Technical Credit Evaluation Support

NICE TCB

Technology & Credit Report

Tech Credit Report (for Investors)

Company Name	MaaSFarm Co., Ltd.
CEO	Lee Hyeon
Issue No.	NICE-2020-04-000212 (Standard)
Date of Issuance	2020.11.23
Evaluators	Kim Gyeonghun, researcher, Corporate Evaluation Office, Information Operation Division Tel. 02-2124-6802
Reviewer	Lee Changseon, team leader/ technology transfer agent, Evaluation Team, Corporate Evaluation Office, Information Operation Division Tel. 02-2124-6939

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01. Comprehensive Tech Credit Grade

Company Overview

Company Name	MaaSFarm Co., Ltd.		
Corporation No.	210111-0133307	**Date of Establishment**	2018.05.25
Business Registration No.	819-87-01030	**Date of Business Launch**	2018.05.28
Name of CEO	Lee Hyeon	**Date of Birth**	1964.02.12
Company Classification	General small ~ medium enterprise	**Firm Characteristics**	Startup/Post-Commercialization
Address	#311, 111, Ballyong-ro, Deokjin-gu, Jeonju-si, Jeollabuk-do		
TEL.	-	**FAX**	063-214-2257
Standard Industrial Classification	Main line of business: (J58222) application software development/supply		
Industry Technology Classification	Utilization service platform and application software		
Name of Technology	Controlled Environment Horticulture smart farming– solution		
Main Products	Smart farming (agricultural ICT), etc.		
Total Assets	KRW 303 million	**Sales**	KRW 41 million
Venture Certification	Y(2020.05.17~2022.05.16)	**Innobiz Certification**	
Research Center	No research facility or personnel	**New Growth Product Code**	-

■TECH RATING

Comprehensive Tech Credit Grade

TI-4

Date of Issuance	2020.11.23
Effective Until	2021.11.22
Submitted to	Seoul Business Agency (SBA)

Tech Assessment Grade (for investors)

Inadequate | Poor | Fair | Very Good | Excellent

TI-10 | TI-9 | TI-8 | TI-7 | TI-6 | TI-5 | **TI-4** | TI-3 | TI-2 | TI-1

Considerable future growth potential based on technological prowess and good potential of the market

■Comprehensive Opinion

Established in May 2018, MaaSFARM Co., Ltd. (“the Company”) engages in the [application software development/supply] business (representative: Lee Hyeon/location of HQ: #311, 111 Ballyong-ro, Deokjin-gu, Jeonju-si, Jeonbuk-do/core technology: Controlled Environment Horticulture smart farming solution). The single-proprietorship business concentrates on the development of smart farming-related platform/service including environment for growing vegetables/fruits in smart farming through Controlled Environment Horticulture, growth monitoring/analysis solution, and growth analysis kit-related app service. For said platform/service, the proprietor collects data through IoT sensors that -- along with the database held – enable estimating values through machine learning. The service uses KS (Korean Industrial Standards)-based activators, and the proprietor is making preparations for export to countries including Denmark.

The business strives to adopt government-led platform/service. Businesses like SK TELECOM CO., LTD., kt corp., and Kakao Corp. provide support for platform/service. The sector is expected to post rapid growth in the future, requiring technical prowess related to network, database, server/IoT, etc. The proprietor strives to internalize these technologies, and such is expected to enhance the level of recognition for the Company in the industry gradually.

In 2019, the Company showed poor profit structure, posting sales of KRW 41 million, operating profit to sales ratio of minus 124.7%, and net profit to sales ratio of minus 93.4%. It kept a status of partially impaired capital through continued deficit. Its stability indicators improved, i.e., 33.5% capital ratio, 198.1% debt ratio, and 66.1% reliance on borrowings, but the share of borrowings in the entire financial structure was still high.

The Company is judged to have considerable future growth potential based on its technological prowess and the good potential of the market (TI-4).

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01. Comprehensive Tech Credit Grade

Tech Assessment Grade Details

Tech Assessment Grade (for investors)	Inadequate	Poor	Fair	Very Good	Excellent
	TI-10	TI-9	TI-8	TI-7	TI-6	TI-5	TI-4	TI-3	TI-2	TI-1
	Considerable future growth potential based on technological prowess and good potential of the market									

Statistical Score	75%	
Expert's Score	25%	

- The statistical score is derived by inputting the value of the explanatory variable of the target company into the model equation, and then standardizing the score on a scale of 0~100.
- The expert's score is calculated from the expert opinions on the evaluation items for each model. This score is then standardized on a scale of 0~100.

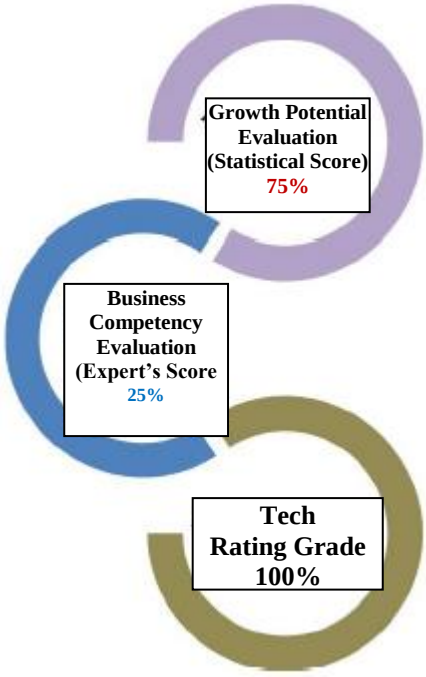
Tech Assessment Grade Details

Technology Sector	□Chemical/Material □Electricity/Machine/Equipment	□Distribution/Service □Bio/Medical Care	□ICT Manufacturing ■ICT Service	□Video/Performance/Album □Game
Application Model	□Regular Model	□Startup: Pre-commercialization	■Startup: Post-commercialization	

- The statistical score equation is estimated using the logistic regression model for each application model. The likelihood of high growth is defined as the dependent variable, and the significant variable is set as the independent variable.
- The statistical score is calculated for each application model by inputting the value of the independent variable of the target company into the estimated equation. The resulting probability value is then standardized and used as the score.

Structure of Technology Evaluation Model (for investor)

Source – Technology Evaluation Model (for investor)
(Ministry of Trade, Industry, and Energy/Financial Services Commission/Korea Institute for Advancement of Technology/Korea Technology Finance Corporation, 2016)



・The technology evaluation model for investment differs from the technology evaluation model for loans, which focuses on the likelihood of bankruptcy. The model evaluates a company in terms of its ability to operate a technology business and future growth potential based on statistical data.

・The technology evaluation model for investments has a structure in which the **"expert evaluation model" (25%) is combined with the "statistical evaluation model" (75%).**
√ Expert evaluation model – Technology business competency is evaluated based on weighted expert opinions.
√ Statistical evaluation model – Business growth potential is evaluated based on technology evaluation data using statistical methods.

・Technology evaluation for investment uses 3 different models for different stages of growth, in order to maximize the accuracy of evaluation.
√ Pre-commercialization company – 5 years have not yet passed since the company's establishment, and the product has not yet been commercialized.
√ Post-commercialization company – 5 years have not yet passed since the company's establishment, but the product has already been commercialized.
√ Regular company – A company that has operated for more than 5 years since its establishment. (Product commercialization is irrelevant.)

・Technology evaluation rating for investing is defined on a 10-point scale (TI-1 ~ TI-10), with technology competency and growth potential as the criteria.

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· The evaluation ratings for each specific item, substantiating evidence, and opinions on the rating are used to determine the expert's evaluation ratings.

02. Expert Evaluation Results

Major Items Evaluation Results

Major Items	Evaluation Grade	Inadequate		Slightly Inadequate		Average		Very Good		Excellent	
		E-	E+	D-	D+	C-	C+	B-	B+	A-	A+
Management Competency	B-										
Technological Competency	C-										
Market Potential	B-										
Business Potential	C-										

Detailed Items Evaluation Results

Major Items	Main Items	Main Items Evaluation Grade	Sub-items	Inadequate		Slightly Inadequate		Average		Very Good		Excellent	
				E-	E+	D-	D+	C-	C+	B-	B+	A-	A+
Management Competency	Entrepreneurial spirit/ credibility	A+	Entrepreneurial spirit										
			Credibility										
	Competency of CEO	B+	Industry experience level										
			Technical knowledge level										
			Understanding of the technology										
	Competency of top management	E+	Expertise of top management										
			Management commitment to business										
			Teamwork with the manager										
Techno-logical Competency	Technology development status	E+	Technology development/awards										
			Intellectual property rights owned										
			R&D investments ratio										
	Technology development capability	E+	Level of R&D efforts										
			Expertise of technology personnel										
			Management of technology personnel										
	Technological innovativeness	B-	Innovativeness of products										
			Position on the technology life cycle										
	Techno-logical self-sufficiency / expand-ability	C+	Technological self-sufficiency										
			Technological impact										
	Protection of technology	C-	Difficulty of imitation										
			Ability to protect technology										
Market Potential	Market situation	B+	Market size										
			Market growth potential										
	Competitive situation	B-	Competition situation										
			Regulatory incentives/control factors										
			Low barriers to market entry										
	Product competitiveness	C-	Market Share										
			Comparative advantage (vis-a-vis competitor products)										
			Product awareness										
Business potential	Management Competency	C-	Adequacy of production plan										
			Adequacy of sales plan										
			Diversity/stability of distributors										
			Funding ability										
	Overlook	C-	Growth potential										
			Earnings potential										

03. Company & Technology Information

Company Overview

Company Name	MaaSFarm Co., Ltd.		
Business Registration No.	819-87-01030	**Corporation No.**	210111-0133307
Name of CEO	Lee Hyeon	**Date of Birth**	1964.02.12
Date of Establishment	2018.05.25		
Company Classification	General small ~ medium enterprise	**Firm Characteristics**	Startup/Post-Commercialization
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Address	#311, 111, Ballyong-ro, Deokjin-gu, Jeonju-si, Jeollabuk-do		
Standard Industrial Classification	Main line of business: (J58222) application software development/supply - -		
To Be Submitted To	Seoul Business Agency (SBA)		

Financial Status (2018, KRW 1M)	Total Assets	Total Capital	Revenues	Net Income
	303.	102.0	41.0	-38.0

Technology Personnel	Special	Senior-level	Mid-level	Entry-level	Others	Total	Avg Duration of Employment
	0 person	0 person	0 person	0 person	0 person	0 person	0 year

Status of Main Businesses	Business Area	Key Product	Share of Revenues
	Software R&D	Smart farming (agricultural ICT), etc.	100.00%
	-	-	-
	-	-	-
	-	-	-
	-	-	-

Established in May 2018, MaaSFARM Co., Ltd. (“the Company”) engages in the [application software development/supply] business (representative: Lee Hyeon/location of HQ: #311, 111 Ballyong-ro, Deokjin-gu, Jeonju-si, Jeonbuk-do/core technology: Controlled Environment Horticulture smart farming solution). According to its accounting settlement financial statements dated 12/31/2019, the Company is an SME with total assets and sales of KRW 300 million (paid-in capital: KRW 140 million) and KRW 40 million, respectively.

History & Achievements

2018.05	The Company’s establishment

03. Company & Technology Information

Status of major technologies in each sector

Category	Number	Title
Registration of trademark right	40-1530688	MaaSFarm
Registration of trademark right	40-1530689	MaaSFarm.
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

We intend to define the core technologies of the Company as follows for its technological evaluation considering the future growth potential of the market, level of commercialization of the Company's technologies, composition of the products/sales of the Company and relevant prospects, status of industrial property rights held by it, and future business plan as stated in the tech credit survey. We will also evaluate its business-related implicit technologies comprehensively including industrial property rights like patents and utility model rights.

Summary of Key Technologies

Evaluated Technology No.	Technology Category	Name of Evaluated Technology	Evaluation Importance
JC9136_1	Smart farming	Controlled Environment Horticulture smart farming solution	100.00%
-	-	-	-
-	-	-	-

04. Summary of Evaluation Opinion

Management Competency Evaluation	
Entrepreneurial Spirit / Competency of CEO	The proprietor makes core decisions for the Company and plays a lead role in overall business operations. He appears to run the Company stably. His entrepreneurship is judged to be rather high in terms of desire for accomplishment, ability for self-control, sensitivity to risk, and creativity. His reliability as proprietor is judged to be solid based on credibility perceived by others, level of social contribution, transparency in operation and assets, etc. His experience in technological management appears to be at an ordinary level. His technological knowledge appears to be at a chief engineer level considering his major in school and past experience in the relevant sector. All in all, the proprietor's capability is judged to be good.
Competency of Top Management	It is a single-proprietorship business. Thus, categories like expertise in management, level of immersion of the top managers in the business, relationships between the proprietor and top managers, teamwork, etc. are not applicable in our evaluation. The Company is judged to be able to improve its status in these matters by recruiting good top managers.

Technological Competency Evaluation	
Technology Development Status/ Technology Development Capability	The Company was established to carry out the development of agriculture-related ICT (information and communications technology) and establishment of agriculture ICT-based computer system. It carries out the business with a long-term plan including execution of research assignments. In this regard, it has taken part in programs such as development of database operation system for optimization of smart farming and KETI-run open lab (i.e., paprika testbed) within the Jeonbuk Agricultural Technology and Extension Services. It has posted a case of commercialization of products and a case of technology development. As for the intellectual property right owned by it, the Company has registered two cases of trademark right and had one case of certification. It has not made any investment in R&D, so its status of technological development remains at an insufficient level. As a single-proprietorship business, it plans to hire engineers. It needs to hire the relevant engineers and operate a research institute or an R&D department.
Competency of Top Management	The Company's core technology is Controlled Environment Horticulture smart farming solution. It provides services related to growth monitoring/analysis solution and growth analysis kit-related app. With this solution, the Company collects the relevant information through IoT sensors and predicts growth/development logic through machine learning. The business requires complex skills including those related to network, database, and server/IoT. The proprietor has internalized the relevant technology and secured technological prowess differentiated from others. The usefulness of the Company's technology -- which is at the early stage of the growth period -- is apparently being demonstrated. The Company engages in the development and provision of services based on its own technology, so its technological reliance appears to be at an ordinary level. The spill-over effects of its technology are judged to be at an ordinary level, considering the fact that its services can be invigorated with the development of associated industries. The Company persistently engages in R&D in cooperation with public institutions and looks for opportunities to make forays into overseas markets. The Company is judged to be lacking investment in the protection of its technologies as one without separate personnel in charge of technological protection, and there have been no ascertained regulations that can protect its technologies.

04. Summary of Evaluation Opinion

Market Potential Evaluation	
Market Situation and Competitiveness	According to the report on smart farming technology and market trends published in November 2019 by the Commercialization Promotion Agency for R&D Outcomes (COMPA), the domestic smart farming market is growing at an annual rate of 5% from KRW 4,449.3 billion in 2017, and it will reach the level of KRW 5,958.8 billion by 2022. Thus, the target market -- where the technology in question belongs -- is expected to do well. The following factors are at a good level: past growth rate of the target market, future prospects, rate of increase in average sales in the past three years of the top industries including the technology in question, and growth potential of the market against the rate of increase in sales of all industries in the past three years. Meanwhile, government-led technological support is being provided to the sector where the Company's technology belongs, and such will have a positive impact on the Company. The Company remains relatively little known in the sector but strives for the commercialization of its technology in many respects in cooperation with public institutions.

Business Potential Evaluation	
Business Capability and Outlook	The Company appears to have more or less insufficient production capability considering its facilities, its ability to provide personnel, the proprietor's knowledge and experience, and its ability to provide service to meet the demand. Its marketing capability also appears to be insufficient in terms of market analysis capability, marketing strategies, PR strategies, etc. Nonetheless, the diversity and stability of customers appear to be at an ordinary level considering the number of customers, the Company's relationship with them, types of customers, share of cash transactions, and period taken to collect receivables. Its capital supply capability appears to be more or less insufficient considering the ability to supply the necessary funds on time. Its growth potential is judged to be at an ordinary level, considering the following factors: rate of increase in recent sales, operating profit-to-sales ratio, future business plan, etc. At present, its profitability remains low but is expected to improve considering the fact that it is a startup in the early stage of doing business, average status of those in the industry, sales plan in2020,etc.

05. Detailed Evaluation Opinion

Management Competency Evaluation

■ Entrepreneurial Spirit / Competency of CEO

Sub-items	Result Grade
Entrepreneurial Spirit	A+
Credibility	A+
Technology Management Experience	C+
Technical Knowledge Level	A+
Understanding of the Technology	B+

■Focus of Evaluation

- Evaluation of the competencies of the CEO in technology planning and development based on his experience in the industry, undergraduate degree, and license/certifications.
- Comprehensive evaluation of the CEO's drive for achievement & creativity, self-control, risk taking, internal and external reputation, transparency, and understanding of the technology

■CEO

Name	Lee Hyeon		**Form of Management**	■Founder □ Inherited □Acquisition □ Professional Manager	
Experience in the Industry	16.0 years		**Date of Birth**	1964.02.12	
Education	Graduate School of Minnesota State University (master's degree)		**Alignment with Educational Degree**	■ Aligned □ Misaligned	
Career	Period	Place of Work	Sector	Responsibilities	Position
	2018.~present	MaaSFarm Co., Ltd.	IT/R&D	General control	Proprietor
	2002.~2009.	E-Powernet Inc	IT/Electronics	General control	Proprietor
	1985.~1991.	Samsung.	-	Chip design	Researcher
	-	-	-	-	-
	-	-	-	-	-

■ Shareholders

Shareholder	Relationship with CEO	Share	Remarks
Lee Hyeon	Self	94.59%	-
Gwon Ujeong	Two different people	0.41%	-
Korea Angel Investment Matching Fund No. 4	Others	5.00%	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

■Detailed Opinion

The core decisions of the Company are made by its president Lee Hyeon, who has accumulated experience in IT/system planning and development. He has strong confidence in his abilities and knows how to think out of the box. He appears to have a high level of entrepreneurship together with ability for self-control in making decisions quickly. His overall reliability appears to be good in terms of external activities, cooperative network established, and reputation.

The Company's proprietor majored in electrical engineering and computer science (master's degree). He built experience in chip design, IT development, service provision, etc. at E-Powernet, Inc. and Samsung having accumulated experience at the Company for more than 15 years. Thus, his technological management is judged to be at a higher-than-ordinary level. He is considered to be a chief engineer based on the level of his technological knowledge and experience accumulated. He formulates logical and realizable strategies concerning smart farming/agricultural ICT-related target market/demand analysis/forecast and sales channel. The level of his understanding of technologies is good considering the fact that he gets a grasp of regulations/policies related to commercialization of technologies. All in all, his capability as proprietor is judged to be good.

05. Detailed Evaluation Opinion

Management Competency Evaluation

■ Competency of Top Management

Sub-items	Result Grade
Sub-items	**E+**
Expertise of Top Management	**E+**
Business Commitment of Top Management	**E+**

■Focus of Evaluation

- Evaluation of the top management executives (i.e. the core executives in administration, planning, finance, design tech, and marketing) according to such criteria as educational background and experience (their responsibilities and achievements). The CEO is not included in this group.
- Examination of the relationship between the CEO and the top management executives (i.e. the core executives in finance, technology, design, and marketing), including the decision-making process, teamwork, and business commitment in terms of their capital contributions and years of employment.

■CTO

Name	-				
Experience in the Industry	-		**Date of Birth**	-	
Education	-		**Alignment with Educational Degree**	■ Aligned □ Misaligned	
Career	Period	Place of Work	Sector	Responsibilities	Position
	-	-	-	-	-
	-	-	-	-	-
	-	-	-	-	-
	-	-	-	-	-
	-	-	-	-	-

■ Shareholders

Position	Name	Responsibilities	Relationship with the CEO	Years of Employment	Education	Career
-	-	-	-	-	-(-)	-
-	-	-	-	-	-(-)	-
-	-	-	-	-	-(-)	-
-	-	-	-	-	-(-)	-

■ Commercialization History

Name of CEO	Year	Description
Lee Hyeon	2020	Agricultural ICT R&D
-	-	-

■Detailed Opinion

It is a single-proprietorship business. Thus, categories like expertise in management, level of immersion in the business by top managers, relationships between the proprietor and top managers, teamwork, etc. are not applicable in our evaluation. The Company is judged to be able to improve its status in these matters by recruiting good top managers.

05. Detailed Evaluation Opinion

Technological Competency Evaluation

■ Technology Development Status/

Sub-items	Result Grade
Technology Development / Awards	E+
Knowledge Assets Owned	E+
R&D Investment Ratio	E+
Level of R&D Efforts	E+
Expertise of Technology Personnel	E+
Management of Technology Personnel	E+

■Focus of Evaluation

- Evaluate the level of investment in R&D and establish and operate an R&D organization that plays a pivotal role in research and development
- Identify technical personnel, evaluate technology development and commercialization performance over the past three years, and understand the status of all intellectual property rights held by the company.

Technology Development Environment	□Research Institute (Annex) □ R&D service □ Industrial design service company		□ R&D dedicated department □ Design Team □ Internal development department		□Only technical or engineering personnel operated □ Outsourcing ▪ No R&D Capability or Manpower		No. of Years of Operation in Business 0.0 year
Technology Personnel Status	Special	Senior-level	Mid-level	Entry-level	Others	Total	Average Duration of Employment
	0 person	0 person	0 person	0 person	0 person	0 person	0 year
R&D Investment Situation	Category	2018	2017	2016	3-year Average	Industry Average	
	R&D Investment Ratio	0.00%	0.00%	-	0.00%	4.00%	
	Revenues (KRW 1 million)	41	0	-	20	1,850	
	R&D Cost (KRW 1 million)	0	0	-	0.	74	
Technology Development Achievements (previous 3 years)	Technologies Developed				Certifications & Awards		
	Technology Commercialization	0 case			Certifications	1 case	
	Technology Development	1 case			Awards	0 case	
	Product Commercialization	1 case			Technology Adoption	0 case	
Intellectual Properties Owned	Patent Applications	Patent Registrations	Utility Model Applications	Utility Model Registrations	Design Registrations	Trademark Registrations	Program Registrations
	0 case	0 case	0 case	0 case	0 case	2 cases	0 case

■Detailed Opinion

The Company was established to engage in the development of agricultural ICT and establishment of the relevant computer system. It is carrying out business based on a long-term plan for the execution of government-initiated research assignments, etc. In this regard, it has taken part in programs such as development of database operation system for optimization of smart farming and KETI-run open lab (i.e., paprika testbed) within the Jeonbuk Agricultural Technology and Extension Services. It has posted a case of commercialization of products, a case of technology development, and a case of certification (as a venture business). It is carrying out R&D related to the relevant technologies but has secured no patent registration. It has registered two cases of trademark right. It has not made any investment in R&D over the past two years versus the average investment ratio of 4.00% in the application software development/supply (J58221) sector; thus, the status of its technological development remains at an insufficient level. This suggests the need for the Company to expand its R&D and secure more intellectual property rights (patents and program registration certifications, etc.)

05. Detailed Evaluation Opinion

Technological Competency Evaluation

■Detailed Opinion(Continued)

The Company has no research institute or R&D department recognized by the Korean Industrial Technology. Association (KOITA). The two engineers who used to work for the Company until 2019 left to become independent; thus, it remains a single-proprietorship (engineer) business. As such, the Company remains at an insufficient level in terms of the following factors: level of R&D invigoration, expertise of engineers, incentive system for engineers, level of management of engineers concerning education/training, etc. In this regard, it needs to hire the relevant engineers and operate a research institute or an R&D department.

05. Detailed Evaluation Opinion

Technological Competency Evaluation	Applied technologies	Smart Farm

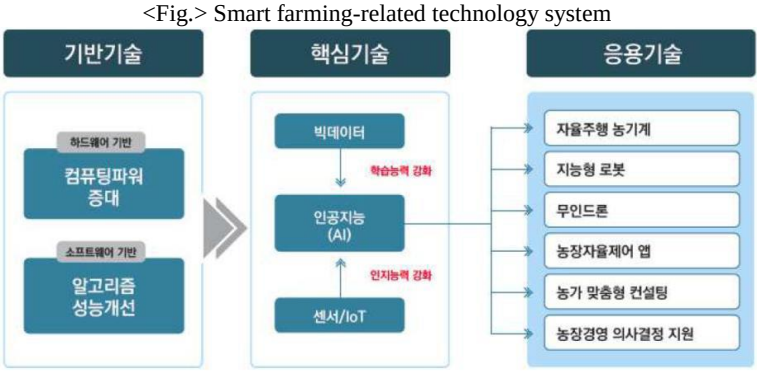
■ Technical definition

"Smart farming" refers to an automated, remote-controlled system for the maintenance/management of optimal growing environment of crops, livestock, or fish in a farm, a hoop house, a cattle shed, or a fish farm using ICT. Smart farming aims to enhance productivity and product quality -- using less labor, energy, and nutrients -- by providing an optimal growing environment for crops and livestock based on the relevant information and data. The concept attracts attention as a way of addressing problems caused by the drop in farming productivity, rise in prices of seeds and chemicals, and environmental pollution.

■ Technical Overview and Features

Smart farming uses base, core, and application technologies. Base technology refers to technology related to the establishment of infrastructure and includes computer hardware concerning the operation of smart farming and software related to algorithm. Core technology refers to ICT in general including IoT, Big Data analytics, AI, deep learning, etc. Application technology includes autonomous farm equipment, intelligent robot, drone, farm control application, etc.

<Fig.> Smart farming-related technology system

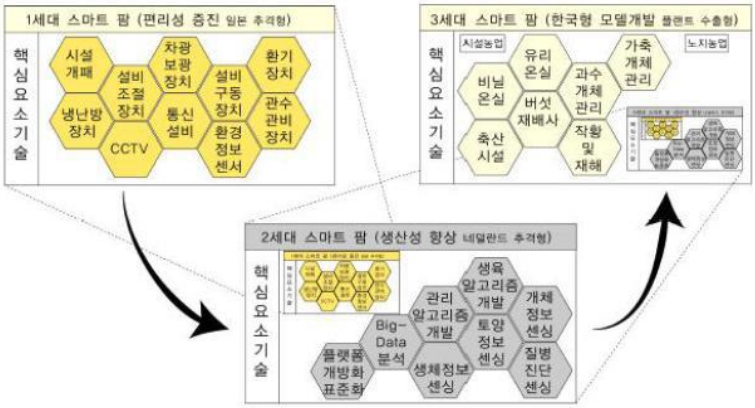


Source: KREI

■ Domestic Smart Farm Trends

According to the Rural Development Administration (RDA), smart farming is divided into the first to third generations depending on the level of technological development. The country's smart farming is judged to be 1.5th-generation, i.e., somewhere between the 1st generation focusing on the enhancement of convenience of hoop house operation and the 2nd generation that can engage in complex environment control.
1G smart farming mainly aims at the enhancement of convenience. It is also considered to be on the heels of Japan. What 2G smart farming aims at is the enhancement of productivity, and it is also considered to be on the heels of the Netherlands. 3G smart farming aims at global industrialization, and it is deemed to be on the verge of industrial plant export.

<<Fig.> Stages of smart farming development



Source: MAFRA

05. Detailed Evaluation Opinion

Technological Competency Evaluation

■ Technical definition /Classification

Applied technologies	IoT

■ IoT (Internet-of-Things) links people, things, and spaces together through the Internet. As an efficient technology for situation analysis through networking with things, it collects information from things and shares and uses it with other people. In general, IoT refers to a technology for the collection and use of data through the Internet, using network chips and sensors for communications mounted in things. Here, "things" refer to diverse embedded systems including household appliances, mobile equipment, wearable devices, etc.

ings connected with IoT should be connected with the Internet with a unique IP that can identify them and may be embedded with sensors to acquire data from an external environment.

All things connected through the network are subject to information theft. Thus, security technology should accompany the development of IoT.

■ IoT device-related elemental technology includes platform, networks, products/devices, and services. "Products/Devices" are divided into embedded system/sensor, gateway (including reader) and other equipment. Their details are stated in the table below.

Category per IoT elemental technology

Category	Features
Platform	* Hardware/Software that provides the function of processing, handling, and converging information collected by sensors linked to the terminal activated with applications * A system wherein software for action is executed through convergence between devices and services
Network	* Wired/Wireless communications infrastructure designed to transmit information acquired to people, platforms, and other devices through linkage with devices and devices for providing such infrastructure
Products/Devices	* Products/Devices * Devices/Relevant products that can create or collect information and deliver it through
Service	* An act of providing convenience through the application of IoT * Function of management/control of devices connected to things

Category of products/devices

Category		Features
Products/Devices	Embedded system/sensor	* IoT-related wireless transmission chip or micro controller, sophisticated sensors equipped with communications functions * Intelligent terminal that provides communications service to users in IoT * Information devices (sensors/activators) including those designed to measure or detect information related to ambient environment
	Gateway (including reader)	* A device that provides the information collected through linkage with terminals and tags * Including gateway, bridge, hub, RFID reader, etc..
	Other equipment (Educational equipment, tag printer other communications equipment, etc.)	* IoT education-related module, terminal, EVKit, and other ancillary equipment (tag, printer, housing, etc.)

Source: TDB, IoT device-related materials, 2016 (reedited through exception)

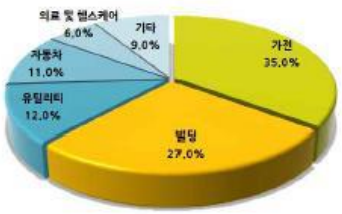
05. Detailed Evaluation Opinion

Technological Competency Evaluation

■ Applied technologies

■ As an initial stage of IoT, M2M (Machine-to-Machine) is used for the application of a simple communications system like sensors (e.g., RFID) to traditional industries. Examples of its use include: traffic car, barcodes, Door-to-Door Courier Tracking, ATM, car navigation system, etc. The IoT market is growing rapidly with the increase in the distribution of high-speed network (wireless communications devices, tablet PC, etc.)-based mobile terminals and introduction of IoT products to people's daily lives.

Cases of IoT applications

Category	Cases of IoT applications	Applications in sectors
Household appliances	- -Digital photo frames/camera/display devices - Sensor, lighting, pump, vending machine control	
Remote-controlled maintenance of building, etc	- Monitoring of bridges/buildings for maintenance; remote gas/water/electricity meter reading	
Security and public safety management	- CCTV-based security; surveillance of buildings/roads - Natural disaster (forest fire/flood) monitoring	
Vehicles	- Telematics service like vehicle management, emergency call, anti-theft system, care navigation system, etc - Intelligent Transport Systems (ITS) including traffic information, toll collection - Control of buses/call taxis	
Medical/Health care	- Personal health check solution (blood pressure/diabetes) - Vital signs monitoring - Taking care of seniors/the disabled; remote medical care	
Asset management	- Remote management of vending machine, copier, display device	
Tracking	- Tracking system-based management of things (including logistics) and tracking of people - Checking the location of (seniors living alone and monitoring) - Monitoring of location of those with criminal record (electronic bracelet), etc.	

Source: TDB, IoT device-related materials, 2016 (readited through exception)

■ Technology Trends

■ **(IoT's development stages)** IBM has divided IoT's development stages as follows: linkage of a device to a product (IoT 1.0); infrastructure establishment (IoT 2.0); and innovative solution development in industries (IoT 3.0). IoT is expected to develop in a way that will enable monitoring and control by having all things and people linked to the network from the status of using sensors including RFID

■ **(Standardization of IoT devices)** It is important to set standards including communications standards to connect a large number of devices manufactured by different businesses with each other in the IoT market. Currently, standardization is underway in connection with the need to make the market grow and realize economies of scale. Standards organizations including IEEE, IIC, AllSeen Alliance, Thread Group, OIC, etc. are vying with each other to play a lead role in the standardization

■ **(IoT's hype cycle and Priority Matrix)** IoT has produced partial success cases in large quantities, become the focus of public attention, and gained strength as a major technology in the IT market, being in the growth stage in the market cycle. It is difficult to express all IoT technologies adequately with one point in hype cycle, but they are expected to go beyond the Peak of Inflated Expectations and reach the Trough of Disillusionment in a few years. In 2015, Gartner estimated that 4.9 billion IoT devices were used and predicted that the technology will reach the Plateau of Productivity five to ten years after the Trough of Disillusionment. Platform/Network technologies are being developed for IoT, being in the early stage of growth. Smart home technology is also in a similar stage.

05. Detailed Evaluation Opinion

Technological Competency Evaluation

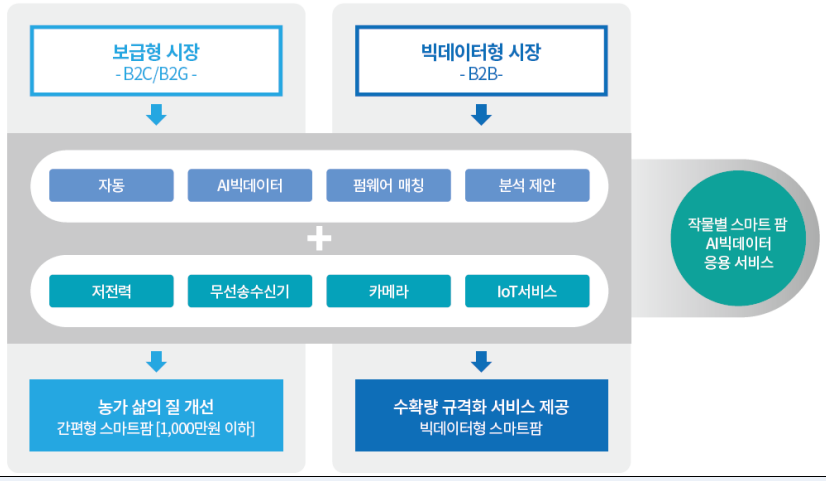
■ **Technological superiority**

Applied technologies	**Controlled Environment Horticulture smart farming solution**

Key Contents

◇ The Company provides kit app service related to the environment for growing fruits/vegetables and growth monitoring/analysis solutions at smart farming facilities. The solutions are collected through IoT sensors concerning the environment, crop growing, fertilizer, etc. Crop growing logic prediction can be done through machine learning based on historical data and database/files. It is possible to control the KS-based actuator through Modbus-type data transformation control using the Daemon server after obtaining app service information.

[The Company's business model]

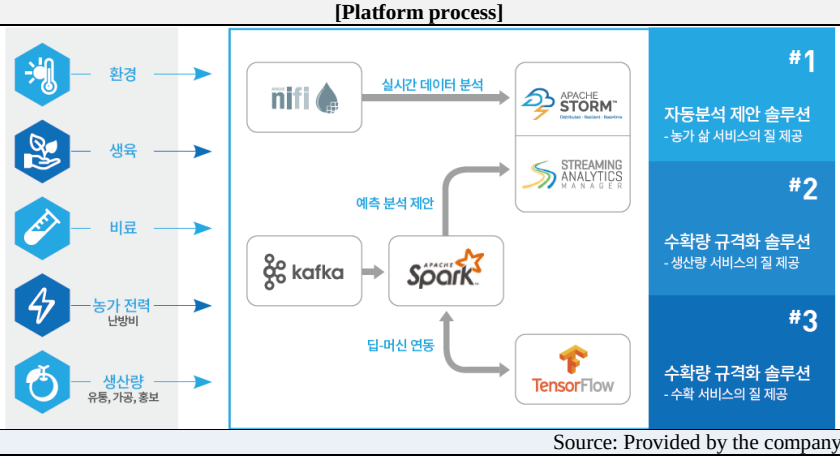


Source: Provided by the company material

◇ The platform is provided through the hardware/database solution of wired/wireless adapters and complex gateways. It can suggest forecast/analysis through the real-time data analysis of information on the environment, crop growing, fertilizer, etc. and machine learning, having the merits of automated analysis-based suggestions and standardization of yields.

.

[Platform process]



Source: Provided by the company material.

05. Detailed Evaluation Opinion

Technological Competency Evaluation

■ **Technological superiority**

Applied technologies	**Horticulture smart farming solution**

◈ Based on its technology/knowhow, the Company set the cucumber/tomato/horticulture markets in Funen, Denmark as its target.

Key Contents

[Target market analysis]

희망(기) 진출시장	시설원예 과채소 작물의 클라우드 기반 재배 환경 모니터링 및 재배 조건 제안 시장
진출 희망국가	덴마크
선정사유*	1. 클라우드와 센서 기반의 작물 활동 분석 기술을 통한 예측 감시 데이터관리에 대한 수요가 시설원예나 노지에서 확장 중 2. 유럽등에서 이산화탄소 환경 규제등의 법적 강화된 조건으로 효율적 데이터 기반 작물의 성장의 관심 집중
자체진행현황	Kotra-코펜하겐의 지원 아래 7개의 파트너 들과 토마토등 과채소작물의 시설 원예 작물 활동 분석 솔루션 적용을 위한 협업 및 파트너십 연구 개발 중

Source: Provided by the company material

For export, the Company carries out a project for collaboration and partnership with businesses specializing in controlled horticulture management system and IoT -- including Semantic and Sensohive Technologies -- using test beds in Denmark. The Company has registered itself with the Council for Export of Smart Farming, and it cooperates with KOTRA, Foundation of Agricultural Technology Commercialization & Transfer, and MAFRA

◈ The Company cooperates with B2G, Public Procurement Service, and agricultural technology centers run by local governments for R&D commercialization and strives to realize sales. Its R&D/investment plans are as follows:

Key Contents

[R&D commercialization budget]

구 분	(2020)년 (개발종료 해당년)	(2021)년 (종료 후 1년)	(2022)년 (종료 후 2년)	(2023)년 (종료 후 3년)	(2024)년 (종료 후 4년)	(2025)년 (종료 후 5년)
사업화 제품명	수확량 예측 로봇	작기별 기상 상황 예측 로봇	생육 재배 환경 예측 로봇	생산량,품종 등 농산물 수급 안정의 방안 예측 로봇	수확시기,재배면적 예측 로봇	생육이상 평가 예측 로봇
투자계획(백만원)	70	140	300	600	1,500	3,000

Source: Provided by the company material

The Company continues to invest in R&D. It is expected to carry out the business stably and enhance the level of recognition in the smart farming industry by securing engineers

05. Detailed Evaluation Opinion

Technological Competency Evaluation

■ The company's SWOT analysis

[The company's SWOT analysis]

◈ **(Strong Point) Internalized technology/knowhow**

The single-proprietorship business engages in professional smart farming ICT R&D/service. It concentrates on the development of smart farming-related platform/service including environment for growing vegetables/fruits in smart farming through Controlled Environment Horticulture, growth monitoring/analysis solution, and growth analysis kit-related app service. It is making preparations including the development of platforms to make forays into world markets with the help of KOTRA..

◈ **(Weakness Point) Difficulty in onsite application and propagation of convergence technology**

There has been a drastic improvement in the sector that the Company specializes in, but farmers still lack understanding of ICT convergence technology. Shifting to smart farming also requires massive investment. It is difficult to spread smart farming throughout the industry. The Company needs to expand its business areas by recruiting technological/marketing personnel.

◈ **(Opportunity Point) Government's effort for the invigoration of smart farming**

Smart farming, which the Company specializes in, is a complex sector wherein diverse technologies including those related to agriculture/livestock/fishery, ICT, and electric/electronic/machinery technology are combined. In the country, the central/local governments play a lead role in the sector. The government has started installing the smart farming management system at farming households through MOUs signed with the relevant businesses. Large-sized businesses such as SKT, KT, and Kakao are investing in it.

◈ **(Threat Point) Competition getting fiercer; global businesses increasing their investment**

Businesses in the Netherlands -- where controlled farming is well-developed -- lead others in the global smart farming market thanks to the government's strong support and individuals' active participation. It is followed closely by countries like Japan and the United States. Up to now, smart farming is the only way to enhance productivity in a given size of farmland without doing further harm to the natural environment. Thus, countries advanced in farming vie fiercely with each other to improve their smart farming technology and system.

05. Detailed Evaluation Opinion

Technological Competency Evaluation

■ Competency of Top Management

Sub-items	Result Grade
Technological differentiation	C+
Position in the technology life cycle	B+
Technological self-sufficiency	C+
Technological impact	C+
Difficulty of imitation	C+
Ability to protect technology	D+

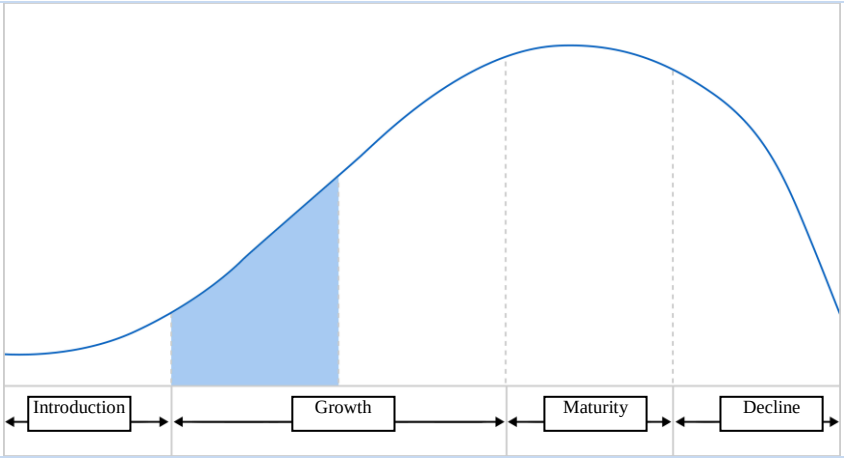
■Focus of Evaluation

- The level of differentiation that the technology can bring vis-a-vis existing technologies and the possibility of developing a new technology sector.
- Examination of the cost of developing the technology, development time, intellectual properties owned by the company, and the company's ability to protect the technology.
- Evaluation of the usefulness of the technology and technological self-sufficiency based on a study of the related technologies, the innovativeness of the applied technology, and technological trends

■ Key Competitors

	Company Name	Revenues (KRW 1 million)
Key Competitors	Green Labs	436
	VandalSoft Co.,Ltd.	-
	n.thing Inc.	495
Additional Information		

■ Technological Advantage

Name of Technology	Controlled Environment Horticulture smart farming solution				
Technological Competency	□ Innovative Technology	□ Major Improvement	■ Minor Improvement	□ Existing Technology	
Type of Technology	□ Product Technology	■ Process Technology	□ Material Technology		
Technology Readiness Level	■ Selling	□ Production Ready	□Pilot	□ Laboratory	□ Idea
Technology Acquisition Method	■ Developed In-house	□ Shared Technology	□ Purchased Technology	□ General-purpose Technology	
Technology Lifecycle					

■Detailed Opinion

The Company's core technology is judged to be Controlled Environment Horticulture smart farming solution. It concentrates on the development of smart farming-related platform/service including environment for growing vegetables/fruits in smart farming through Controlled Environment Horticulture, growth monitoring/analysis solution, and growth analysis kit-related app service. The solutions are collected through IoT sensors concerning environment, crop growing, fertilizer, etc. Crop growing logic prediction can be done through machine learning based on historical data and database/files. It is possible to control the KS-based actuator through Modbus-type data transformation control using the Daemon server after obtaining the app service information.

05. Detailed Evaluation Opinion

Technological Competency Evaluation

■Detailed Opinion(Continued)

The sector requires complex skills including those related to network, database, and server/IoT to engage in platform development. The Company engages in the development and provision of services based on its own technology. It makes preparations for linkage with platform-based intelligent data service based on the service in cooperation with Sematic, having adopted a business model for realizing sales through B2G, etc. It has the ability to provide a stable smart farming environment through said service, having secured technological differentiation by internalizing the relevant technologies. The sector that the Company specializes in, i.e., smart farming/agricultural ICT, is at the beginning of growth stage; thus demonstrating the usefulness of the sector.

The Company engages in the development and provision of services based on its own technology. The sector is a technology-intensive industry that requires high-level technological prowess and IoT knowhow of the computing system in general including infrastructure, middleware, applications, etc.

The Company's technological self-reliance is judged to be at an ordinary level as the Company provides services based on its own knowhow. Industries related to the technology in question are being developed in cooperation with farming households as well as the Region & Agriculture Research Institute amid the increase in the need for agricultural ICT/smart farming. The spill-over effects of the technology are judged to be at an ordinary level, considering the fact that services based on it can be invigorated with the development of the relevant industries.

The Company does not have intellectual property rights related to the technology in question but appears to have secured technological knowhow above a certain level. It engages in R&D concerning the technology in cooperation with domestic public institutions and strives to find an opportunity to make forays into overseas markets through KOTRA. The Company is judged to have secured an ordinary level of difficulty in technology imitation -- as it is necessary to accumulate knowledge/knowhow in the sector -- and it is sophisticating its technology through constant development. The Company has no other engineer as a single-proprietorship business. Access to its facilities is being controlled, but there are no security employees and no particular steps are apparently being taken against leak of the technology. Thus, its investment in the protection of its technology is judged to be insufficient.

05. Detailed Evaluation Opinion

Technological Competency Evaluation

■ **Market Overview**

Target Market	**Smart Farm**

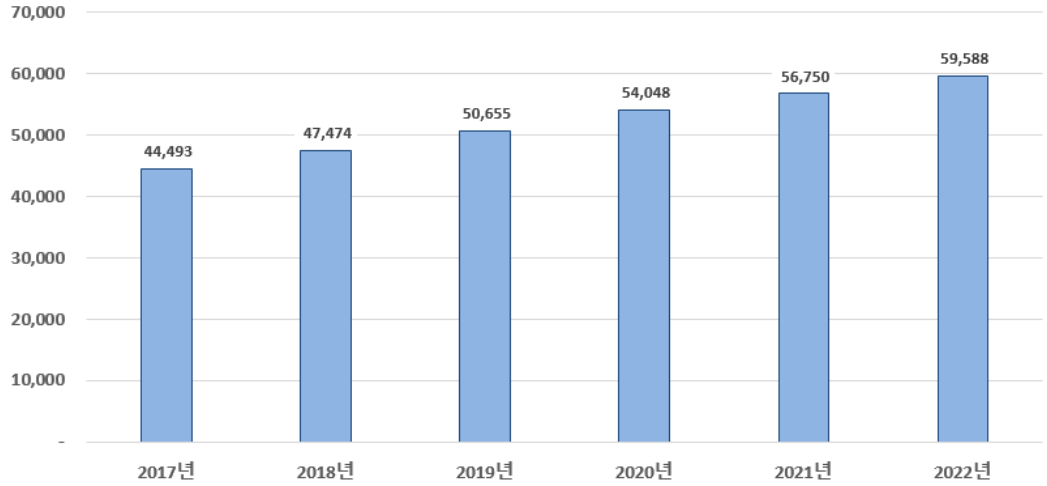
Smart farming enables enhancing productivity and product quality using less labor, energy, and nutrients by checking the status of crop/livestock growing and coping with any problem in a timely manner based on accurate data/information on their growing and surroundings

In the country, smart farming is being spread to sectors like distribution, consumption, etc. but remains focused on agricultural production. The practice is judged to be focused on monitoring/controlling stages. Automation technology linked to Big Data-based optimization algorithm development and robots appears to remain at the R&D stage.

Smart farming system, which is being adopted by domestic farming households, remains at the level of opening/closing the insulated cover, ceiling, or curtains and controlling the temperature, humidity, and intensity of illumination using smart media

[Size of the domestic smart farming market]

(Unit: KRW 100 million)



[Source: COMPA and NICE Information Service/reconfigured]

The size of the land using smart farming in the Controlled Environment Horticulture sector comes to 1.258 ha, i.e., 1.9% of the entire land. At least 760 of the 927 farming households in the Controlled Environment Horticulture sector are using smart farming. Majority of those using smart farming appear to be growing paprika and tomato. Many facilities used for nutriculture and supply of carbon dioxide appear to use smart farming as well.

05. Detailed Evaluation Opinion

Technological Competency Evaluation

Target Market	Smart Farm

[Status of propagation of Controlled Environment Horticulture smart farming in the country]

Category		Number of farming households	Facility land size (ha)
All facilities (A)		151,496	64,528
ICT facilities	Government support	1,047	769
	ICT facilities	1,578	489
	Total (B)	2,625	1,258
Percentage (B/A)		1.7	1.9

[Source: COMPA and NICE Information Service/reconfigured]

The size of smart farming land receiving government support is steadily increasing. The government strives to come up with comprehensive measures for smart farming, improve the strategy for propagating smart farming more widely, and expand smart farming to frontline/rear industries engaged in by young farmers as the main target of the policy. The government also strives to accelerate the propagation of smart farming and strengthen the basis for the growth of the relevant industries through comprehensive approaches such as policy fund support, R&D, education/training, and development of businesses and by getting rid of obstacles to smart farming.

[Status of government support by year]

Category	~2013	2014	2015	Total
Horticulture smart farming (ha)	345	60	364	769
Livestock breeding households(ho)	-	30	456	186

[Source: COMPA and NICE Information Service/reconfigured]

05. Detailed Evaluation Opinion

Market Potential Evaluation

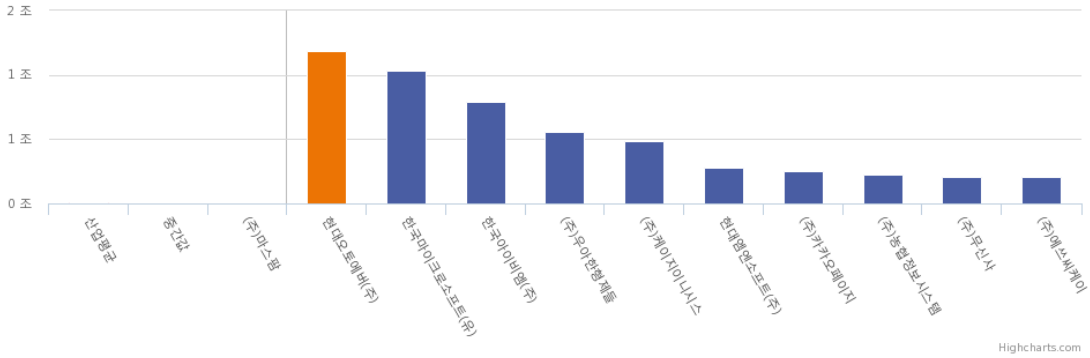
■ Competency of Top Management

Sub-items	Result Grade
Market size	B+
Market growth potential	B+
Competition situation	C+
Regulatory incentives/control factors	B+
Ease of market entry	C+
Market Share	D+
Comparative advantage	C+
Brand Awareness	C+

■Focus of Evaluation

- Investigation of the target size and growth potential of the market for the technology. Assessment of the competition situation by studying the market structure and the cost structure.
- Performance of a comparative analysis of the market growth rate by comparing the growth in revenues for the entire industry with the growth in revenues for the sector(s) in which the technology for which an application has been made will be used.
- Evaluation of the environmental factors - such as politics, culture, economy, laws and regulations - related to the product (technology) in question.
- Estimation of the market share and market position which the technology/product has the potential to attain in its target market on basis of pricing and product competitiveness

Industry analysis and market trend – Smart Farm



[Source: NICE Credit Information Service KISLINE, 2020]

Nowadays, businesses are increasing their investment in future agricultural technologies to enhance their productivity with less input using ICT. World-class IT businesses such as Microsoft, Google, Softbank, Alibaba, etc. are making new investments, selecting smart farming as a future promising industry. In the country, SK Telecom, KT, etc. are making forays into the agricultural market. Aside from IT businesses, those in diverse industrial sectors that are hardly related to agriculture are advancing into the smart farming market. Businesses are paying attention to the possibility of global food crisis amid the rapid increase in world population, climate change, water scarcity, energy crisis, etc. They are looking for new business opportunities through future farming based on the expectation that the existing limitations of agriculture can be overcome by having ICT -- represented by the Fourth Industrial Revolution -- converged with agriculture.

■Detailed Opinion

The smart farming market is a factor included in the major business plan of the Company and is one of its core technologies. According to COMPA's report on smart farming and market trends published in November 2019, the domestic smart farming market is growing at a rate of 5% on an annual average from KRW 4,449.3 billion in 2017, and it is expected to reach KRW 5,958.8 billion by 2022. The size of the target market will be large considering the features of the sector. The market's growth potential is expected to be good judging from the past growth rate and future prospects of the target market and average rate of sales increase (5.08%) in the communications sector (J582) over the past three years.

05. Detailed Evaluation Opinion

Market Potential Evaluation

■Detailed Opinion (Continued)

Smart farming, which the Company specializes in, a complex sector wherein diverse technologies including those related to agriculture/livestock/fishery, ICT, and electric/electronic/machinery technology are combined. In the country, the central/local governments play a lead role in the sector. The government has started installing smart farming management system in farming households through MOUs signed with the relevant businesses. Large-sized businesses such as SKT, KT, and Kakao. are investing in it. Diverse types of businesses are collaborating or competing with each other, but a business that plays a lead role in the sector has yet to emerge. Small-sized businesses are developing their technologies to occupy the market ahead of others, and competition appears to be at an ordinary level.

Technological barriers to market entry are not that high, but businesses interested in entry need to check the regulations etc. applied to the agricultural market. Government support for smart farming is steadily increasing. The government strives to come up with comprehensive measures for smart farming, improve the strategy for propagating smart farming more widely, and expand smart farming to frontline/rear industries engaged in by young farmers who are the main target of the policy. The government also strives to accelerate the propagation of smart farming and strengthen the basis for growth of the relevant industries through comprehensive approaches such as policy fund support, R&D, education/training, and development of businesses and by getting rid of obstacles to smart farming.

As a startup business in its early stage, the Company has engaged in technological development. It takes part in programs wherein it receives government support with a long-term plan. According to its financial statements for 2019, the Company posted about KRW 40 million in sales, and it belongs to the bottom group in the target market. Its status in the market is expected to improve as it plans to hire engineers and carries out its service business in earnest.

The platform that the Company owns with regard to the technology in question is a specialized, differentiated service. The Company does not have a patent concerning the technology but has developed its own knowhow, striving to establish barriers against potential competitors. It is making efforts to commercialize the technology through the following institutions: FACT, KOTRA, MSS, MOTIE, etc. The Company strives to enhance the level of its recognition, which is expected to be improved through its industrial activities.

05. Detailed Evaluation Opinion

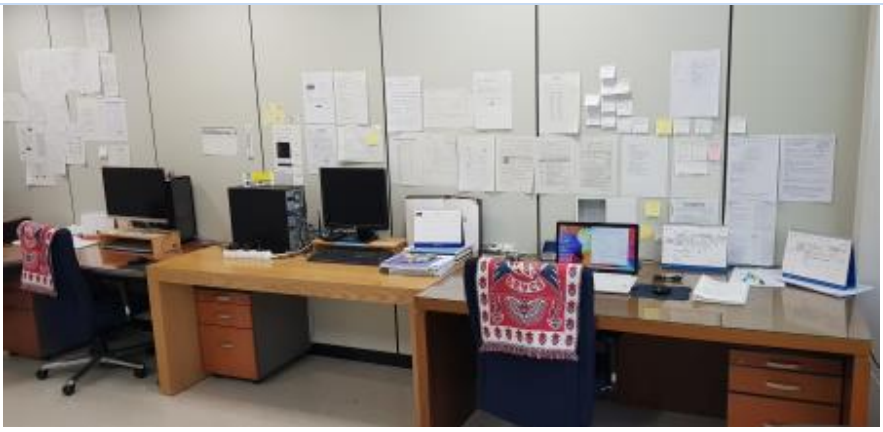
Business Potential Evaluation

■ Business Capability & Outlook

Sub-items	Result Grade
Feasibility Of Production Plan	D+
Seller Secured Status	D+
Diversity/stability of sales points	C+
Financing Capacity	D+
Growth potential	C+
Earnings potential	D+

■ Focus of Evaluation

- Assessment based on on-site audits of the company's production facilities and manpower levels, availability of raw materials and components.
- Evaluation of the rationality and validity of the company's marketing, advertising, and promotional strategies, and its efforts to build diverse sales points, form client relationships, and develop a detailed sales plan.
- Evaluation of the company's revenue growth rate potential and profits from the sale of the target technology (product), and its financing capabilities (financial status, profitability, etc.).

Adequacy of Production Facility	□ Very High □ High ■ Average □ Slightly Inadequate □ Inadequate			**Year of Most Recent Facility Upgrade**
				-
Category	**Company Name**	**Products**	**Share of Revenues**	**Relationship Duration**
Major Sources of Revenue	Government support-related programs	Establishment of computer system	100.00%	1.0 year
Additional Opinion				
Production Facility Status	 [Source : Onsite photos]			

■Detailed Opinion

As a single-proprietorship business, the Company has no other engineers or R&D facility/department. Thus, its production/marketing capabilities and investment/research activities remain at an insufficient level.

The Company generates sales based on the development of its own technology through government support programs. The diversity/stability of its customers is judged to be at an ordinary level, considering the following factors: its capability to provide service in step with the sophistication of technologies and development direction of the relevant industrial sectors; the business model owned by it; the characteristics of customers in the industry, etc..

05. Detailed Evaluation Opinion

Business Potential Evaluation

■Detailed Opinion(Continued)

According to its list of shareholders, Angel Investment Matching Fund No. 4 is listed as a shareholder, but the level of its capital participation is at a paltry level. Its fund supply capability appears to be insufficient considering the following: 33.54% capital ratio; 66.08% reliance on borrowings [Ref. software development/supply businesses' (J582) capital ratio: 58.58%; reliance on borrowings: 18%].

The future prospects of the Company were evaluated based on average figures accumulated in the past 2 years, its financial statements, and BOK's corporate management analysis. In 2018, the sector [software development/supply businesses (J582)] posted a sales increase of 9.11%. According to its financial statements, the Company posted KRW 40 million in sales in 2019; it is expected to record more robust sales starting 2021 by hiring engineers, etc. and reach the average level of the sector. Its growth potential appears to be at an ordinary level, considering the fact that smart farming will be in constant demand amid the development of the relevant industrial sectors.

The operating profit-to-sales ratio of the Company stands at 124.72%. It is expected to carry out its business based on its technological prowess but requires time to reach the level of 6.57%, the average operating profit-to-sales ratio of the sector as of 2018. The result of its sales activities is expected to be at an insufficient level for the time being.

06. Key Competitor Information

Company Overview

Company Name	Green Labs	VandalSoft Co.,Ltd.	n.thing Inc.
Name of CEO	Shin Sanghun/An Donghyeon/Choi Seongu	Lee Bonghak	Kim Hyeyeon
Business Registration No	320-88-00732	745-88-01527	134-87-20367
Corporation No.	110111-6387727	110111-7589562	131411-0312464
Date of Establishment	2017.04.26	2020.08.14	2014.01.10
No. of employees	28 people	0 person	0 person
Type of Corporation	General(SME)	General(SME)	General(SME)
Sector (Standard Industrial Classification))	Computer manufacturing	Applied software development and supply	Applied software development and supply
HQ address	#A 204/205, 25 Beobwon-ro 11-gil, Songpa-gu, Seoul	#384, 932 Yangjae-daero, Songpa-gu, Seoul	1F-3F, 54 Apgujeong-ro 42-gil, Gangnam-gu, Seoul
HQ phone no.	-	-	-
Key products	smart farming devices development, propagation	Information communication	Software, design development/communications equipment, parts
Trading Bank	-	-	wholesale/wired/wireless communications equipment manufacturing/ vegetable, horticulture,
Business Closure Information	Ordinary taxpayer	Ordinary taxpayer	fruit crops growing facilities
Corporation Registration Status	Valid registration	Valid registration	-

Credit

Company Name	Green Labs	VandalSoft Co.,Ltd.	n.thing Inc.
Credit Rating (date of financial statements)	CCC0 (2018.12.31)	B+ (-..)	CCC+ (2019.12.31)
Watch Rating (date of evaluation)	Normal (2020.04.26)	Normal (2020.08.21)	Pending (2020.10.22)

Patents

Company Name	Green Labs	VandalSoft Co.,Ltd.	n.thing Inc.
Total	6 cases	0 case	12 cases
2019	0 case	0 case	1 case
2018	2 cases	0 case	8 cases
2017	4 cases	0 case	1 case

Finances

(Unit: million KRW)

Company Name	Green Labs	VandalSoft Co.,Ltd.	n.thing Inc.
Date of financial statements	2018.12.31	-	2019.12.31
Revenues	436	-	495
Operating Income	-630	-	-1,615
Net Income	-567	-	-1,627
Total Assets	4,576	-	2,423
Total Liabilities	4,442	-	602
Shareholder's Equity	135	-	1,821

07. Company Evaluation Results

Target Company

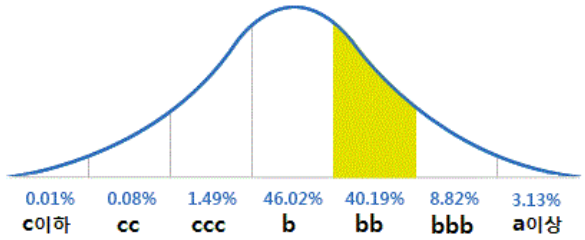
■ Credit Analysis Target

			Company Evaluation Rating	Cash Flow Rating
Name of Company	MaaSFarm Co., Ltd.		bb	CF5
Business Registration No	819-87-01030			Closing : 2019.12.31
CEO	Lee Hyeon			Watch Rating
Address	#311, 111, Ballyong-ro, Deokjin-gu, Jeonju-si, Jeollabuk-do			Normal
Phone	-			
Date of Establishment	2018.05.25			
Standard Industrial Classification	(J58222)	application software development/supply		
Type of Corporation	General	Small and Medium Business	Closing : 2019.12.31	-
No. of Employees	2 people	(2019.03)	Valid Until : 2021.06.30	Date of Evaluation : 2020.11.21

※ This credit rating cannot be used when submitting bids to public institutions

Company Evaluation Results

■ Company Evaluation Rating

Company Evaluation Rating	Explanation of Rating	
bb		Its creditability related to loan transactions is at an ordinary level. A business whose stability in transaction is anticipated to worsen if the economic situation becomes difficult
Closing : 2019.12.31		
Date of Evaluation: 2020.11.21		

■ Cash Flow Rating

Total Credit Rating	Explanation of Rating	
CF5		Its ability to create cash flow is at a less than ordinary level. At the current rate, its ability to repay borrowings and supply cash in investment activities is likely to decrease.
Closing : 2019.12.31		

■ WATCH Rating

Total Credit Rating	Explanation of Rating	
Normal		No recent changes have occurred in the internal or external environment of the enterprise

07. Company Evaluation Results

Key Financial

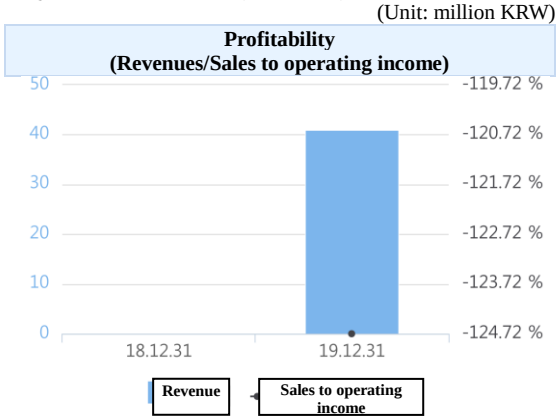
■ **Key Financial Ratios (K-GAAP)**

Ratio		Formula	-	2018.12.31	2019.12.31	Industry Average
Total Asset Growth Rate	%	(current period total assets/previous period total assets - 1) × 100	-	-	202.5	10.7
Net Sales Growth Rate	%	(current period revenue/previous period revenue -1) × 100	-	-	-	9.1
Operating Income Increase Rate	%	(current period operating income/previous period operating income - 1) × 100	-	-	-	-
Net Income Increase Rate	%	(current period net income/previous period net income - 1) × 100	-	-	-	-
Net Income to Total Assets Ratio	%	net income/average total assets×100	-	-0.2	-19.0	3.6
Net Income to Shareholder's Equity	%	net income/average shareholder's equity×100	-	-4.4	-71.3	6.1
Operating Margin	%	operating income/revenues × 100	-	-	-124.7	6.6
Interest Expense Ratio	%	interest expense/revenues × 100	-	-	3.2	1.0
Interest Coverage Ratio	times	EBIT/ interest expense × 100	-	-32.3	-39.5	6.9
Current Ratio	%	current assets/current liabilities × 100	-	99.2	122.2	184.0
Shareholder Equity Ratio	%	shareholder's equity / total assets × 100	-	5.7	33.5	58.6
Debt to Equity Ratio	%	total liabilities/ shareholder's equity × 100	-	1640.9	198.1	70.7
Total Debt to Total Assets Ratio	%	total debt / total assets × 100	-	91.3	66.1	18.0
Receivables Turnover	times	net credit revenue/average accounts receivables × 100	-	-	-	6.6

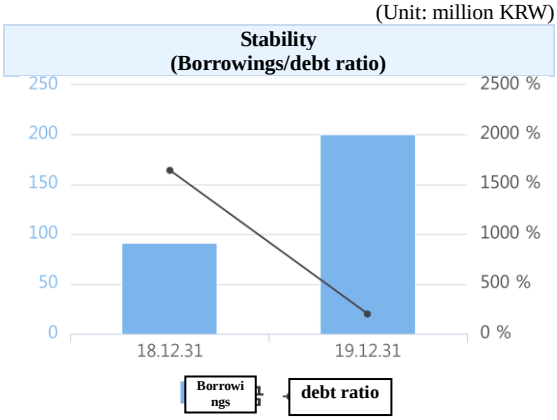
※ Averages such as average total assets, average shareholder's equity and average accounts receivables are calculated as (current period value + previous period value)/2..

■ **Key Financial Trends (K-GAAP)**

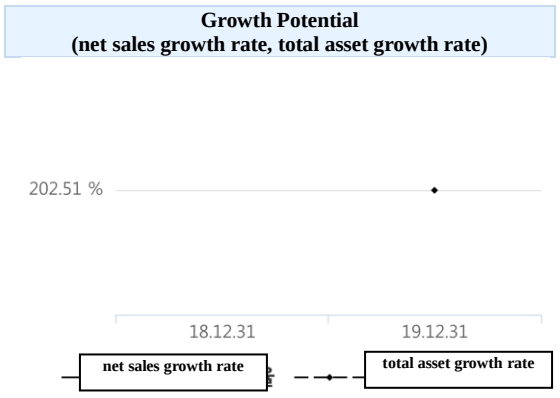
(Unit: million KRW)



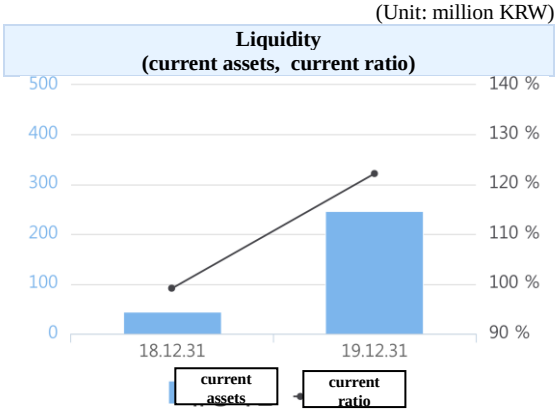
(Unit: million KRW)



(Unit: million KRW)



(Unit: million KRW)



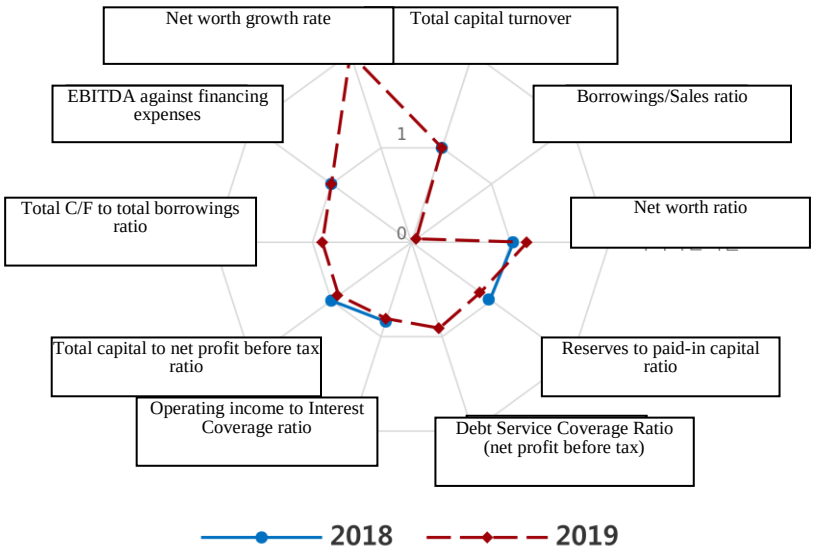
08. Management Analysis Results

Comparison of financial status

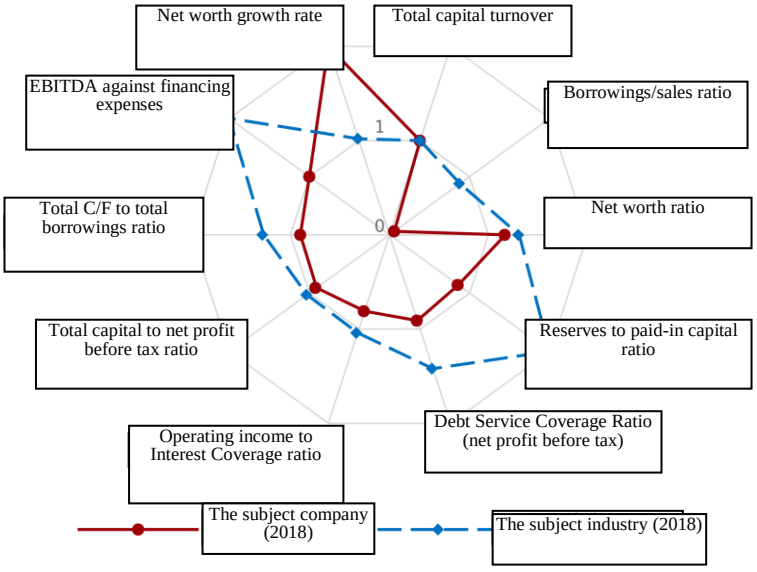
The company's grade in financial assessment items may be compared with that in the financial assessment items of a leading business in the same industry. The financial ratings are based on the financial statements of December 2018 and December 2019. The original financial ratio items are converted using the logistics function and are indicated by a value between 0 and 2

■ Conversion value of financial ratio items of the company

Recent vulnerability areas
(Previous) Operating income to interest coverage ratio
Debt Service Coverage Ratio (net profit before tax)
Level of reserve
Turnover ratio of net worth



■ Comparison of conversion value of recent financial ratio: Subject company vs. industry average



09. Ratings System & Definitions

■ Definition of Technology Evaluation Rating for Investment

Rating	Definition
TI-1	The likelihood of growth is at the uppermost level because the technology is most outstanding and the market growth potential is outstanding.
TI-2	The likelihood of growth is outstanding because the technology is most outstanding and the market growth potential is outstanding.
TI-3	The likelihood of growth is outstanding because the technology is outstanding and the market growth potential is good.
TI-4	The likelihood of growth is considerable because the technology is outstanding and the market growth potential is good.
TI-5	The likelihood of growth exists because the technology is good and market growth potential exists.
TI-6	The likelihood of growth partially exists because the technology is good and market growth potential exists.
TI-7	The likelihood of growth is slightly low because the technology is slightly inadequate and the market growth potential is also slightly inadequate.
TI-8	The likelihood of growth is low because the technology is slightly inadequate and the market growth potential is also slightly inadequate.
TI-9	The likelihood of growth is low because the technology is poor and the market growth potential is poor.
TI-10	The likelihood of growth is very low because the technology is poor and the market growth potential is poor.

■ Company Evaluation Rating Definition

Rating	Probability of Bankruptcy	Definition
aaa	0.02%	The company‘s capacity to meet its financial commitments on debt obligations is extremely strong, and it can respond fully to changes in the business environment.
aa	0.04%	The company‘s capacity to meet its financial commitments on debt obligations is very strong, and it can respond appropriately to changes in the business environment.
a	0.20%	The company‘s capacity to meet its financial commitments on debt obligations is strong, and it can respond to changes in the business environment in limited ways.
bbb	0.70%	The company’s capacity to meet its financial commitments on debt obligations is strong, but depending on the economic conditions and deterioration of the business environment, there is a possibility that the safety of its transactions could decrease.
bb	1.78%	The company’s capacity to meet its financial commitments on debt obligations is average, and depending on the economic conditions and deterioration of the business environment, there is a possibility that the safety of its transactions could decrease.
b	4.85%	The company’s capacity to meet its financial commitments on debt obligations is average, and depending on the economic conditions and deterioration of the business environment, there is a high possibility that the safety of its transactions could decrease.
ccc	8.60%	The company’s capacity to meet its financial commitments on debt obligations is below average, and the safety of its transactions is expected to decrease; therefore caution is advised.
cc	15.00%	The company’s capacity to meet its financial commitments on debt obligations is very low, and the safety of its transactions is low.
c	60.00%	The company’s capacity to meet its financial commitments on debt obligations is ranked bottom, and the likelihood of transaction risks is very high.
d	100.00%	A credit risk has occurred to the company or it is facing a situation that is equivalent to a credit risk situation.
* In the case of the A, BBB, BB, and B ratings, sub-grades of +/0/- can be given as options, resulting in an 18-point rating system		

09. Ratings System & Definitions

■ Definition of Cash Flow Rating

Cash flow is the most direct tool for characterizing a company's liquidity.
The cash flow rating code indicates a company's ability to pay (repayment ability) and thus reflects the health of its cash flow.

Cash Flow Rating	Definition of Cash Flow Rating
CF1	Ability to generate cash flow is excellent. The company's cash payment ability is top-rated.
CF2	Ability to generate cash flow is positive. The company's cash payment ability is above average.
CF3	Ability to generate cash flow is moderate. The company's cash payment ability could suffer slightly if the macro-economic conditions and the industry environment deteriorate.
CF4	Ability to generate cash flow is low. The company's cash payment ability concerning its financial and investment activities could decline if its sales performance deteriorates.
CF5	Ability to generate cash flow is risky. There is a high likelihood that the company's cash payment ability concerning its debt repayment and capital investment activities will suffer if the current situation continues.
CF6	Ability to generate cash flow is poor. The company's cash payment ability concerning its debt repayment and capital investment activities could be weak, and it must work continuously to improve its cash flow.

■ Definition of Watch Rating

Watch Rating is a tool that is used to check daily changes in a company's conditions that may affect its credit rating for the purpose of monitoring changes in its credit rating over a period of time after initially being given a credit rating. Credit ratings are calculated at a specific point in time during a given year, whereas the Watch Rating is a continuous monitoring tool for checking changes in a company's creditworthiness dynamically.

WATCH Rating	Definition of Watch Rating
Normal	There has been no change in the credit rating of the company concerned since the award of the first credit rating.
Pending	Since the initial credit rating, there has been a change in the internal and external environment of the company concerned. However, the change is not of a magnitude that could have a significant effect on the company's creditworthiness.
Observe	Signs of a change in the credit worthiness of the company concerned have been detected since the previous credit rating. An analysis of the impact on the company's revenue and credit is required.
Caution	Since the previous credit rating, signs of insolvency have been detected which appear to have been caused by a change in the company's credit rating. Since there is a likelihood of the company defaulting on its debt, precaution is required in debt and credit management.
Warning	Since the previous credit rating, signs of insolvency have been detected which appear to have been caused by a change in the company's credit rating. Since there is a high likelihood of the company defaulting on its debt, considerable precaution is required in debt and credit management.
Risky	Since the previous credit rating, signs of insolvency have been detected which appear to have been caused by a change in the company's credit rating. Since there is an extremely high likelihood of the company defaulting on its debt, plans must be prepared for default.
Doubtful Collection	The company has become delinquent or is facing a credit crisis that is equivalent to delinquency. Plans must be prepared to respond to the company's defaulting on its debts.
Shutdown or closure of business	Merger, closure of business, liquidation.
Bankruptcy	The company is bankrupt or is facing a credit crisis that is equivalent to a bankruptcy. Plans must be prepared to respond to the company's defaulting on its debts.