificial Intelligence, Nanotechnology (GRIN) technologies is important in society today, especially in areas where technological advances have a transforming effect on society. Techno-ethics was developed by Moore's Law, which holds that, as the social impact of technological revolutions grows; ethical problems increase. Techno-ethics is holistic in orientation and provides an umbrella for grounding all sub-areas of applied ethics focused on technology related areas of human activity including, business, politics, globalization, health and medicine, and research and development (Luppicini, 2009), specifically such as: (1) Engineering ethics; (2) Internet ethics and Cyber ethics; (3) Educational techno-ethics; (4) Biotech ethics; (5) Media & communications techno-ethics; (6) Professional techno-ethics; (7) Environmental techno-ethics; (8) Nano-ethics; (9) Military techno-ethics and (10) Computer ethics (Muthoka-Kagwaini et al., 2020).

In particular, with digital technology, for example, Big Data, generation of large volumes of data and the creation of centralized data repositories promise to drive growth across all sectors of society including advancements in SDGs, such as in agriculture, resource allocation, public health, education, and poverty reduction (Garson, 2006). While this virtual realm offers a level of intimacy regarding opinion and social interaction, dealing with "Big Data" raises not only ethical issues but also questions relating to the expertise required to gather, analyze, and interpret this data (Brenner, 2018).

In addition, the study of Human & Kazzazi (2021) reminds us that personal data protection is multidimensional: Human-centric (H), Accountable (A), Lawful (L), and Ethical (E) (or HALE). Hence, personal data protection and consent-obtaining frameworks and mechanisms should be co-created by considering different interdisciplinary cognitive, ethical, legal, technical, societal, and economic perspectives. This might seem complicated, but it is a requirement for the realization of a sustainable digital economy. Sustainable progress, according to Cohen (2007), requires this shift in thinking, including awareness and knowledge of sustainability as well as development of a sustainable mind-set with new thinking patterns,

skills, knowledge, ethics, and morals (Stubbs & Cocklin, 2008). Besides economy, society, environment, the new ethic is also a condition for reaching sustainable development (de Paula, 2000). Hence in this research, Ethics is used as the fourth pillar, in addition to economy, Society and Environment, to support sustainability.

2.11 Sustainable Digital Economy in Thailand

In order to use digital technology to create stability, prosperity and sustainability, according to the Thai government policy, Thailand has been undergoing extensive reformation in all socio-economic dimensions. The cabinet has realized the urgent need to leverage digital technology to drive the country forward and therefore assigned the involved ministries to co-develop the Thailand Digital Economy and Society Development Plan/Digital Thailand Plan. The plan acts as a digital blueprint to revolutionize government operations, business practices, and people's lifestyle. The ultimate goal is to bring about social stability as well as economic wealth in Thailand while creating the so-called digital economy and society for everyone, driving the country with digital innovation, and leveraging digital technology to create value in a long-term and sustainable manner (MICT, 2016).

The digital economy, which is a new economy represented by the inclusion of technology and digital information, has become a dominant force in today's economy. In Thailand, there is an urgent need to leverage digital technology to drive the country forward. Therefore, Digital Thailand Plan is developed to generate social stability and economic wealth in Thailand as the followings (MICT, 2016).

1. To translate the government's digital economy policy as delivered before the National Legislative Assembly on 12 September, 2014 into practice.
2. To ensure that all in the government, business, and civil such policy in an integrated and consistent manner.
3. To set a government framework for allocating both human and financial resources required to drive the country towards a digital common goal.

The Thailand Digital Economy Plan is divided into four phases to be incorporated over a 20-year period which its goals are to be achieved over this period via six strategies which overlap with but are not quite the same as the goals (Siriruchatapong, 2016). Since May 2016, the Thai economy has been guided by the "Thailand 4.0" policy. In addition to encouraging complementing the 2017-2021 and the 2023-2027 National Economic and Social Development Plans (the Twelfth Plan and the Thirteenth Plan) and other reform agendas such as the Sustainable Development Goals (SDGs), the Thailand 4.0 policy aims to transform the economy into one that is driven by digital technologies and innovative business practices. Such an approach, it is envisaged, will achieve the core goal of moving Thailand towards a high income nation that encourages financial and social equality, and ensures that all growth is environmentally sustainable (BOI, 2018).

2.12 The Twelfth National Economic and Social Development Plan (2017-2021) and the Thirteenth National Economic and Social Development Plan (2023-2027)

In formulating the Twelfth Plan (2017- 2021) ((NESDB, 2017), the Office of the National Economic and Social Development Board (NESDB) adhered to the 20-year National Strategy framework (2017-2036), the country's Sustainable Development Goals (SDGs), the Thailand 4.0 Policy, as well as other reform agendas. Hence, under the Twelfth Plan, the strategies for Thailand's sustainability include the six primary strategies of the 20-year National Strategy: (1) Strengthening and Developing the Potential of Human Capital; (2) Creating a Justice Society and Reducing Inequality; (3) Strengthening sustainable Economic Development and Competitiveness; (4) Green Growth for sustainable Development; (5) National Security for the Country's Development towards Prosperity and Sustainability; and (6) Public Administration, Corruption Prevention, and Good Governance in Thai Society.

However, with the implementation of the 12th National Economic and Social Development Plan (NESDB, 2017), which runs from 2017 to 2022, it is likely to fall short of expectations, as the country continues to grapple with the spread of COVID-19. Because the country has been currently dealing with challenges relating to COVID-19, the 12th plan had not been able to quite achieved its goals. The 12th plan, which started on October 1, 2017, aspired for annual economic growth of 5%. In the first two years of the five-year period, the economy increased by an average of 4.1 %, before falling to a 2.3 % rise in 2019 and a 6.1 % contraction in 2020 (International Institute for Non-Aligned Studies, 2021).

After the ending of the 12th National Economy and Society Plan of Thailand, under the 13th National Economy and Society Plan, the target implementation period for the plan is year 2023 to the year 2027 and includes developing human resources for the new world, creating a society of opportunity and fairness, and more. The essence of the plan is outline in the 5 strategic areas as the followings (NESDC, 2022):

1. Restructuring of production, into an economy based on innovation that aligns with technology trends and global trade through promoting research and innovation development.
2. Developing people/ human resources to have the ability and quality of life suitable for the new world through building essential skills for the 21st century, as well as elevating schools and teachers into higher professions.
3. Creating a society of opportunity and fairness by reducing social inequality and increase welfare for the people, and for the underprivileged to have equal access.
4. Creating sustainability for the country through solving environmental problems, and strengthening the industry and green economy.
5. Preparing the country to cope with risks and changes in a new global context.

With the conclusion on the SDGs, the digital economy, the sustainable digital economy, and the ongoing sustainable digital economy in Thailand with the implementation of the National Economy and Society Development Plans, the sustainable digital economy in Thailand under



the 4 pillars of sustainability, i.e., economy, society, environment and ethics, could be detailed as below.

Firstly, the components under the economy pillar consist of ensuring sustainable consumption, ending poverty and hunger, strengthening global partnership, promoting sustainable economic growth, building confidence in using digital technology, boosting economy with digital technology, transforming organization to digital organization and developing skilled digital manpower (Matte et al., 2015; MICT, 2016; Sirirutchatapong, 2016; BOI, 2018; NESDB, 2017; NESDC, 2022; Noonpakdee et al., 2018). Secondly, the components under the society pillar consist of achieving gender equality, promoting peaceful society, transforming organization to promote education, creating quality society, building country-wide infrastructure, and ensuring quality education, and implementing global partnership (Matte et al., 2015; Sirirutchatapong, 2016; NESDB, 2017; NESDC, 2022). Thirdly, the components under the environment pillar consist of conserving oceans and resources, protecting terrestrial ecosystems, combating climate changes, ensuring availability of water, adopting digital technology for energy saving, promoting environmental awareness and ensuring access to sustainable energy (NESDB, 2017; NESDC, 2022; Holga et al., 2019; Lai & Wong, 2012; Matthews, 2022).

Finally, the components under the ethics pillar consist of transforming into an organization with good governance, enhancing systemic work process in organization, using code of ethics, using ethical auditing system in organization and using digital technology to prevent corrupting and misconduct (NESDB, 2017; NESDC, 2022). The details of sustainable digital economy in Thailand are shown in Table 3.

Table 3: Sustainable Digital Economy in Thailand

Economy	Society	Environment	Ethics
Ensure sustainable consumption production patterns (SDG Goal 12)	Achieve gender equality and empower all women and girls (SDG Goal 5)	Conserve and sustainably use the oceans, seas and marine resources for sustainable development (SDG Goal 14)	Transform into an organization with good governance, transparency both inside and outside the organization and able to prevent and suppress corruption and misconduct (NESDB, 2017)
End poverty in all its forms everywhere, end hunger, achieve food security and improved nutrition and promote sustainable agriculture, and ensure healthy lives and promote well-being for all at all ages (SDG Goals 1, 2, 3)	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels (SDG Goal 16)	Take urgent action to combat climate change and its impacts (SDG Goal 13)	Enhancing the organization's work processes to be systematic and ethical standards (NESDB, 2017)
Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development (SDG Goal 17)	Transform organization to promotes education, learning and human resource development of the organization (Siriratchatpong, 2016)	Ensure availability and sustainable management of water and sanitation for all (SDG Goal 6)	Use of Code of Ethics in corporate management (NESDB, 2017)
Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all including social development and environment protection (SDG Goal 8; NESDB, 2017)	Create quality society and reduce inequality with inclusive digital technology and participation from all sectors of society (Siriratchatpong, 2016; UN, 2017) Reduce inequality within and among countries (SDG Goal 10)	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss (SDG Goal 15)	Use of ethical auditing system in the organization for accuracy, transparency and fairness in operation (NESDB, 2017)
Build confidence in using digital technology by creating security and confidence in transactions for people and all sectors (Siriratchatpong, 2016)	Build country-wide high-capacity digital infrastructure while ensuring accessibility, availability, and affordability (Siriratchatpong, 2016)	Adopt digital technology for energy-saving and environmental protection measures for sustainable development (Kasulman, 2010; WCED, 1987; Estevez, 2013; Jarwal, 2017).	Use digital technology to control work processes for the prevention and suppression of corruption and misconduct (Tikhonen, 2016; Muthoka, 2020)
Boost the economy with digital technology, drive new S-Curve services, raise competitiveness, build new businesses and create values (Siriratchatpong, 2016; MICT, 2016; Neenpakdee et al., 2018; BOI, 2019)	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (SDG Goal 4)	Promote environmental awareness in every step of the product life cycle (Ferron et al., 2016)	
Transform organization to a digital organization that is ready to serve people and able to provide people with access to services and products (Siriratchatpong, 2016)	Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development (SDG Goal 17)	Ensure access to affordable, reliable, sustainable and modern energy for all (SDG Goal 7)	
Develop skilled digital manpower for the digital economy and society (Tikhonen, 2016; Siriratchatpong, 2016)			

3. RESEARCH METHODOLOGY

3.1 Research Process

In this research, in Figure 5, the process from step 1-14 is designed to use the combination of research methodologies of both qualitative and quantitative research with documentary research and content analysis which were conducted thru research steps 2 and step 14, particularly in step 3 which the list of contents after performing documentary research method in step 2, i.e. 1) Strategic digital leadership competencies for digital transformation in private sector 2) Digital transformation in private sector; and 3) Sustainable digital economy were created along with its components as shown in the Table 1-3. Then, the research questionnaire was constructed and verified through step 4–6 by conducting the In-depth interview with the 20 key stakeholders in private sector from different organizations and was also verified its validity and reliability by using the Index of Item-objective congruence (IOC) with the value ≥ 0.8 and the Cronbach Alpha Coefficient method with the confidence level at 0.93 (Rovinelli & Hambleton, 1977).

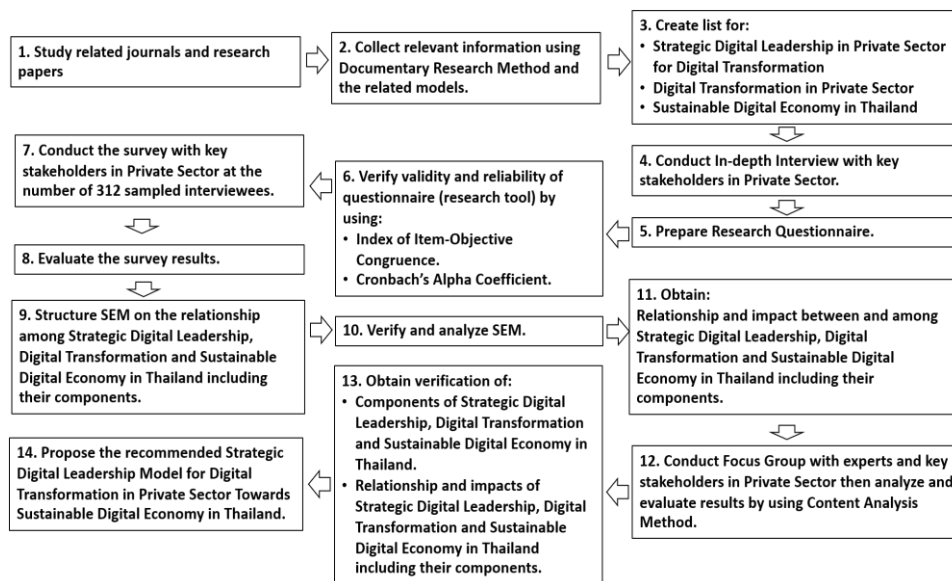


Figure 5: Diagram of Research Flow

On the basis of the existing digital private sector literature, a semi-structured interview guide for the expert interviews was created while the forty interviews were conducted with experts knowledgeable about digital transformation projects between January and March 2022. The experts included managers, IT service providers and enterprise officers/users from the national, regional, and local firms for private sector clients.

In the step 7, the survey was conducted with 328 interviewees in private sector, in 5 business segments which are trading/commercial, service, production, agriculture sectors and others by having them assign the five-points Likert scale in the box of questionnaire they see that it should reflect ranging from Totally agreed (5), Strongly agreed (4), Agreed (3), Somewhat disagreed (2) and Totally disagreed (1). Then, from step 8 – 13, the results from the survey were used to structure the Structural Equation Modeling (SEM) which is a technique combining both path analysis (PA) and confirmatory factor analysis (CFA) for testing hypotheses regarding the relationship between multiple latent variables simultaneously. The SEM was then used to verify relationship among 1) Strategic digital Leadership competencies for digital transformation 2) Digital transformation and 3) Sustainable digital economy and the related components of each three nodes. Finally, in step 14, the proposed recommendation to the requirements for strategic digital leadership competency development framework in private sector for digital transformation towards sustainable digital economy in Thailand was concluded.

Likert Scale was adopted, which consists of five degrees to determine how much the responders agree or disagrees with each statement in the questionnaire as shown in Table 4.

Table 4: Likert Scale

Scale	Degree
Strongly Agree	5
Agree	4
Neutral	3
Disagree	2
Strongly Disagree	1

To interpret Likert scale results, weighted mean to represent each question was computed. Table 5 shows the level of agreement associated with each weighted average mean range (Al-Khadash et al., 2017).

Table 5: Weighted Mean- Level of Agreement

Weighted Mean(x-bar)	Level of Agreement
More than 4.2 - 5	Very High
More than 3.4 – 4.2	High
More than 2.3 – 3.4	Average
More than 1.8 – 2.6	Low
1.8 and less	Very Low

3.2 Research Model and Hypotheses

In accordance with the research objectives stated above and the consistency with the previous related literature, this study tested relationship among strategic leadership competency, digital transformation in private sector and sustainable digital economy in Thailand with the following hypotheses, analyzed and finally confirmed.

- H1: Strategic digital leadership will have significant influence on digital transformation of organizations.
- H2: Digital transformation will have significant influence on sustainable digital economy.
- H3: Strategic digital leadership will have least influence or will not have direct significant influence on sustainable digital economy.

The above hypotheses give rise to the research model for the study, portrayed below in Figure 6, which needs to be tested and analyzed by employing SEM approach in this paper.

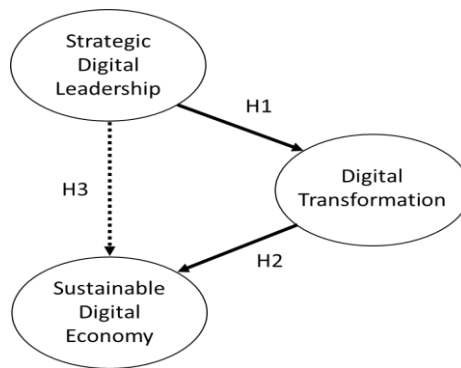


Figure 6: Research Hypotheses on relationship among the 3 Latent Variables (SDL, DT and SDE).

4. RESEARCH FINDINGS

The validation component analysis with AMOS program in this research was conducted to verify the conformity and coherence of factors in the SEM which is an analysis of the relationship between latent and observable variables. Hence, the correlation was tested between 3 latent variables and 12 observable variables. The authors analyzed the confirmatory components with AMOS program from a total of 328 samples as shown in Figure 7. From the analysis of the SEM of strategic digital leadership model in private sector for digital transformation towards sustainable digital economy development in Thailand's digital economy, it was found that the model was consistent by considering the statistical values of the model with the following empirical data: Chi-square = 48.701, Degree of Freedom (df) = 38, Relative Chi-square = 1.282, statistical significance (p-value) = 0.114, Conformity Index Goodness of Fit Index: GFI is 0.976, NFI is 0.992, TLI is 0.997, Comparative Fit Index (CFI) is 0.998, Root Mean Square Error of Approximation (RMSEA) is 0.029 and RMR is 0.012.

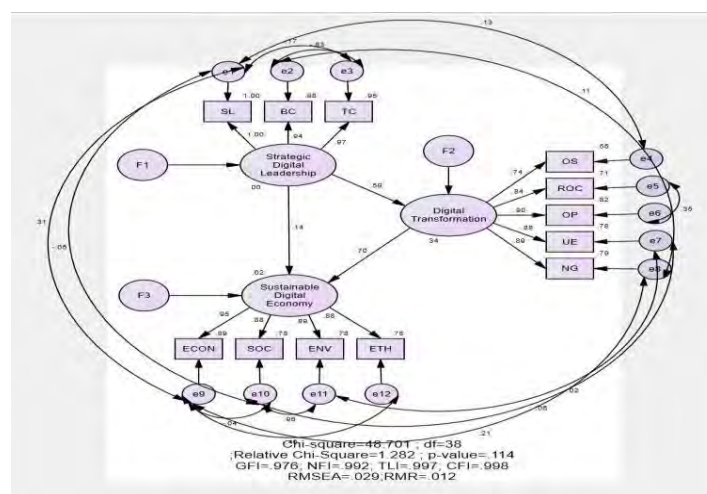


Figure 7: Factors affecting strategic digital leadership model for digital transformation in private sector towards sustainable digital economy development in Thailand.

Table 6: Conformity value of the measurement model

SEM Model Index	Values	Criteria	Results
Chi-square	48.701		Pass
P-value	0.114	≥ 0.05	Pass
Relative Chi-square	1.282	< 2.00	Pass
GFI	0.976	≥ 0.95	Pass
NFI	0.992	≥ 0.95	Pass
TLI	0.997	≥ 0.95	Pass
CFI	0.998	≥ 0.95	Pass
RMSEA	0.029	≤ 0.05	Pass
RMR	0.012	≤ 0.05	Pass

From the Table 6, it was found that the statistical significance level (p) had a statistical value of 0.114, which was higher than the specified threshold, so it was considered that it passed the standard. The harmonization index (GFI) of 0.976 statistic value is above the specified threshold indicates that the model is consistent with the empirical data. The Relative Harmony Index (CFI) was 0.998 more than the specified statistic, indicating that the model was consistent and the estimated mean error index (RMSEA) had a static value of 0.029 less than 0.05, indicating that the model was very consistent and fitted (Bollen, 1989; Diamantopoulos, 2000; Kaplan & Ferguson, 1999; Hu & Bentler, 1999)

When considering Bartlett's test of sphericity, it was found that the value is equal to 5865.843, $df = 66$, $p = 0.000$ and the correlation coefficient matrix was not an identity matrix at the .01 level. There is sufficient correlation to be able to analyze the composition consistent with the analysis results. Kaiser-Mayer-Olkin (KMO), which is close to 1 (0.851) is consistent with the research model and the empirical data, since the index value is 0.80 or higher, indicating that the data is very well suited for factor analysis. The results of the data suitability check are shown in Table 7.

Table 7: The results of the data suitability using Pearson's correlation analysis between the observed variables.

Factors	SL	BC	TC	OS	ROC	OP	UE	NG	ECON	SOC	ENV	ETH
SL	1											
BC	0.936**	1										
TC	0.975**	0.847**	1									
OS	0.422**	0.394**	0.413**	1								
ROC	0.553**	0.519**	0.543**	0.631**	1							
OP	0.562**	0.527**	0.556**	0.671**	0.840**	1						
UE	0.506**	0.461**	0.508**	0.646**	0.734**	0.801**	1					
NG	0.482**	0.473**	0.471**	0.683**	0.734**	0.797**	0.789**	1				
ECON	0.533**	0.512**	0.504**	0.510**	0.652**	0.683**	0.646**	0.703**	1			
SOC	0.472**	0.450**	0.450**	0.447**	0.588**	0.624**	0.609**	0.620**	0.825**	1		
ENV	0.484**	0.460**	0.461**	0.455**	0.597**	0.631**	0.608**	0.629**	0.834**	0.991**	1	
ETH	0.450**	0.426**	0.432**	0.458**	0.571**	0.583**	0.583**	0.607**	0.773**	0.792**	0.791**	1

** Correlation is significant at the 0.01 level (2-tailed).

Means	4.00	4.03	3.98	4.26	4.09	4.14	4.16	4.31	4.07	4.00	4.01	4.12
S.D.	0.62	0.60	0.68	0.69	0.75	0.70	0.77	0.65	0.74	0.81	0.81	0.83

**Bartlett's Test of Sphericity = 5865.843, $df = 66$, $p = 0.000$ Kaiser-Meyer Olkin (KMO) = 0.851

Remark: Significance at the level of $p < 0.01$

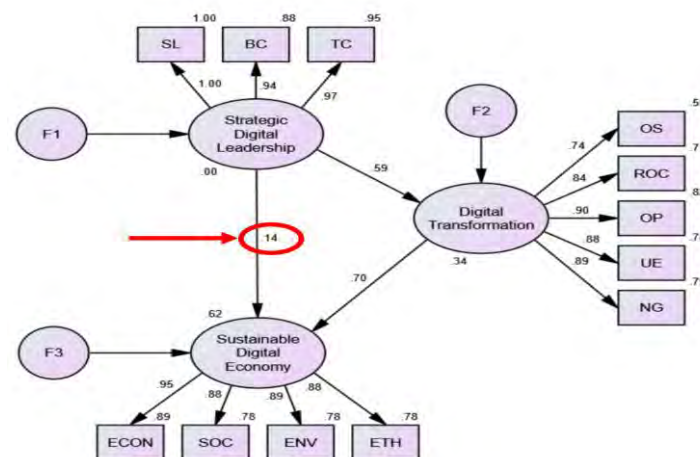


Figure 8: The causal relationship model between strategic digital leadership, digital transformation and sustainable digital economy development in Thailand.

As per the finalized SEM in Figure 8, the model shows relationship among the 3 latent variables which are strategic digital leadership competency in private sector, digital transformation in private sector and sustainable digital economy in Thailand and 12 observed variables which are Strategic Leadership Competencies (SL), Business Process Competencies (BC), Technology Competencies (TC), Organization Strategy (OS), Restructure of Structure of Organization (ROC), Operation Process (OP), User Experience (UE), New Growth (NG), Economy (ECON), Society (SOC), Environment (ENV) and Ethics (ETH).

4.1 Path Analysis

From the hypothesis in Figure 6 and from the SEM shown relationship between each latent variable and observed variables in Figure 8, especially the relationship between each 3 latent variables, i.e. strategic digital leadership, digital transformation and sustainable digital economy, with the values of factor loadings of the relationship between and among the 3 latent variables which that the factor loading of the path from the strategic digital leadership to the digital transformation is equal to 0.59, from the digital transformation to the sustainable digital economy is 0.70 and from the strategic digital leadership to sustainable digital economy is 0.14, the hypothesis could be proven on its validation as below.

- H1: Strategic digital leadership has significant influence on digital transformation of organizations is valid since the loading factor between the two latent variables is 0.59.
- H2: Digital transformation has significant influence on sustainable digital economy is valid since the loading factor between the two latent variables is 0.70.
- H3: Strategic digital leadership has least influence or does not direct significant influence on sustainable digital economy since the loading factor between the two latent variables is 0.14.

The details of the results above will be further elaborated in the next session.

Table 8: Factor loading values of latent variables and observed variables

Latent Variables	Observed Variables	Standardized Regression Weight (Estimated)	\bar{x}
Strategic Digital Leadership	SL	1.00	1.00
	TC	.97	.95
	BC	.94	.88
Digital Transformation	OP	.90	.82
	NG	.89	.79
	UE	.88	.79
	ROC	.84	.71
	OS	.74	.55
Sustainable Digital Economy	ECON	.95	.89
	ENV	.89	.78
	SOC	.88	.78
	ETH	.88	.78

From Table 8, the top three observed variables with their factor loadings of the 3 latent variables are displayed in ascending order. In case strategic digital leadership, the top 3 observed variables in descending order are strategic leadership competency (SL) (FL=1.00), technology competency (TC) (FL=.97) and business process competency (BC) (FL=.94) and. For digital transformation, the top 3 observed variables in descending order are operation process (OP) (FL=.90), new growth (NG) (FL=.89) and user experience (UE) (FL=.88). And in case of sustainable digital economy, the top 3 observed variables in descending order are economy (ECON) (FL=.95), environment (ENV) (FL=.89) and society (SOC) (FL=.88) (with the same value of ethics (ETH) (FL=.88)).

In the Table 9 – 11, the details of the 3 observed variables of the concerned latent variable which is the strategic digital leadership consisting of strategic leadership competency, business process competency and technology competency are displayed in the top 3 expected competencies private sector organizations would like to have or see that these competencies are important listed in descending order with the statistical values \bar{x} (Mean) and S.D. (Standard Deviation) with “Very High” level of agreement with criteria reference to the Likert Scales as per the Table 4 and Table 5 are shown below in the tables accordingly. In addition, concerning competency gap analysis which is a comparison between the mean (average value) of expected competencies private sector organizations would like to have or see that these competencies are important and the same competencies the organizations currently have their abilities to perform of strategic leadership, business process and technology are calculated by using the equations (1) – (6) which the results are also shown in the Table 9-11 and in Figure 9-11 (in Radar Chart/Spider Web Chart) accordingly.

Finally, and mostly important, from the results above, in the Table 12-14, the training priority competencies of the organizations evaluated by the highest gap values of the pairs of expected

competencies compared with the current competencies in ascending order are obtained and shown in the tables consecutively.

Equations for gap analysis of strategic leadership competency, business process competency and technology which the results are shown in the Tables 9-11 are listed and detailed as below.

$$Gap\ CSL = |CSL_{Expected} - CSL_{Current}| \quad (1)$$

$$Gap\ CSL_{Avg.} = \frac{\sum_{i=1}^p |CSL_{Expected} - CSL_{Current}|}{N_{CSL}} \quad (2)$$

Where:

$Gap\ CSL$ = Gap of strategic leadership competency

$CSL_{Expected}$ = Strategic leadership competencies that the organizations would like to have

$CSL_{Current}$ = Strategic leadership competencies that the organizations currently have their abilities to perform

$Gap\ CSL_{Avg.}$ = Average of gap from strategic leadership competency

$$p = 9$$

$$N_{CSL} = 9$$

$$Gap\ CBP = |CBP_{Expected} - CBP_{Current}| \quad (3)$$

$$Gap\ CBP_{Avg.} = \frac{\sum_{i=1}^q |CBP_{Expected} - CBP_{Current}|}{N_{CBP}} \quad (4)$$

Where:

$Gap\ CBP$ = Gap of business process competency

$CBP_{Expected}$ = Business process competencies that the organizations would like to have

$CBP_{Current}$ = Business process competencies that the organizations currently have their abilities to perform

$Gap\ CBP_{Avg.}$ = Average of gap from business process competency

$$q = 6$$

$$N_{CBP} = 6$$

$$Gap\ CT = |CT_{Expected} - CT_{Current}| \quad (5)$$

$$Gap\ CT_{Avg.} = \frac{\sum_{i=1}^r |CT_{Expected} - CT_{Current}|}{N_{CT}} \quad (6)$$

Where:

Gap_{CT} = Gap of technology competency

$CT_{Expected}$ = Technology competencies that the organizations would like to have

$CT_{Current}$ = Technology competencies that the organizations currently have
their abilities to perform

$Gap_{CT_{Avg}}$ = Average of gap from technology competency

$r = 5$

$N_{CT} = 5$

Table 9: Gap Analysis on strategic leadership competency (expected vs current) for private sector.

Strategic Leadership Competency	Statistic Values				
	☐ (Expected)	S.D.	Interpretation	☐ (Current)	Gap
1. Integrity and Moral and Ethics Skills.	4.63	0.61	Very High	4.08	0.54
2. Problem Solving and Decision Making Skills.	4.44	0.71	Very High	3.66	0.77
3. Holistic Thinking and Strategic Thinking Skills.	4.43	0.68	Very High	3.59	0.83
4. Motivation and Team Leading Skills.	4.42	0.71	Very High	3.57	0.85
5. Human Resource Development and Interpersonal Skills.	4.41	0.74	Very High	3.55	0.76
6. Initiative, Creativity and Innovation Skills.	4.40	0.71	Very High	3.64	0.85
7. Planning and Organizing Skills.	4.40	0.71	Very High	3.63	0.77
8. Self-control and Personal Motivation Skills.	4.37	0.69	Very High	3.70	0.67
9. Analytical Thinking and Critical Thinking Skills.	4.37	0.71	Very High	3.63	0.73
Overall Average	4.43	0.70	Very High	3.67	0.75

Table 10: Gap analysis on business process competency (Expected vs Current) for private sector.

Business Process Competency	Statistic Values				
	☐ (Expected)	S.D.	Interpretation	☐ (Current)	Gap
1. Project Management for Fast Changing Digital Technology Environment.	4.45	0.69	Very High	3.66	0.79
2. Business Process Management for Sustainable Development	4.44	0.68	Very High	3.70	0.74
3. Organization Changes for Business Process Efficiency Improvement.	4.44	0.68	Very High	3.63	0.81
4. Business Process Analytic and Business Development.	4.44	0.68	Very High	3.73	0.71
5. Marketing Analytics, Strategic Marketing Management and Customers/Sales Relationship Management.	4.40	0.73	Very High	3.66	0.74
6. Enterprise Architecture for Complex Business Systems.	4.29	0.74	Very High	3.50	0.79
Overall Average	4.41	0.70	Very High	3.65	0.76

Table 11: Gap analysis on technology competency (expected vs current) for private sector.

Technology Competency	Statistic Values				
	☐ (Expected)	S.D.	Interpretation	☐ (Current)	Gap
1. Digital Technology Applications e.g. IoT, Cloud, Social, AR/VR for Cybersecurity Management.	4.48	0.71	Very High	3.58	0.90
2. Digital Technology Utilization for Sustainable Development in economy, society and environment and Human Resource Development.	4.44	0.68	Very High	3.66	0.78
3. Web Design and Development for mobile products/services applications.	4.41	0.75	Very High	3.59	0.81
4. IT/Digital Platform Architecture for business operation.	4.37	0.79	Very High	3.52	0.85
5. Digital Technology Development e.g. Big Data, Analytics, AR, VR, AI and Blockchain for Enterprise Resource Planning (ERP) and business operation.	4.36	0.78	Very High	3.40	0.96
Overall Average	4.41	0.74	Very High	3.55	0.86



Figure 9: Radar chart/spider web chart of the gap analysis of the strategic leadership competency.



Figure 10: Radar chart of the gap analysis of the business process competency.

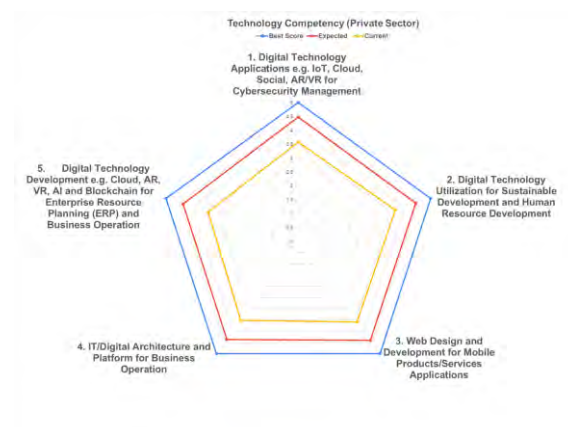


Figure 11: Radar chart/spider web chart of the gap analysis of the technology competency.

Table 12: Analysis on strategic leadership competency training priority for private sector.

Strategic Leadership Competency Training Priority (Private Sector)	Gap
1. Human Resource Development and Interpersonal Skills.	0.85
2. Motivation and Team Leading Skills.	0.85
3. Holistic Thinking and Strategic Thinking Skills.	0.83
4. Problem Solving and Decision Making Skills.	0.77
5. Planning and Organizing Skills.	0.77
6. Initiative, Creativity and Innovation Skills.	0.76
7. Analytical Thinking and Critical Thinking Skills.	0.73
8. Self-control and Personal Motivation Skills.	0.67
9. Integrity and Moral and Ethics Skills.	0.54
Overall Average	0.75

Table 13: Analysis on business process competency training priority for private sector.

Business Process Competency Training Priority (Private Sector)	Gap
1. Organization Changes for Business Process Efficiency Improvement.	0.81
2. Enterprise Architecture for Complex Business Systems.	0.79
3. Project Management for Fast Changing Digital Technology Environment.	0.79
4. Business Process Analytic and Business Development.	0.71
5. Marketing Analytics, Strategic Marketing Management and Customers/Sales Relationship Management.	0.74
6. Business Process Management for Sustainable Development	0.74
Overall Average	0.76

Table 14: Analysis on technology competency training priority for private sector.

Technology Competency Training Priority (Private Sector)	Gap
1. Digital Technology Development e.g. Big Data, Analytics, AR, VR, AI and Blockchain for Enterprise Resource Planning (ERP) and business operation.	0.96
2. Digital Technology Applications e.g. IoT, Cloud, Social, AR/VR for Cybersecurity Management.	0.90
3. IT/Digital Platform Architecture for business operation.	0.85
4. Web Design and Development for mobile products/services applications.	0.81
5. Digital Technology Utilization for Sustainable Development in economy, society and environment and Human Resource Development.	0.78
Overall Average	0.86

5. DISCUSSION AND IMPLICATIONS

For a causal relationship model of a strategic digital leadership model for digital transformation towards sustainable digital economic development in Thailand through SEM analysis, from the SEM in Figure 8, the factor loadings of components of the latent variables and the observed variables in the Table 8, with the main objectives of private sector is to create economy growth for organizations while providing services to the clients and external organizations both in private and public sectors, the research could conclude the results as below.

In the Figure 8 and the Table 8, the 3 observed variables of the strategic digital leadership Competency Latent Variables could be arranged in descending order as per their factor loading (FL) values which are the strategic leadership competency (SL) (FL=1.00), the technology competency (TC) (FL=.97) and the business process competency (BC) (FL=.94). Hence, the strategic leadership competency plays the most important competency role among technology competency and business process competency which implies that the private sector organizations, in order to implement digital transformation successfully, the organizations have to put competency in strategic leadership/strategy as the highest priority among technology and business process competencies.

As the strategic leadership competency is the most crucial among business process competency and technology competency, from the Table 9 and the Figure 9, it is found that its top 3 expected competencies of the private sector organizations consist of integrity/moral and ethics, problem solving and decision making and holistic thinking and strategic thinking are the key competencies which the organizations in private sector expect the most, however, more importantly, in the Table 12, the top three strategic leadership competency training priority are 1) Human resource development and interpersonal skills, 2) Motivation and team leading skills and 3) Holistic thinking and strategic thinking skills.

Regarding the business process competency, from the Table 10 and the Figure 10, the top 3 expected competencies are project management skills for fast changing digital landscape, business process management for sustainable development and organization changes for business process efficiency improvement, however, more importantly, in the Table 13, the top three Business Process competency training priority are 1) Organization changes for business process efficiency improvement, 2) Enterprise architecture for complex business systems and project management for fast changing digital technology environment.

On the technology competency, in the Table 11 and the Figure 11, the top 3 expected competencies for private sector organizations are digital technology applications, e.g. IoT, Cloud, social, AR/VR for cybersecurity management, digital technology utilization for sustainable development and human resource development and web design and development for mobile products/services applications. while, more importantly, in the Table 14, the top three training priority competencies are 1) Digital technology development for enterprise resource planning and business operation, 2) Digital technology application for cybersecurity management and 3) IT/digital platform for business operation.

On the relationship among the 3 latent variables, in the Figure 8, firstly, between strategic digital leadership and digital transformation, the research is found that the strategic digital leadership has impact on digital transformation with $FL = .59$ which means that, in private sector, strategic digital leadership could influence the digital transformation of the organizations. Secondly, between digital transformation and sustainable digital economy, it is found that digital transformation has strong impact on sustainable digital economy with $FL=.70$ through systematic way of digital transformation in the 5 areas, i.e. organization strategy, operation

process, restructure of core/structure of organizations, user experience and new growth. Lastly, but most importantly, on the relationship between strategic digital leadership and sustainable digital economy, it is found that strategic digital leadership has least impact on sustainable digital economy (FL=0.14) which means that strategic digital leadership could not drive the organization to be sustainable directly, however, the leader, in order to achieve sustainable digital economy, the leader must drive organization through systematic digital transformation process. This is very important for any organization as it could not depend on the leader to achieve organization sustainability but needs to have the whole organization go through the digital transformation process first then become sustainable.

Regarding digital transformation, particularly in private sector, this research is found that the top 3 observed variables are operation process (FL=.90), new growth (FL=.89) and user experience (FL=.88). This is true for private sector organizations which operation process needs to be improved and transformed to be more flexible to better serve clients (better user experience) and concerned organizations while new growth means the new services, for examples, mobile applications and digital service platforms and online/e-Commerce services, need to be added and developed to enhance capability to private sector to create and increase revenue growth for the organizations.

Concerning sustainable digital economy, in this private sector case, which the top 3 three observed variables are society, economy and environment accordingly, as per the main objectives of private sector is to create economy growth for organizations while providing services to the clients and external organizations both in private and public sectors, hence economy (FL=.95) is the number one priority for private sector organizations and environment (FL=.89) is the next high priority while society (FL=.88) and ethics (FL=.88) are the next same priority accordingly. Hence this means that the research results do reflect the real situation of private sector organizations.

In further detailed analysis of the sustainable digital economy, while the 3 major pillars such as society, economy and environment have been playing roles on sustainability, however, in this research, it is found that, ethics (FL=.88) has been proven to be new pillar of sustainability since, as the world now have been entering into the era of using digital technology to transform organizations and nations, the ethical use of digitized data and cybersecurity measure for data privacy and public security will play important roles for safety and stability of the society and the world.

6. CONCLUSIONS

In conclusion, this research has opened new opportunities to learn on how the private sector and the policy makers at the organizational and the national levels, including the government as well, in this digital technology and digital economy era, could leverage the knowledge of the right strategic competencies to train their leaders to digitally transform the organizations in a systematic and proper way to obtain the sustainable organizations to respond to the requirements

of society, the growth of economy, the conservation of environment and the ethical and good governance organizations.

This is the innovation on competency analysis which is required to create mostly relevant competency human resource development in the private sector organizations. The key benefits of this research could be highlighted as below.

Firstly, strategic digital leadership plays important role in the digital transformation of organizations in private sector which, when that organization has undergone a systematic digital transformation, will result in that organization to develop a sustainable digital economy and society.

Secondly, strategic digital leadership for digital transformation should be focused on the training for the right competencies for strategic leadership and the right strategy of organization which could answer the requirements of private sector organizations as a top priority while technology and business process competencies should be aligned for the training accordingly.

Thirdly, leaders cannot command or take any action that will ensure sustainable economic and social development, however, this has to be done through the digital transformation of that organization in a systematic way for a long-lasting sustainability of the organization.

Fourthly, with the gap analysis between the expected and the current strategic digital leadership competency evaluated by using the equations (1) – (6) with the results shown in the Tables 9 – 11 and in the figures 8 – 10 accordingly, the top three training priority competencies in strategic leadership, business process and technology illustrated in the Tables 12 - 14 could be very useful for the private sector organizations to organize specific training program which is mostly relevant and answers to the present requirements of the organizations for the effective and successful digital transformation.

And last but not least, in terms of sustainability, it used to only be thinking in the 3 areas: economy, society, and environment, however, this innovative study discovered the 4th component that is extremely important in this era of digital technology for sustainability, which is ethics. This will be the key factor that makes the world in the digital era be able to exist and be sustainable because there must be a consideration of the use of information appropriately and usefully in the non-infringement of personal data, the cyber-attack protection and the use social media properly to the context of that society without violating on the rights of others and threatening the safety of society.

7. FUTURE RESEARCH

From this study, the further researches could be explored on how the private sector organizations need to be aware of their own strategy to fulfill the mission assigned to them with the resources and the requirements that exist at that time as this will help the organizations to have digital



transformation with efficiency and maximum benefits. The future researches in this area could also help the private sector organizations and, in the larger scope, the government to buy technology rationally and will save a lot of organization and national budget rather than investing solely on purchasing technology for digital transformation. With this, more detailed studies could be done on specific strategic digital leadership competencies of each specific private sector organization which could vary upon the nature and functions of the organization, hence, this could help the organization to develop the right competencies for digital transformation towards sustainable digital economy of the specific organization in the long run.

Lastly, considering changes to digital leadership roles and styles necessary in the post-COVID-19 era, the future study on the right competencies of strategic digital leadership could be highly relevant as the pandemic accelerated the private sector organizations to shift to remote or hybrid work formats (Henderikx, 2022; Bhatia, 2021), for example, a study of academic leadership by Fernandez and Shaw (2020) elaborated on leadership in (post-) COVID-19 times.

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