

Article

Decision-Making Model for Reinforcing Digital Transformation Strategies Based on Artificial Intelligence Technology

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Abstract: Firms' digital environment changes and industrial competitions have evolved quickly since the Fourth Industrial Revolution and the COVID-19 pandemic. Many companies are propelling company-wide digital transformation strategies based on artificial intelligence (AI) technology for the digital innovation of organizations and businesses. This study aims to define the factors affecting digital transformation strategies and present a decision-making model required for digital transformation strategies based on the definition. It also reviews previous AI technology and digital transformation strategies and draws influence factors. The research model drew four evaluation areas, such as subject, environment, resource, and mechanism, and 16 evaluation factors through the SERM model. After the factors were reviewed through the Delphi methods, a questionnaire survey was conducted targeting experts with over 10 years of work experience in the digital strategy field. The study results were produced by comparing the data's importance using an Analytic Hierarchy Process (AHP) on each group. According to the analysis, the subject was the most critical factor, and the CEO (top management) was more vital than the core talent or technical development organization. The importance was shown in the order of resource, mechanism and environment, following subject. It was ascertained that there were differences of importance in industrial competition and market digitalization in the demander and provider groups.

Keywords: digital transformation; AI technology; digital strategy; decision model; SERM model



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1. Introduction

Rapid digital environment transformation is becoming a new opportunity and a challenge to companies. Digitizing business-based innovation activities for business innovation through digital technologies, such as social media, mobile service, IoT, cloud, and big data, are being consolidated [1]. According to Harvey Nash and KPMG's [2] survey, 44% of the surveyed firms said fundamental changes in their product or service offering would be brought about within three years through digital transformation projects.

Moreover, since 2020, the COVID-19 pandemic has transformed the world into a non-face-to-face society, and accordingly, digital technology has become an opportunity to strengthen and develop faster than ever before [3]. Companies have reinforced AI technology and have adopted cloud computing quickly for digital transformation activities. Companies revealed that they plan to reorganize over 20% of their business activities, centered on AI, robots and automation for the next five years.

Change in corporate process and value chain through AI technology is an essential factor for firms to be equipped with [4]. The EU will intensively invest 20% of the EU Economic Recovery Fund (EUR 750 billion) in digital transformation throughout industries based on AI and supercomputing for three years from 2021 [5]. The global AI market has been posting over 40% high growth on an annual average from USD 20 billion in 2018, and the market size is projected to reach USD 100 billion in 2022 [6]. In such an environment, leading big tech companies, namely Google, Amazon and native digital

companies including Netflix, Lyft, Zelle, Square, Airbnb, Twilio, Shopify and Zappos, are growing fast [7]. Many companies are firmly propelling digital transformation strategies, including digital technology investment and digital workforce fostering and data service and platform technology reinforcement [8].

For example, fintech, which was formed by mutual fusion of digital technology and traditional financial industries, continues to change the public's financial concepts and consumption methods. Fintech has sparked changes in business patterns and innovation in service models and has created a new financial industry in the Internet era by promoting changes in the financial market environment, customer demand and service models [9,10]. New financial patterns, such as third-party payments, P2P Internet loans, crowdfunding and Internet finance, have emerged. Fintech is now a way of investing in personal finance by the general public. Not only is the size of users growing, but the market's competitiveness is also growing as new platforms are constantly being released. In this situation, fintech companies are seeking ways to gain a superior competitive advantage [11,12].

The firm's digital transformation strategy means corporate activities that can preemptively respond to the rapidly changing management environment due to mobile, cloud computing, big data, IoT, and AI digital technologies that can create continuous growth through new business [13]. Many companies have recognized the potential of AI technology and machine learning development and have solved AI-based business problems for the recent five years. Consequently, a firm's business innovation and process change through AI technology are rapidly accelerating [14]. Global companies are trying to develop AI technology and secure relevant talent. Today's companies are expanding AI-technology-based new business model construction as their vital strategic activities for a successful digital transformation strategy [15].

However, as Kitsios and Kamariotou [16] pointed out, companies repeat various trials and errors due to the lack of professionalism/expertise in applying AI technology to business innovation. They pointed out that companies do not consider strategic management activities or implementation efficiency and organizational effectiveness based on new technologies because they are committed to technical development and actualization [17]. Numerous companies emphasize the importance of a firm's digital transformation strategy establishment and implementation from a technology utilization aspect, as much as technical development [18]. To successfully implement new technology and a business model, the companies started concentrating on management activities to innovate existing organizational culture and process and construct digital competition strategies in and outside of the companies.

A specific approach and strategy to seek successful implementation and performance beyond digital transformation strategies should be presented. However, there are few studies on specific success factors or strategy components of the firms propelling the AI-technology-based digital transformation strategies. Therefore, the purpose of this study is to define the factors affecting corporate AI-technology-based digital transformation strategy consolidation and to present a firm's digital transformation strategy influence components model through which factor importance can be judged for strategic decision making. This study aims to provide the firms propelling AI-based enterprise digital transformation strategies with a practical guide to seek significant factors to consider and effective implementation methods. This study also offers a model to help CEOs to judge strategic decision making.

2. Literature Review

2.1. Corporate Digital Transformation Strategy

IBM [19] defined digital transformation as a strategy to change a business model by integrating digital and physical factors and establishing a new industry business model. IDC [20] explained design transformation as a continuous innovative process to adapt to and lead the customer and market changes. Ismail et al. [18] defined AI and big data technologies as activities to innovate market and customer values by adopting those

technologies to corporate value change, including operations, marketing, production and development.

As above, digital transformation means a management strategy creating new markets and customers by changing traditional industry processes and organizations through core technologies centered on cloud computing, IoT, big data and AI, and making a new business model [21]. As seen in Figure 1, traditional companies have become digitalized, and the transformation of production, products, business models and organizations is carried out, changing to a digitalized and flexible new organization type [22].

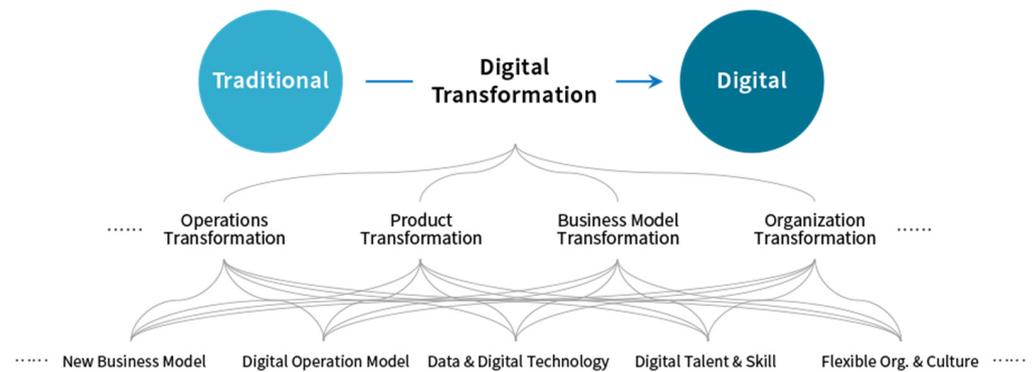


Figure 1. Leading digital transformation [22].

Leading companies actively respond to customer and market changes by adopting digital technology capabilities, maintaining corporate earnings increase and competitive edge, and creating sustainable business competitiveness through persistent efficiency improvement [23]. Although digital transformation strategies vary depending on corporate and industrial characteristics, it is essential to secure technology capabilities to make data and use them [24]. Companies nowadays are developing business models in which producers and consumers are connected with networks and the platform ecosystem based on data-centered technological capabilities in the conventional business model through AI-technology-based digital transformation [15]. Therefore, digital transformation capabilities can create destructive business models, new customers and market changes, which can lead to sustainable corporate growth within the digital environment [25]. Their performance increases a strong relationship when mediated by knowledge management and agility practices in an organization [26].

AI technology has placed itself part of the entire business network by integrating new devices or applications' technical data processing methods. According to the AI network, this demands the change of a business model or the change in automation and operating system. Companies devise new methods to provide corporate values, create earnings and improve efficiency based on AI technology beyond digitization, transforming analog-type information into digital type information or digitalization that integrates digital technology with existing business processes. Additionally, the companies consolidate digital transformation strategies applied to company-wide management activities [27].

As Brock [28] asserted, companies continue to perform business transformations based on the development of data collection, storage, processing technologies and digital product and service commercialization using cloud computing, AI, platform and robots. To successfully perform the business transformation, companies propel fundamental reconstitution strategies of customer experience, business models and operations through corporate culture and business innovation, as well as technological innovation. Consequently, companies adapt to the market's destructive change through digital capabilities, and a new process and an implementation strategy are constructed [29].

Today's companies are transforming their organizational structures and business models, centered on digital technology and new business through a strategic digital transformation based on new digital technology, and they are creating a new ecosystem beyond

the traditional corporate environment [21]. Those companies are consolidating the process innovation, organizational cultural innovation and change management activities of development, production, sales and marketing sectors supporting new digital transformation activities [22,30].

2.2. Influence Factors of Digital Transformation Strategies

The firm's digital transformation strategies form the change of real-time enterprises (RTE). New business model development aims to construct a continuously changing management environment based on differentiation through data-centered personalized new digital operation models. Therefore, many previous studies stress the importance of digital transformation on considerable data utilization [30,31]. Corporate digital transformation from a product and service aspect varies depending on industrial groups and firms' characteristics, and most companies regard securing the digital environment producing and using necessary data and capabilities as the most critical factor [24]. Resources and technology innovation on digital transformation in the areas directly affecting the production, distribution and marketing of firms, including communication between things, real-time collection and analysis of information and product servitization in corporate social activities, have been discussed [32].

In addition, Chanas et al. [29] emphasized the importance of the financial sector's digital transformation, such as fintech through digitalization according to blockchain. Discussions on digital transformation from an IoT consolidation aspect [33] and digital transformation from a technology-type aspect continue to be carried out. Although digital transformation starts by sharing big data accumulated through blockchain and IoT in a cloud model, the activities analyzing context, operating simulations and constructing systems are supported by AI [34]. Consequently, it is understood that the corporate value chain becomes digitalized, through which product production or service activities are actualized and systematized according to an AI-based digitalized platform. Corporate digital transformation is managed and continuously grows from this aspect, centered on AI-system-based enterprise management systems and processes.

Park and Yang [35] pointed out that the adoption of AI is the most crucial management change to transform into the digital era. They asserted that digital transformation could succeed through AI adoption via new personnel, recruitment and job structure changes. Matt et al. [36] insisted that new corporate repositioning should be tried by leading business innovation through AI advancement and digital platform consolidation based on data creation, collection and control management. This will strengthen data science capabilities to secure digital capabilities and lead successful digital transformation.

However, recent digital transformation aims at whole organization and business digitalization beyond just product and service innovation activities, and it is discussed as enterprise organization and business innovation using AI and cloud computing technologies. Einsehardt and Martin [37] reported that varieties of strategies, including product development, strategic decision-making, M&A and alliance to constitute new resources depending on market change should be processed. It is crucial to reinforce the continuous response capability of organizational coordination and strategy. Fenech et al. [38] stressed that human resources transformation and organizational acceptance and consultations are essential from a corporate change management perspective.

Lee and Oh [30] presented the importance of the CEO's leadership, organizational culture, and resources management. Correani [39] emphasized that firms' visions, goals and CEOs influence successful digital strategy factors. Warner and Wäger [32] insisted that processes and systems are required as change management capabilities and that business application and continuous learning competencies are critical to technical development. Park and Yang [35] reported that the digital transformation of HR management, such as personnel, recruitment and job structure, under the CEO's leadership is a pivotal influence factor.

2.3. Dynamic Capability View and SERM Model

The strategic approach in the management strategy field has been discussed, centered on the firm's core capabilities, including the resource-based perspective, technology-based perspective and environment-based perspective since the 1970s. From the resource-based theory perspective that has been emphasized since the 1990s, digital companies' competitiveness is explained as the outstanding obtainment of resources and the valuable and imitation-impossible technological competitiveness [40]. However, as Nonak [41] asserted, corporate strategies need a dynamic approach depending on the corporate environment. Moreover, recent firms' competition trend is that it is gradually more difficult to have an absolute and continuous comparative advantage. Companies successful in technology competition can easily lose market dominance due to failure in new investments, existing organizational inertia and resource distribution [42]. Consequently, the dynamism of resources and capabilities has placed itself as an essential factor for corporate success, and interest in dynamic capability view is increasing. Rapid change through the firm's dynamic capabilities and the integration, development and reconstitution of the internal and external organization are stressed [43].

Dynamic-capability-based theory has stressed dynamism: it stresses an asset orchestration is integrating, constructing and reconstituting an organization's internal and external capabilities for companies to adapt to the quickly changing environment [44]. From this point of view, the SERM model that Cho [44] asserted is a model emphasizing mechanism as dynamic capability through integrated access, coordination, learning and selecting capabilities of a subject, environment and resource. The SERM model has been used in research to analyze corporate strategies. Sakakibara and Cho [45] comparatively analyzed cooperative R&D activities of Korea and Japan based on the SERM model. Lee and Oh [30] analyzed digital-platform-based business activities of AI-based insurance companies. Kim and Kim [46] analyzed Google's digital transformation strategies and presented core success factors. Cho and Ku [47] empirically analyzed each factor's influence of the SERM model of companies within the digital environment targeting high-tech companies. Kim and Cho [48] presented corporate success factors through an empirical study through the SERM model targeting venture capital companies.

When looking at each factor of the SERM model, the role of the CEO (top decision-maker) is crucial for a firm's success when it comes to the subject. Subject means a factor affecting a firm's strategy establishment and implementation, organizational structure design and composition. Environment means an industrial structure, customer and market changes, competition environment and governmental and social constraints. Resource refers to tangible and intangible resources and a physical factor that includes corporate culture existing in the combined form of resources. The mechanism is a factor complexly affecting management strategies and activities through organic interactions between subject, environment and resource. Some scholars classify the mechanism as capability [49,50], process or routine [36]. In addition, the mechanism can be defined as a capability to integrate and reconstitute an organization's internal and external capabilities to adapt to a rapidly changing environment [42]. As Zollo and Winter [51] asserted, the mechanism can be explained as core capabilities to make the characteristics and rarity of a firm's valuable resources strategic.

Previous studies presented the sub-factors of mechanism as organizational learning capability, environmental sensing, opportunity seizing, strategic flexibility and entrepreneurial orientation. Eriksson [52] emphasized learning capability, and Lin [53] presented environmental sensing, opportunity seizing and strategic flexibility, alongside learning capability. The components of mechanism in the SERM model are defined as a firm's coordination, learning and selection [43]. When looking at the three factors, coordination means a conflict-resolving capability in an organization's business process construction and implementation stages. Learning means voluntary participation and a learning capability for organizational activity reinforcement. Selection means a strategic decision-making capability to draw business success.

3. Methods

3.1. Analytic Hierarchy Process (AHP)

This study used an analytic hierarchy process (AHP) and Delphi methods. AHP analysis is a hierarchical decision-making method developed by Saaty [54]. Decision making by a generally used quantitative analysis method is scientific and objective, but limitations in use appear if comparative scales are different or do not exist. AHP was created to overcome the limitations [55].

AHP methodology supports a systematic and hierarchical decision-making process by quantifying relative comparative information on major influence factors through a simultaneous analysis with a ratio scale of qualitative and quantitative data drawing importance and priorities. AHP method draws core factors through the evaluator's knowledge, experience and intuition using a questionnaire and evaluates relative importance through a pairwise comparison to constitute a decision-making hierarchy structure [56]. The AHP method is effectively used in various areas requiring multi-attribute decision-making. The AHP method helps analyze priority influence decision-making factors for planning, resource distribution and prediction [57].

This study used the most appropriate and efficient AHP method to identify the importance of the AI-technology-based digital influence factors. The relative importance of factors was drawn based on the geometric average of each factor, and reliability and validity were presented by producing consistency index (CI) and consistency ratio (CR), measured to maintain a questionnaire response's consistency.

3.2. Research Framework and Variables

The digital transformation influence factors were designed as shown in Figure 1, using the SERM model. Four factors, namely subject, environment, resource and mechanism, were comparatively analyzed as core factors. Each core factor was divided into four detailed items, and the components of all hierarchies designed a mutually exclusive and collectively exhaustive decision-making model.

This study performed a Delphi survey to enhance the objective reliability of significant factors in AHP and revise and supplement the detailed subject, environment, resource and mechanism factors in the SERM framework model. For two weeks in January 2022, the Delphi survey was carried out through an in-depth interview method targeting three experts, one enterprise executive, one global service business CEO and one venture capital investment business CEO. In doing so, the subject's strategic organizational and mechanism's change management factors were added as an evaluation factors variable.

Ultimately, the evaluation factors of the subject factor consisted of CEO, core talent, technical development organization and business strategy organization. The evaluation factors of environmental factors consisted of compliances and regulations, industrial competition, market digitalization and social responsibility. The evaluation factors of resource factor consisted of technological capabilities, big high-quality data, data management infrastructure and capital and investment. The detailed mechanism factor included coordination, learning and selection capabilities (See Figure 2). The AI-technology-based digital transformation factors' hierarchy model consisted of 16 evaluation factors of four evaluation areas (See Table 1).

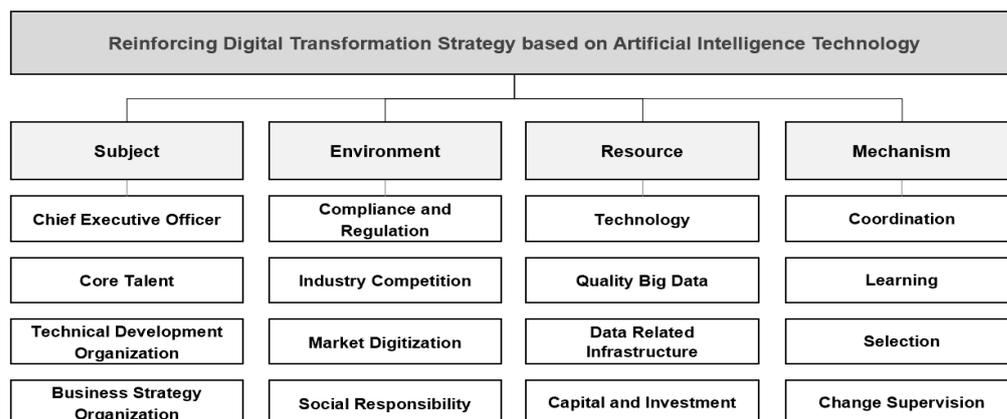


Figure 2. Research framework.

Table 1. Evaluation factors and definitions.

Evaluation Area	Evaluation Factor	Definition	Related Literature
Subject	Chief Executive Officer (CEO)	Chief Executive Officer’s interest in artificial intelligence technology and digital transformation leadership	[10–12,24,29,30,32,33,49,53]
	Core talent	Securing and managing key talent to lead AI technology	
	Technical development organization	Core organizational activities and support that lead the development of artificial intelligence technology	
	Business strategy organization	Strategic organization leading the AI-based digital transformation innovation business	
Environment	Compliance and regulation	Compliance and regulations affecting the development of artificial intelligence and digital technology	[10,19,27,57–61]
	Industry competition	Intensifying competition and changing industrial structure among companies promoting artificial intelligence technology development and digital transformation.	
	Market digitization	Changes by digital-based market environment and expanding customer acceptance of digital technology	
	Social responsibility	Changes in social awareness of artificial intelligence and expansion of corporate social responsibility roles	
Resource	Technology	Changes in social awareness of artificial intelligence and expansion of corporate social responsibility roles	[1,4,13,25,28]
	Big Data quality	High quality big data collected on business activities and user usage and experiences	
	Data related infrastructure	Data center or infrastructure for AI technology development and data collection and management	
	Capital and investment	Capital and investment priorities for AI technology development and enterprise-wide digital transformation	
Mechanism	Coordination	Conflict resolution and business process establishment activities due to digital transformation and organizational innovation	[12,19,24,26,29,30]
	Learning	Voluntary participation and continuous learning activities to strengthen digital technology-based organizational activities	
	Selection	Strategic decision making to lead technology and innovation business	
	Change supervision	Strategic change administration activities for developing the company-wide changes by digital transformation	

3.3. Research Process and Data Collection

The AHP questionnaire was made, centered on the pair-wise comparison, based on the designed model. The questionnaire response copies were collected for four weeks, from 3 January to 31 January 2022. The questionnaire survey participants were digital technology and strategy propulsion experts within global enterprises propelling digital transformation strategies, including Google, Microsoft, AWS and SAP as a provider group, and Samsung Electronics, SK, Hanwha, Korean Air and Doosan as a demander group. A one-on-one questionnaire survey was carried out using an online video interview method, and detailed guidelines were presented to respond to questions based on an accurate understanding of the background and core factors of the questionnaire.

For a comparative analysis of the demander group, namely, firms' digital transformation decision-makers, and the provider group, namely, the heads of AI and digital transformation service supply, the survey was conducted targeting 30 people, 15 from each group. Microsoft Excel software was used for the analysis using the drawn data. To ensure the reliability of the questionnaire responses, only the responses within 0.2 of consistency ratio were analyzed. Excluding 6 response copies whose consistency was lacking, 24 questionnaire responses were ultimately analyzed.

As shown in Table 2, the respondent information shows that men were 87.5% and women were 12.5%. As for age, 33.3%, 62.5% and 4.2% were in their 50 s, 40 s and 30 s, respectively. Work experience, 20.8%, 75% and 4.2% were 10–20 years, 20–30 years and over 30 years, correspondingly.

Table 2. Demography information.

Section	Characters	Frequency	Ratio (%)
Gender	Male	21	87.5
	Female	3	12.5
	Total	24	100.0
Age	30s	1	4.2
	40s	15	62.5
	50s	8	33.3
	Total	24	100
Work Experience	10–20 years	5	20.8
	20–30 years	18	75.0
	Over 30 years	1	4.2
	Total	24	100
Professional Area	Demander Group	12	50.0
	Provider Group	12	50.0
	Total	24	100

4. Results

4.1. Comparison of Evaluation Variables

As a result of the analysis on the evaluation areas of AI-technology-based digital transformation, the consistency ratio: reliability (CR) was adequate between 0.1239 and 0.1849. As a consistency index of each evaluation area, the CR of the subject, environment, resource and mechanism were 0.1849, 0.1239, 0.1463 and 0.1348, respectively. As shown in Table 3, the importance of the subject area was the highest (0.592), followed by resource area (0.1685), mechanism area (0.1441) and environment area (0.0954) in that order. According to the evaluation factors' analysis result, CEO showed the highest value (0.2885), followed by core talent (0.1742), technical development organization (0.0717), business development organization (0.064), big high-quality data (0.0599) and selection capability (0.0526).

Table 3. Weights and priority of the evaluation variables.

Evaluation Areas	The Weights of Areas	Evaluation Factors	The Weights of Evaluation Factors			
	Local		Local *	Priority	Global **	Priority
Subject	0.592	Chief Executive Officer (CEO)	0.4794	1	0.2885	1
		Core talent	0.2895	2	0.1742	2
		Technical development organization	0.1192	3	0.0717	3
		Business strategy organization	0.1119	4	0.0674	4
Environment	0.0954	Compliance and regulation	0.1566	3	0.0149	15
		Industry competition	0.4192	1	0.0399	8
		Market digitization	0.3168	2	0.0302	11
		Social responsibility	0.1074	4	0.0102	16
Resource	0.1685	Technology	0.1768	3	0.0285	12
		Big Data quality	0.3718	1	0.0599	5
		Data-related infrastructure	0.1276	4	0.0206	14
		Capital and investment	0.3238	2	0.0522	7
Mechanism	0.1441	Coordination	0.2134	3	0.0303	10
		Learning	0.1599	4	0.0227	13
		Selection	0.3706	1	0.0526	6
		Change supervision	0.256	2	0.0363	9
Total	1		4		1	

* Local: mean value of the evaluation factors in each group of criteria. ** Global: mean value of the evaluation factors in total criteria.

To summarize, the subject logged the highest value in the core area of digital transformation. As for evaluation factors, the CEO's leadership, core talent, relevant organization, big high-quality data and capital and investigation were crucial factors.

4.2. Comparison of Evaluation Areas between the Demander and Provider Groups

As shown in Table 4, the subject (0.5527, first), resource (0.2159, second), mechanism (0.1583, third) and environment (0.0731, fourth) were revealed in the demander group in the order. In the provider group, the subject took up the first rank (0.6209), followed by resource (0.1288, second), mechanism (0.11284, third) and environment (0.1219, fourth). Each group showed the same rankings, and the subject was analyzed as the most important.

4.3. Comparison of Evaluation Factors between the Demander and Provider Groups

According to a comparative analysis of the evaluation factors on AI-technology-based digital transformation, the CEO and core talent ranked first and second as the most crucial factors in the demander and provider groups with decision-making right. As a result of the analysis of significant sub-factors, CEO (0.2519, first), core talent (0.1501, second), technical development organization (0.0812, third), big high-quality data (0.0796, fourth),

business strategy organization (0.0724, fifth) and capital and investment (0.0399, sixth) were drawn as crucial evaluation factors in the demander group with decision-making right. In the service provider group, CEO (0.3202, first), core talent (0.1961, second), technical development organization (0.0613, third), business strategy organization (0.0608, fourth), selection capability (0.0532, fifth) and industrial competition (0.0470, sixth) were drawn as necessary. As the evaluation factors, both groups regarded CEO and core talent as the most important, and it was confirmed that the technical development organization and big high-quality data were essential factors, following CEO and core talent in the demander group. It was ascertained that the technical development organization and business strategy organization were essential factors in the provider group (see Table 5).

Table 4. Comparison analysis result on the evaluation areas.

Evaluation Areas	The Weights of Areas			
	Demander Group		Provider Group	
	Importance	Priority	Importance	Priority
Subject	0.5527	1	0.6209	1
Environment	0.0731	4	0.1219	4
Resource	0.2159	2	0.1288	2
Mechanism	0.1583	3	0.1284	3
Total	1		1	

Table 5. Comparison analysis result on the evaluation factors.

Evaluation Factors	The Weights of Evaluation Factors				Priority of Factors (by Global)	
	Local		Global		Demander Group	Provider Group
	Demander Group	Provider Group	Demander Group	Provider Group		
CEO	0.4534	0.5016	0.2519	0.3202	1	1
Core talent	0.2701	0.3071	0.1501	0.1961	2	2
Technical development organization	0.1462	0.0961	0.0812	0.0613	3	3
Business strategy organization	0.1302	0.0952	0.0724	0.0608	5	4
Compliance and regulation	0.1462	0.1675	0.0111	0.0195	15	13
Industry competition	0.4345	0.4036	0.0329	0.0470	11	6
Market digitization	0.3203	0.3127	0.0242	0.0364	14	9
Social responsibility	0.0990	0.1162	0.0075	0.0135	16	16
Technology	0.1695	0.1843	0.0364	0.0216	9	12
Big Data quality	0.3705	0.3729	0.0796	0.0437	4	7
Data-related infrastructure	0.1306	0.1247	0.0280	0.0146	12	15
Capital and investment	0.3295	0.3181	0.0708	0.0373	6	8
Coordination	0.2192	0.2059	0.0338	0.0263	10	11
Learning	0.1809	0.1401	0.0279	0.0179	13	14
Selection	0.3273	0.4158	0.0504	0.0532	7	5
Change supervision	0.2726	0.2382	0.0420	0.0305	8	10
	4	4	1	1		

5. Discussion

This study drew four evaluation areas and 16 evaluation factors based on the SERM framework model consisting of subject, environment, resource and mechanism to draw major factors affecting AI-technology-based digital transformation. Through the factors, this study empirically presented a strategic decision-making model and the importance of factors that need to be considered to consolidate digital transformation strategies. Through a comparative analysis between the demander and provider groups, a comparative analysis on differences of factors to consider between stakeholders was performed. As a result of the analysis, four issues can be discussed.

First, the subject is greatly emphasized among four evaluation areas. It was confirmed that core talent that can lead AI technology and the leader's commitment and organizational activities to support it are essential, among other factors, for successful digital transformation. As Matt et al. [36] insisted, the core of digital transformation strategies can be regarded as technology development or competitiveness, but humans develop and lead innovative digital technologies; therefore, human capabilities are crucial. As a result of this study, human capabilities, the competitiveness of leaders, core talent and subject were ascertained to be the most critical factors. Many previous studies [39,62,63] stress that the success of digital transformation strategies mainly depends on selection and concentration through digital human resource fostering and organizational change management. If new organizations such as AI research institutes and big data management organizations for digital transformation strategies are set up, cooperation and conflicts with existing organizations are necessary. Additionally, a new process should be constructed and led due to organizational changes. As Einsehardt and Martin [37] pointed out, a leader's commitment and organizational members' active attitude to absorb digital technology capabilities should be backed up for digital transformation to be established within an organization and lead organizational change through active support for a new organization.

Second, it needs to accept that the AI-technology-based digital transformation strategies should be led to core business areas as an enterprise strategy to IT platform firms, called big tech firms. However, an AI-based digital transformation strategy means a new organizational change to existing general firms. Therefore, problems of new attempts or innovation changes, such as organizational resistance, business value chain change and process innovation, should be resolved. As the previous studies pointed out [24,33], the core of innovative organizational change management is connected to the role of a leader, who is a CEO. As revealed in this study, leadership, including CEO's robust commitment to investment in and policy support for AI-technology-based digital transformation strategies, should be backed up to invigorate digital transformation strategies and successfully lead organizational change management.

Third, AI technology innovation or digital transformation strategies are discussed in connection with social change, including the Fourth Industrial Revolution and the digital technology environment. As Ismail et al. [18] pointed out, new digital technologies affect corporate business and correlate to a paradigm change of changing market and social trends. In this study, however, the environmental factors, including industrial competition, market digitalization, compliances and regulations and social responsibility, are analyzed to be low in terms of importance. Namely, an organization's internal factors, such as subject, resource and mechanism, are much more important than external factors such as the environment for firms to lead AI-technology-based digital transformation strategies.

Ong and Tan [64] said that firms quickly respond to organizational changes because their acceptance and elasticity of external digital environmental change have been enhanced since the COVID-19 pandemic. It has been fast-forwarded to digital transformation and technology adoption [3]. As Heinze et al. [22] asserted, diversities of digital technology development and usability change the composition of market competition and need new social norms through firms' technology development and business model application, rather than market competition environment and legal and social regulations.

Consequently, the AI-based digital transformation strategies reveal the characteristics of leading the society or market change, not adaption to or application of competitive environment. Therefore, digital transformation strategies need an approach from a preemptive strategy aspect, not from a market-chasing strategy aspect.

As a comparative analysis result between the demander and provider expert groups, the CEO, core talent and technical development organization were revealed as the same rankings. However, the demander group stressed environmental factors, such as industry competition or market digitalization [65], while the provider group emphasized technology and significant data quality factors. In the demander group that emphasizes corporate business activities, the considerations of the market environment and market entry can be significant. Meanwhile, in the provider group developing and supporting technologies, the relevant factors for better technology and data offers are more crucial. All this is confirmed in the result of this study. In the provider group, the selection area of the mechanism was drawn as a significant factor. This shows that selection capability for proper technology and solution offering is more important in the provider group than capabilities from an organizational aspect such as coordination, learning and change management because role category and content change depend on corporate strategic decision making in offering digital technologies and solutions.

6. Conclusions

This study presents the following implications. First, it was confirmed that a CEO's role is central in a firm's digital transformation. CEOs need to present a clear vision for digital transformation, exert company-wide leadership and develop their business strategies as a new business model. CEOs should foster core talent and make them stand in the center of changing technology and business. CEOs and executives should empower their employees and make a reward system in which the employees can mutually respect ideas, take risks and challenge again, although a failure is entailed in the beginning era of AI. Through this, prime user experience with AI-technology-based firms' products and services can be created, and new business models and markets can be developed.

Second, it was ascertained that internal environment management is critical, although the external environment is also important to lead digital transformation strategies. Companies should create a highly creative corporate culture by overcoming the fear of failure in digital transformation and new business, fostering cultural change leaders on digital transformation for their entire organizations. To support combined core talent between digital and industrial experts, firms need to carry out company-wide organizational activities to present a direction for employees' career development and organizational direction and establish strategies to implement the directions. Alongside a differentiated talent management strategy, AI-technology-based sustainable digital growth can be made through the firm's unique culture and mechanism to create human networks and continuously carry out and develop relevant research and services.

Third, the key factor mechanism was identified as an important part of the digital transformation influencing factors based on AI technology. In particular, change management capabilities and learning capabilities were emphasized as important factors for digital transformation. As digital transformation maturity increases, key factor mechanisms will become more and more important as a core competency of the enterprise.

Numerous companies have been implementing digital transformation strategies, and many changes have been led worldwide for the past five years. However, academic empirical results on digital transformation's success factors and specific strategy implementation methods are lacking. From this aspect, this study has significance in that the study defined the influence factors of digital transformation strategies, centered on AI technology, and presented a model to help decision making lead to successful strategies.

Nonetheless, this study has the following limitations: Firstly, this study conducted a questionnaire survey targeting persons and experts in charge of the digital transformation within global firms, namely, the participants were experts of activities in Korea, so there is

a limitation to generalize the study results. Factors affecting strategic activities can vary depending on countries and organizational environments, so a further study targeting various countries and experts should be carried out. Secondly, this study limited the core technology of digital transformation strategies to AI technology. Firms seek digital transformation strategies through diversities of digital technologies and AI. A further study can present a company-wide digital strategy decision-making model by drawing and analyzing more comprehensive factors affecting digital transformation strategies and AI technology. Lastly, this study defined influence factors through the AHP method and analyzed their importance. However, an empirical study on whether the defined factors affect the success of firms' digital transformation strategies appears to be necessary.

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