

# A study on the Relationship between Leadership and Agile Culture: focusing on the mediating effect of Perceived Organizational Support(POS)

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## 리더십과 애자일 문화간의 관계에 관한 연구: 조직지원인식의 매개 효과를 중심으로

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**Abstract** The purpose of this study was to examine the characteristics of Agile Culture, which is attracting attention as an organizational culture suitable for responding to changes in the recent corporate management environment, and to reveal the roles and relationships of leadership, Perceived Organizational Support(POS), and Agile Culture. The research was conducted on the employees of the National Agricultural Cooperative Federation and its subsidiaries, and SmartPLS 3.3.2 was mainly used for the research model test. As a result of the study, both Servant Leadership and Authentic Leadership had a positive effect on POS, and POS had a significant effect on all sub-dimensions of Agile Culture(Empowerment, Collective Intelligence and Continuous Learning). In addition, POS mediated the effects of the above two leaderships on Collective Intelligence and Empowerment, but there was no mediating effect in the relationship with Continuous Learning. These results suggest that leadership and Employees' perceptions of organizational support are important to build an Agile Culture.

**Key Words** : Leadership, Agile culture, POS, Empowerment, Continuous learning, Collective intelligence

**요약** 최근 기업 경영환경의 변화에 대응하기 적합한 조직문화로 주목받고 있는 애자일 문화의 특성을 검토하고 리더십, 애자일 문화, 조직지원인식(POS)의 역할과 상호 관계를 밝히고자 하였다. 연구는 농협중앙회 및 산하의 자회사 직원들을 대상으로 진행하였고, 연구모형 검증에는 주로 SmartPLS 3.3.2를 사용하였다. 연구결과, 서번트리더십과 진성리더십은 모두 POS에 긍정적인 영향을 미쳤고, POS는 애자일 문화의 모든 하위차원(권한위임, 지속적인 학습, 집단지성)에 유의미한 영향을 미쳤다. 또한 POS는 위의 두 가지 리더십이 집단지성과 권한위임에 미치는 영향을 매개 하였으나, 지속적 학습과의 관계에서는 매개 효과가 없었다. 결론적으로 본 연구는 애자일 문화를 구축하기 위해서는 애자일 문화에 적합한 리더십과 조직지원에 대한 직원들의 확신이 매우 중요하다는 것을 시사하고 있다.

**주제어** : 리더십, 애자일 문화, 조직지원인식, 권한위임, 지속적인 학습, 집단지성

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## 1. Introduction

The recent change in technology, market, and customer characterized by the Fourth Industrial Revolution and digital transformation is faster than ever before. In addition, the phenomenon that called by Nassim Nicholas Taleb, an American professional investor and business scholar, as 'The Black Swan', that is something unlikely to happen, occurs repeatedly and frequently, including the international financial shock arising from the U.S. subprime mortgage crisis in 2008 or the current global crisis caused by the COVID-19 pandemic. Many managers were already well aware that old management methods are not suitable to guarantee their company's survival in such a rapidly changing, uncertain and unpredictable business environment, and this shift in awareness made the agile enterprise or agile methodology to attract attention. The Deloitte, a global consulting company, conducted a questionnaire survey of 10,000 business leaders from 140 countries in 2017 and 94% of the respondents referred agility and collaboration as the most important factors for success of organization [1]. Many companies, however, failed in transition to agile organization despite the existing methodologies for introducing agile management have been available. This is because it is often overlooked that the 'Agile' is ultimately a culture and the transition to agile management means the transition in the organizational culture. Furthermore, although organizations are aware of the importance of Agile Culture, there has been other problem that the study on this area has been very limited. E. Rebentisch et al (2018) found that today's research efforts in the field of 'Agile' are mostly focused on bringing tools, practices and methods into organizations, which is a fundamental reason why many implementation efforts of agile methods still fail[2]. In addition, J. C. Sarros et al (2002) argued that in the study of leadership's influence on

organizational culture, there are many irrefutable evidences that strong organizational culture is related to strong and competent leadership[3]. And, a study by P. C. Manzano (2020) on the impact of Authentic Leadership on organizational change readiness suggests that not only is it important for employees to recognize the value of organizational support for change, but also that employees' emotional commitment to change should be deliberately developed[4]. In this context, research on leadership as an influencing factor on Agile Culture can be of great significance. However, there are few studies on the relationship between leadership and Agile Culture or finding factors that reinforce or mediate the influence of leadership on agile organizational culture. Therefore, the purpose of this study is to explore the lower dimensions of agile organizational culture, to identify leadership that affects agile organizational culture, and to propose Perceived Organizational Support (POS) as a factor that mediates such leadership and culture. Through this, we will expand the scope of research related to leadership and agile organizational culture academically, and in practice, we want to awaken the importance of changing organizational culture to many companies that want to introduce successful agile methods, and provide implications for leadership and human resource management suitable for building an agile organizational culture.

## 2. Theoretical background

### 2.1 Leadership theory and leadership styles for agility

The leadership is, in the social science field, regarded as a core concept influencing organizational behavior and structure and is being addressed more than any other subject in behavioral science. The leadership is recognized as important concept in the social science field because it is linked to the achievements of the

whole organization as well as to the formation of individual and group behaviors and is an important factor, in the rapidly changing modern society, for promoting the change of the organization that hesitates to change [5]. Although most scholars agree that leadership has effect on organizational members, they define and insist on different concepts according to social phenomena and research viewpoints [6]. This is why the leadership, despite the extensive studies in the field of social science, has not determined the conclusive definition and has not been established as a common theory with the addition of various views. The studies on leadership until now have been carried out in many different ways reflecting various methodology, approach, and the spirit of the time. The traditional leadership theories based on the innate characteristics of leaders and the process theory may be classified generally into trait theory, behavior theory, and situational theory. The trait theory that was adopted from the late 1930s to the 1950s considered that the leadership ability is an innate one and the behavior theory that was popular from the 1950s to the late 1960s attempted to find out the behavioral characteristics of the leaders shown to their subordinates. The situational theory that was influential from the late 1960s to the 1980s, from the perspective that everyone has talent to be a leader, focused on the various situations faced by the leaders rather than the leaders themselves. Many researchers, since the 1980s, have attempted to be closer to the essence of leadership by identifying the actual influence between leader and subordinate, beyond the traditional leadership, and in this context, various types of leadership such as transactional leadership, transformational leadership, Servant Leadership, and Authentic Leadership have been suggested and studied until now. And, since the release of the Agile Manifesto in software field in 2001, some studies on agile leadership have been conducted,

mainly focusing on the characteristics of leaders in agile environments, agile methods, or agile organizations, which has not yet been established as a theory. A. Medinilla (2012) in his book "Agile Management" stated that leaders in an agile environment encourage open organizations, help others when needed, share vision, and value communication[7]. N. Bushuyeva et al. (2019) studied the behavioral patterns of project managers as leaders in agile project management, and viewed supporting and advising behaviors, engagement and affection, coaching and mentoring, and impact on others as major competency indicators[8]. M. Cleveland et al (2020) presented relational leadership as culturally agile leadership through a literature study. The main competencies of relational leadership were viewed as inspiration, passion to help others, and competence, and Servant Leadership was included in this category[9]. In addition, R. D. Barclay (2020) found strong evidence that leaders using Servant Leadership behavior lead to a team's dedicated work in organizations using a scaled agile framework[10]. Sarkar (2016) argued that in an environment dominated by uncertainty and ambiguity, the company's responsiveness, collaborative networks, innovation and moral practices are important, and that the combination of transformational leadership, Servant Leadership, and Authentic Leadership can create these practices[11]. In addition, according to a study by P. C. Manzano (2020), Authentic Leadership can create an environment in which employees feel safe even at risk, thereby increasing the cognitive and emotional tendencies of employees who embrace change[4]. Therefore, based on the preceding studies as described above, I would like to examine the relationship between leadership and Agile Culture, focusing on Servant Leadership and Authentic Leadership among modern leadership theories.

## 2.2 Servant Leadership

The Servant Leadership was first introduced in Greenleaf's book, "The servant as a leader" and Greenleaf (1970) described the Servant Leadership as a dedication to satisfy the needs of customers and members focusing on serving others [12]. Since the servant leaders believe that the most important resource for achieving an organization's goal is an organizational member, they perceive support for the growth and success of the organizational members as their role and recognize the relationship between them and the subordinates as a horizontal one by considering themselves as a servant. The servant leaders also provide their subordinates with a sense of trust and an environment in which subordinates seek change and growth, and strive to form a mutual consensus with subordinates. The organizations controlled by Servant Leadership, therefore, form consensus among members through advice and dialogue rather than instructions, and based on this, achieve the organization's goals. The Servant Leadership, in addition, promotes Empowerment that maximizes the ability and potential of members by assigning the authority to make decisions on their own to specific individuals or groups [13], foster the atmosphere for learning to acquire new knowledge and increase the level of the learning organization within the group [14], and promotes participatory decision-making in which organizational members give their opinions and exert influence in the decision-making process [15].

## 2.3 Authentic Leadership

The Authentic Leadership is a process of reinforcing positive self-development by leaders and subordinates through self-regulatory and self-awareness and is defined as the behavioral style of the leader based on self-awareness, internalization of moral views, balanced information and relationship transparency, which

improve the positive psychological abilities and ethical atmosphere of organizational members [16]. The Authentic Leadership makes decisions based on moral values, delivers the vision and its meaning to members through transparent communication, improves insufficient competencies and behaviors of organizational members, and triggers positive behavioral pattern by wakening the inherent positive minds of both leaders and subordinates. The Authentic Leadership, in addition, improves the psychological Empowerment of members by stimulating members' positive mind and attitude [17], provides an atmosphere that encourages individual and organizational learning through transparent relationships and communication with members [18], and facilitates participatory decision-making by members by collecting, based on the trust of members, various viewpoints and opinions regardless of their position [19]. It was found, on the other hand, that the leadership characterized by coordination, integration and support positively affect the expression of Collective Intelligence [20].

## 2.4 Perceived Organizational Support (POS)

The POS is the belief of individual members about the degree to which an organization is interested in their own happiness, and is the perception of organization members about the level the organization put to their role or performance. POS is rooted in social exchange theory and argues that, when the satisfaction of members with their organization or leader, they also have the intention to help the organization and that, by focusing on tasks through the demonstration of their own capabilities, they not only improve the performance but also reduce the turnover intention toward other organization [21]. POS has been addressed frequently as a control or mediating variable. The antecedent variables include support by the leader, good relationship with the leader, trust and

consideration for the organization and management. Servant leadership acts as a factor to raise POS by providing, beyond a formal employment relationship, extended support to organizational members based on the trust relationship with them [22]. The Authentic Leadership also changes the attitudes and behaviors of organizational members, such as organizational citizenship behavior, based on the trust relationship, and it was found that POS acts as a mediating factor in this process [23]. One of the variables to which POS influences is Empowerment, which enables organizational members to perform various roles by inducing organizational citizenship behavior [24]. In addition, given that the action of Collective Intelligence requires reinforcement of commitment to the group through non-monetary compensation such as praise and recognition [25], it may be inferred that the POS influences this commitment. On the other hand, the Continuous Learning is essential to improve the ability of an organization to respond to rapidly changing environments, and POS has an important influence on raising the level of establishment of a learning organization that provides a field for organizational members [26].

## 2.5 Agile Culture

The 'Agile' concept appeared in the software development methodology in the 2000s. 17 distinguished software developers such as Kent Beck adopted a new software development method different from the traditional waterfall model at Snowbird Ski Resort in Utah, U.S. in 2001, and published it through 'The Agile Manifesto'. The Agile method they proposed, unlike the traditional management methods, was to quickly accept various changes through rapid feedback and continuous correction without detailed plan and the importance was given to management method based on collaboration, tacit knowledge, flexible

and cooperative organizational structure, leadership as an assistant, and reward system for teams rather than individuals. The origin of the word "Agile" in the field of social science, however, goes back to older date. The 'adaptivity' concept in the 1950s and 'organizational flexibility' in the 1980s instead of 'Agility' were used as the ability to cope with change and uncertainty, and the 'Agility' concept was introduced for the first time in the 'Strategies for Manufacturing Enterprises in 21th Century' published by the Institute of Iacocca at Leigh University in the United States as a concept to respond to a dynamic and changing environment [1]. Agile methodology that developed in the IT industry is expanding recently to various industrial fields, and has been accepted by many companies. The Agile organization refers to one that emphasizes dynamics and speed in organizational operation, overcomes the walls of departments, and forms small teams to perform tasks [1]. The definition of Agile Culture has not yet been established, however, is being conceptualized by the study of several scholars on the characteristics of agile organization. Harraf et al (2005) argued that the Agile Culture is an attribute of a horizontal and flexible organization, and includes Empowerment, active participation of organizational members, cooperation, and agreement [27]. In addition, J. S. Jung (2019) reported that the important cultural factors in agile organizations include immersive talent management, innovation culture, autonomous organizational structure, and Collective Intelligence[28].

## 3. Research design and methods

### 3.1 Research model

A research model was designed as shown in Fig. 1 to analyze the structural relationship between the leaderships, POS, and Agile Culture discussed above. For the leadership, the Servant Leadership

and Authentic Leadership that are based on human relations, trust, and communication with members were set as exogenous variables. The sub-dimensions of Agile Culture such as Empowerment, Collective Intelligence, and Continuous Learning, which are found commonly in several previous studies, were set as endogenous variables.

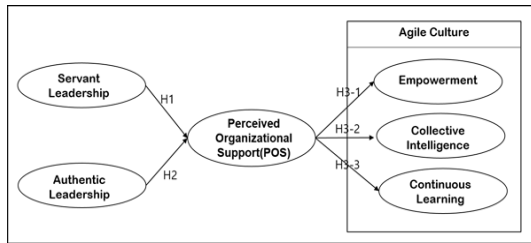


Fig. 1. Research Model

### 3.2. Research hypotheses

According to Y. Zhou & Q. Miao. (2014) on the influence of Servant Leadership on affective commitment of employees through Perceived Organizational Support(POS) in China's public sector, Servant Leadership contributes to POS, which forms emotional commitment[22]. J. Y. Lee & S. K. Kwun (2020) said that Servant Leadership has a positive effect on POS, and increases the performance of employees[29]. Meanwhile, in Y. S. Kwon & J. K. Lim's (2015) study of Authentic Leadership, POS, organizational citizenship behavior, and organizational silence in the public sector, it argued the importance of POS in changing members' attitudes and behaviors[23]. In addition, B.M. Park (2019) found that in a study related to the role of Authentic Leadership in the hotel industry, Authentic Leadership can maintain a high level of POS, allowing members to immerse themselves in the organization[30]. Based on the above discussion, the following hypotheses were established.

H1: Servant Leadership will have a positive effect on POS.

H2: Authentic Leadership will have a positive effect on POS.

E. G. Kang & S. K. Lee (2017) studied the mediating effects of psychological Empowerment in the relationship between POS and organizational citizenship behavior. According to their work, organizations can increase psychological Empowerment and express the organizational citizenship behavior of their members by recognizing interest and support for individuals [24]. A. K. Lee (2011) argued that in order to successfully introduce Collective Intelligence into a company, organizational support that can stimulate the intrinsic motivation of members is necessary in addition to the company's economic compensation [25]. J. H. Kim & K. H. Lee (2018) stated that the higher the level of POS, the higher self-directedness strengthens affective commitment, thereby increasing the intention of members to participate in the learning provided by the company [31]. Based on the above discussion, the following hypotheses were established.

H3-1: POS will have a positive effect on Empowerment.

H3-2: POS will have a positive effect on Collective Intelligence.

H3-3: POS will have a positive effect on Continuous Learning.

In order to test the mediating effect of POS, first of all, it is necessary to grasp the influence of exogenous variables, Servant Leadership and Authentic Leadership, on each lower level of Agile Culture, which is endogenous variables, such as Empowerment, Collective

Intelligence, and Continuous Learning. In this regard, as discussed in the theoretical background at the front of this study, Servant Leadership strengthens the Empowerment of members to make decisions on their own [13], and promotes them to express opinions and exert influence on the decision-making process[15], and plays a role in raising the learning atmosphere within the group [14]. Likewise, Authentic Leadership stimulates the positive minds and attitudes of members to increase the effectiveness of Empowerment[17], promotes organizational learning through transparent human relationships and communication[18], and enables the participative decision-making based on trust[19]. In particular, J. W. Tak & H. J. Oh. (2018) argued that in a study between participative leadership and Collective Intelligence, leadership with participative and supportive characteristics enhances Collective Intelligence within the organization [20]. We focused on the mediating role of POS after confirming the influences between these two leaderships and Agile Cultures through literature review. POS has been studied a lot in the field of social science as a mediating or moderating variable rather than an independent or a dependent variable. As suggested in the theoretical background of this study, POS not only mediates the relationship that leaderships reinforce the affective commitment and change the attitudes and behaviors of members[23,29], but also affects the components of Agile Culture[24,31]. Therefore, the following hypotheses were established by synthesizing the above discussion.

H4-1: POS will mediate the positive effect of Servant Leadership on Empowerment.

H4-2: POS will mediate the positive effect of Servant Leadership on Collective Intelligence.

H4-3: POS will mediate the positive effect of Servant Leadership on Continuous Learning.

H5-1: POS will mediate the positive effect of Authentic Leadership on Empowerment.

H5-2: POS will mediate the positive effect of Authentic Leadership on Collective Intelligence.

H5-3: POS will mediate the positive effect of Authentic Leadership on Continuous Learning.

### 3.3. Measurement and operational definition of variables

The questionnaire items for Servant Leadership was developed focusing on the characteristics of Servant Leadership such as altruistic calling and emotional healing, referring to the questionnaire developed by S. Y. Yi (2109) and J. G. Yu(2019) based on the concept defined by Spears (1995), Yukl (2009), and Barbuto & Wheeler (2006). The questionnaire items for Authentic Leadership were developed focusing on self-awareness, internalization of moral views, balanced information, referring to the items developed by B. M. Park (2019) based on the scale developed by Neider & Schriesheim (2011). The questionnaire items for POS were developed by referring also to items by B. M. Park (2019) who reported that the measurement tool was developed by referring to several previous studies based on Eisenberger et al (1986). The questionnaire items for Empowerment, one of the sub-dimensions of Agile Culture, were developed by referring to the items developed by H. G. Kim (2019) and Y. G. Kim (2019), abbreviated form of one from Bolton & Brookings (1998). The questionnaire items for Collective Intelligence were developed based focusing on participation, openness, and cooperation, referring to items developed by M. H. Cho (2018), which were based on the Mark (2008) and Leadbeater (2008). Lastly, the questionnaire items for Continuous Learning

were developed focusing on participation in educational program and job experience by referring to items developed by Y. A. Choi (2014) and S. I. Jeon (2015). All questions were applied with Likert five-point scale, and the detail operational definitions of constructs are shown in Table 1.

### 3.4. Population and sample selection

The questionnaire survey was administered to employees working in the Planning Department and Management Department of the National Agricultural Cooperatives Faderation (NACF) and Nonghyup Agribusiness Group in Korea. NACF in Korea is a federation of Agricultural cooperatives, the largest producer organization in Korea, and has Nonghyup Financial Group and Nonghyup

Agribusiness Group under its subsidiaries. Nonghyup Financial Group has eight subsidiaries related to businesses including bank, life insurance, property & casualty insurance, and investment & securities, and Nonghyup Agribusiness Group has 17 subsidiaries related to businesses such as distribution, manufacturing, food, logistics, and trade. NACF and Nonghyup Agribusiness Group were selected as the subjects of this study because these organizations received business strategy consulting from the BCG-KPMG consortium in 2018, have sought management innovation until recent times, and in particular significant efforts have been made to introduce and establish the agile organization and culture. The employees of Planning Department and Management

**Table 1. Operational definition of constructs**

Constructs	Operational Definition	Ref.
Servant Leadership	<ol style="list-style-type: none"> <li>1. My immediate superior puts priority on helping me.</li> <li>2. My immediate superior does his best to help me.</li> <li>3. My immediate superior is a person who is willing to discuss personal difficulties.</li> <li>4. My immediate superior is a person who cheers me up when I'm in trouble.</li> </ol>	S.Y. Yi (2019), J.G. Yu (2019)
Authentic Leadership	<ol style="list-style-type: none"> <li>1. My immediate superior knows how his actions will affect others.</li> <li>2. My immediate superior makes decisions based on his core values and beliefs.</li> <li>3. My immediate superior actively rejects the pressure to act against moral values and beliefs.</li> <li>4. My immediate superior makes clear what he intends.</li> </ol>	B.M. Park (2019)
Perceived Organizational Support(POS)	<ol style="list-style-type: none"> <li>1. My company appreciates my contribution to the company.</li> <li>2. My company fully considers my goals and values.</li> <li>3. My company is truly considerate for my growth and development.</li> <li>4. If I have a problem, I can get help from the company.</li> <li>5. My company shows me a lot of interest.</li> <li>6. My company is proud of what I've achieved.</li> </ol>	B.M. Park (2019)
Empowerment	<ol style="list-style-type: none"> <li>1. I can decide on my own how to handle things.</li> <li>2. I have independence and freedom in performing my duties.</li> <li>3. I have a great influence in the department.</li> <li>4. I have considerable authority over what happens in the department.</li> <li>5. I have a significant influence on the department's decision to do business.</li> </ol>	H.J. Kim (2019), Y.G. Kim (2019)
Collective Intelligence	<ol style="list-style-type: none"> <li>1. I am given the opportunity to actively present my professional insight to the company.</li> <li>2. Our company has an active communication channel for performing jobs.</li> <li>3. My work is performed smoothly through cooperation.</li> </ol>	M.H. Cho (2018)
Continuous Learning	<ol style="list-style-type: none"> <li>1. I participate in training programs in the support by company to learn new knowledge and skills.</li> <li>2. I participate in external education, workshops, and conferences for work and career development.</li> <li>3. I participate in clubs or study groups that are held outside the company for work and career.</li> </ol>	Y.A. Choi (2014), S.I. Jeon (2015)

Department were selected for questionnaire survey because this group has high understanding of the agile method and culture than other groups

since the organizations are in early stage of adopting them. We conducted the survey for about two months, January ~ February, in 2020. 200



questionnaires were distributed and 171 ones were collected. The questionnaires with missing values were excluded and the 160 valid samples were used in analysis. The results of demographic analysis of valid samples using the SPSS statistics package are as follows: Male and female occupied 77.1 and 22.9%, respectively. Those in their 20s, 30s, 40s, and 50s or older were 7.0, 45.2, 38.9, and 8.9%, respectively. As for the educational background, high school graduation or less, college graduation, and graduates or higher were 1.9, 82.2, and 15.9%, respectively. As for the positions, assistant manager or lower, general manager, and, team manager or higher were 36.9, 42.7, and 20.4%, respectively. As for the service years, shorter than five years, five-ten years, ten-fifteen years, fifteen-twenty years, and longer than twenty years were 27.4, 20.4, 19.1, 15.9, and 17.2%, respectively.

### 3.5. Analysis method : PLS-SEM

This study used SmartPLS 3.3.2 to empirically test the hypotheses through Partial Least Squares Structural Equation Modeling (PLS-SEM). The question of whether PLS-SEM or Covariance Based SEM (CB-SEM) is more appropriate is still under debate though there are cases where PLS-SEM is relatively more suitable. PLS-SEM enables analysis when the number of samples is small, data does not follow the normal distribution, and both formative and reflective measures are included in the research model. The PLS-SEM has higher statistic power compared to CB-SEM, therefore, useful for exploratory research verifying theories that have not yet been established or is under development [32]. This study applied PLS-SEM because this study used 160 samples, a relatively small number, and deals with the 0.7 and CR is above 0.6, demonstrating the internal consistency reliability of the study variables. There was no value of 1 in the confidence level of HTMT,

topic of agile organizational culture, which has not yet been established as a concept due to short history of investigation.

## 4. Analysis results

### 4.1 Evaluation of Outer Model

PLS-SEM evaluation using SmartPLS consists of two stages: one is the outer model evaluation which is the process of checking the reliability and validity of the measurement tool and the other is the inner model evaluation which judges the suitability of the structural model. When the evaluation result for the structural model shows that the criteria are acceptable, the researcher is allowed to test the research hypotheses finally. To proceed with this procedure, the outer model evaluation test was performed first. Since the research model of this study is a reflective measurement model that contains only reflective latent variables, the convergent validity, internal consistency reliability, and discriminant validity were evaluated separately and the results are shown in Table 2. The convergent validity represents that there should be a high correlation between the result values measured by different measurement methods for the same latent variable, and outer loading relevance, indicator reliability, and AVE values are used. To provide specific results, the outer loading relevance values were all above the threshold of 0.7, the indicator reliability for individual measurement variables was also above the threshold of 0.5, and the AVE was above the threshold of 0.5, indicating that the convergent validity of the study variables and individual measurement variables was supported. In addition, The Cronbach  $\alpha$  was above the threshold of 0.6, indicating desirable reliability. The rho\_A is above indicating that the discriminant validity is supported.

### 4.2 Evaluation of Inner Model

After completing the measurement model evaluation in PLS-SEM, the second step is to evaluate the structural model itself. The fitness between the structure of the study model and the empirical data is evaluated, and the appropriateness of the study model setting is tested. The evaluation of structural model in PLS-SEM requires the review of the multicollinearity, the coefficient R<sup>2</sup> of determination, the predictive relevance Q<sup>2</sup>, and the relative effect size f<sup>2</sup> of exogenous variables on endogenous variables. First, the inner VIP values examined to evaluate the multicollinearity between latent variables were in the range of

1.000-1.642, all of which were smaller than 5 showing no multicollinearity between latent variables. Next, R<sup>2</sup> and Q<sup>2</sup> were evaluated, and the results are shown in Table 3. For the R<sup>2</sup>, POS, Empowerment, Collective Intelligence, and Continuous Learning were shown to have explanatory power of 18.9, 23.6, 29.6, and 11.5%, respectively. Hair. et al. (2014) presented a guideline that classifies the explanatory power into substantial, moderate, and weak when the R<sup>2</sup> values are 0.75, 0.50, and 0.25, respectively [32]. However, the evaluation of model using only R<sup>2</sup> has limitation because the possibility of increasing the value of R<sup>2</sup> is likely to increase when the number or path of latent

**Table 2. Reflective measurement model evaluation result**

variables	Measured variables	Convergent validity			Internal consistency reliability			Discriminant validity
		Outer loading relevance	Indicator reliability*	AVE	Cronbach α	rho_A	CR	HTMT
		≥0.70	≥0.50	≥0.50	0.60~0.90	≥0.70	0.60~0.90	**
Servant Leadership	SL1	.880	.774	.785	.911	.939	.936	valid
	SL2	.889	.790					
	SL3	.871	.759					
	SL4	.904	.817					
Authentic Leadership	AL1	.817	.667	.643	.819	.867	.877	valid
	AL2	.788	.621					
	AL3	.874	.764					
	AL4	.721	.520					
Perceived Organizational Support(POS)	POS1	.745	.555	.677	.903	.905	.926	valid
	POS2	.886	.785					
	POS3	.869	.755					
	POS4	.714	.510					
	POS5	.838	.702					
	POS6	.867	.752					
Empowerment	EMP1	.798	.637	.635	.855	.859	.896	valid
	EMP2	.854	.729					
	EMP3	.853	.728					
	EMP4	.721	.520					
	EMP5	.748	.560					
Collective Intelligence	CI1	.804	.646	.673	.756	.761	.860	valid
	CI2	.867	.752					
	CI3	.788	.621					
Continuous Learning	CL1	.884	.781	.743	.824	.846	.896	valid
	CL2	.926	.857					
	CL3	.768	.590					

\*The Indicator reliability is calculated as the square of the outer loading relevance

\*\*Confidence intervals do not contain 1

variables increases and the criteria for determining R<sup>2</sup> are different depending on the academic field. Given these considerations, this study adopted the

criteria presented by Cohen (1998) [33] for the field of behavioral science (0.26: substantial, 0.13: moderate, 0.02: weak) proposed in the field of

behavioral science and, according to it, R2s of all endogenous latent variables have appropriate explanatory power. Q2 may be obtained by using blindfolding measurement in which the samples are re-used in SmartPLS and the values above zero may be regarded as indicating predictive relevance of the model. The Q2 of all the endogenous latent variables used in the research were above zero as shown in Table 3, indicating that the predictive relevance are supported.

**Table 3. The evaluation result of coefficient of determination(R2) and predictive relevance(Q2)**

endogenous latent variables	R2	Q2
POS	.189	.119
Empowerment	.236	.141
Collective Intelligence	.296	.194
Continuous Learning	.115	.081

Next, the relative effect size f2 of exogenous latent variables on the R2 of endogenous latent variables was examined and the results are shown in Table 4.

**Table 4. The evaluation result of coefficient of effect size(f2)**

path	f2	effect size
Servant Leadership → POS	.039	'weak'
Authentic Leadership → POS	.049	'weak'
POS → Empowerment	.309	'moderate'
POS → Collective Intelligence	.420	'strong'
POS → Continuous Learning	.130	'slightly smaller than moderate'

The effect size is regarded as strong, moderate, and weak effect when the f2 value is 0.35, 0.15, and 0.02, respectively. As shown in Table 4, the f2 of POS that contributes to R2 of Collective Intelligence was 0.420, indicating strongest contribution, and the f2 of Authentic Leadership that contributes to R2 of POS was 0.049, stronger than that of Servant Leadership (f2=0.039), though both have relatively weak effect size.

**4.3 Hypotheses test**

Based on the fact that the relevance of structural model was confirmed, the significance and relevance of path coefficient were evaluated through bootstrapping. The subsamples were set as 5,000 in bootstrapping and the results are shown in Table 5.

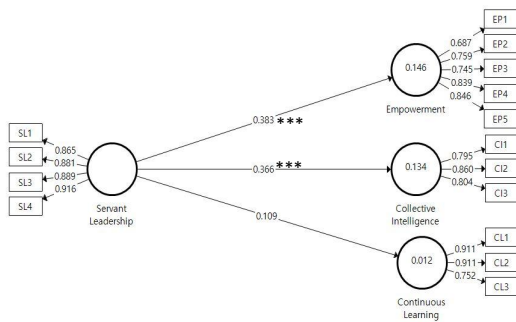
**Table 5. The evaluation result of significance and suitability of path coefficients**

Path	Path coefficient	t value	p value	95% confidence interval	result
⟨H1⟩ Servant Leadership → POS	0.227	2.355	0.017	[0.049, 0.423]	supported
⟨H2⟩ Authentic Leadership → POS	0.255	2.399	0.016	[0.042, 0.463]	supported
⟨H3-1⟩ POS → Empowerment	0.486	7.712	0.000	[0.364, 0.609]	supported
⟨H3-2⟩ POS → Collective Intelligence	0.544	9.299	0.000	[0.425, 0.655]	supported
⟨H3-3⟩ POS → Continuous Learning	0.339	4.558	0.000	[0.192, 0.483]	supported

Since t values for path coefficient of all the hypotheses were higher than the threshold of 1.96 at significance level of 5%, the p values were less than 0.05, and there was no zero in confidence interval as shown in Table 5, the hypotheses H1, H2, H3-1, H3-2, and H3-3 were supported. Servant Leadership and Authentic Leadership had similar levels of effect size on POS and the greatest influence of POS on sub-dimensions of Agile

Culture was found in that on Collective Intelligence and followed by those of Empowerment and Continuous Learning. Next, the mediating effect of POS in the effect of Servant Leadership and Authentic Leadership on Agile Culture was tested. Hair et al (2014) proposed, to test mediating effect through PLS-SEM, an analysis consists of two stages where the model 'without mediating variable' are estimated and those 'with

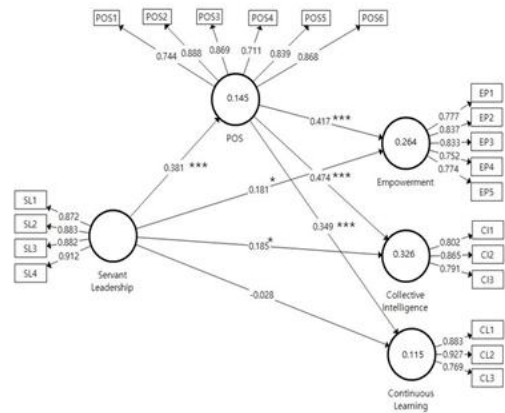
mediating variable' are tested to calculate indirect effect [32]. First, in the model 'without mediating variable(1)' as shown in Fig. 2, it was confirmed that the effects of Servant Leadership on Empowerment ( $t=6.315, p=0.000$ ) and Collective Intelligence ( $t=4.699, p=0.000$ ) were significant, while that on Continuous Learning ( $t=1.012, p=0.311$ ) was not significant. These results suggested that Servant Leadership → Continuous Learning cannot be the subject of a mediating effect test, and only the impact of Servant Leadership on Empowerment and Collective Intelligence can be the subject of the mediating effect test.



Notes: \* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

Fig. 2. Model without mediating variable (1)

The significant effect of Servant Leadership on Continuous Learning also was not found in the model 'with mediating variable(1)' in Fig. 3.



Notes: \* $p<0.05$ , \*\* $p<0.01$ , \*\*\* $p<0.001$

Fig. 3. Model with mediating variable (1)

The path coefficient of specific indirect effect and its significance were examined to investigate the mediating effect of POS and the detail results are shown in Table 6. It was found that the POS mediates the effect of Servant Leadership on Empowerment and Collective Intelligence. Although the path of Servant Leadership → POS → Continuous Learning was significant as shown in Table 6, the POS cannot be considered to have mediating effect in relationship between two variables since the direct effect of Servant Leadership on Continuous Learning was not significant as shown in Fig. 2.

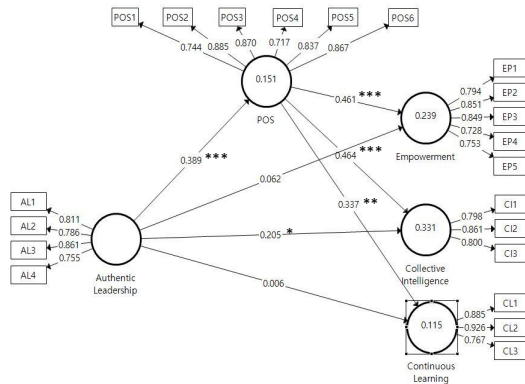
Table 6. The results of mediating effect hypotheses test 1

Path	Path coefficient	t value	p value	95% confidence interval	result
⟨H4-1⟩ Servant Leadership → POS → Empowerment	0.159	3.938	0.000	[0.088, 0.249]	supported
⟨H4-2⟩ Servant Leadership → POS → Collective Intelligence	0.181	3.913	0.000	[0.103, 0.284]	supported
⟨H4-3⟩ Servant Leadership → POS → Continuous Learning	0.133	2.692	0.007	[0.053, 0.243]	-

In the model 'without mediating variable(2)' as shown in Fig. 4, it was found that the effects of Authentic leadership on Empowerment ( $t=3.764, p=0.000$ ) and Use of Collective Intelligence ( $t=5.201, p=0.000$ ) were significant, while that on Continuous Learning ( $t=1.445, p=0.149$ ) was not significant.

These results suggested that Authentic Leadership → Continuous Learning also cannot be the subject of a mediating effect test, and only the impact of Authentic Leadership on Empowerment and Use of Collective Intelligence can be the subject of the mediating effect test.

The significant effect of Authentic Leadership on Continuous Learning also was not found in the model 'with mediating variable (2)' in Fig. 5. The path coefficient of specific indirect effect and its significance were examined to investigate the mediating effect of POS and the detail results are shown in Table 7.



Notes: \*p<0.05, \*\*p<0.01, \*\*\*p<0.001

**Fig. 5. Model with mediating variable (2)**

It was found that the POS mediates the effect of Authentic Leadership on Empowerment and Collective Intelligence. Meanwhile, the significance of relationship between Authentic Leadership and Empowerment disappeared with the addition of POS, a mediating variable, meaning that the POS completely mediates the relationship between two

variables. Lastly, although the path of Authentic Leadership → POS → Continuous Learning was significant as shown in Table 7, the POS cannot be considered to have mediating effect in relationship between two variables since the direct effect of Authentic Leadership on Continuous Learning was not significant as shown in Fig. 4.

In the above analysis of mediating effects, Servant Leadership and Authentic Leadership had a statistically significant effect on Continuous Learning through POS, but these two leaderships did not directly affect Continuous Learning, so the mediating effect in these relationships was rejected. the result that Servant Leadership and Authentic Leadership do not affect Continuous Learning is different from that of J. H. Kim & Choi E.S (2013) [14] and T. M. Sun & E. S. Choi (2016) [18] that the Servant Leadership and Authentic Leadership are effective in raising the level of learning group within organization and improving the learning atmosphere. These contrasting results with the existing studies might be due to insufficient sample numbers (n=160), characteristics of samples targeting only employees of a specific business group, etc. Therefore, it is expected that further research will be needed in the future through the expansion of the research target companies and the increase of the number of samples.

**Table 7. The results of mediating effect hypotheses test 2**

path	Path coefficient	t value	p value	95% confidence interval	result
<H5-1> Authentic Leadership → POS → Empowerment	0.179	3.817	0.000	[0.096, 0.280]	supported
<H5-2> Authentic Leadership → POS → Collective Intelligence	0.180	4.189	0.000	[0.103, 0.272]	supported
<H5-3> Authentic Leadership → POS → Continuous Learning	0.131	2.542	0.011	[0.046, 0.249]	-

## 5. Conclusion

### 5.1 Research Results and Implications

This study analyzed the effect of Servant Leadership that emphasizes the people such as support for growth of members, orientation towards

horizontal culture, and communication and sympathy as important factor for achieving goal and Authentic Leadership adopts moral value and transparent communication as central principle on POS meaning the commitment to organizational members and Agile Culture that seeks rapid

recognition of and response to change. The studies on Agile Culture have been conducted in relatively recent times. This study identified Collective Intelligence, Empowerment, and Continuous Learning as common features of agile organizations. The summarized conclusions of analysis are as follows: First, both Servant Leadership and Authentic Leadership were found to have a positive impact on POS. Second, POS had statistically significant effect on Collective Intelligence, Empowerment and Continuous Learning, all sub-dimensions of Agile Culture. Third, the mediating effect of POS in the relationship between leaderships and Agile Culture was tested and it was found that POS mediated the positive effect of Servant Leadership and Authentic Leadership on Collective Intelligence and Empowerment. POS, in particular, completely mediated the relationship between Authentic Leadership and Empowerment. It was concluded, however, that POS had no mediating effect in the effects of two kinds of leadership on Continuous Learning because, although the specific indirect effect between leaderships and Continuous Learning was statistically significant, the leaderships had no direct impact on Continuous Learning.

Taking the above research results together, the academic implications are as follows. First, the existing research related to 'Agile' has been mainly focused on topics such as manufacturing agility, supply chain agility, agile software development, and agile enterprise, and relatively few studies have identified the characteristics of Agile Culture. J. Y. Lee & S. K. Kim (2020) analyzed 37,366 cases of SCOPUS papers from 2001 to 2019 using the technique of machine learning-based text mining, and investigated topics related to 'Agile'. As a result, it was found that research related to 'Agile' is spreading to 7 areas including agile business environment, agile project management, and agile

organization [29], but Agile Culture does not fall into this category. In this context, this study can help research related to Agile Culture in the future by presenting the characteristics of Agile Culture and by presenting the preceding variables for the expression of Agile Culture. Second, this study is meaningful in that it empirically identified the leadership styles that influence the characteristics of Agile Culture. A study by AN NA (2020) that presented the support of top management as an organizational factor influencing Agile Culture[1], a study by Z. Khalid et al (2020) that entrepreneurial leadership has a positive effect on organizational culture and organizational agility[34], a study by M. Cleveland & S. Cleveland (2020), which presented an approach to relational leadership development as culturally agile leadership, etc[9], there are several studies related to leaderships that influence Agile Culture. However few studies have suggested leadership styles that specifically affect the characteristics of Agile Culture. Therefore, this study can contribute to the expansion of studies related to leaderships that promote Agile Culture in the future. Third, based on the social exchange theory, Perceived Organizational Support (POS), which has been studied a lot as a mediating variable, was introduced into the relationship between leaderships and Agile Culture. In this study, the horizon of research related to POS was broadened by empirically finding out that POS mediates the influence of Servant Leadership and Authentic Leadership on Agile Culture.

Next, practical implications are as follows. First, the organizations that seek the introduction and settlement of Agile Culture should establish a formal or informal system and environment that make the employees to believe that they are recognized and supported by the organization. Second, it is most important for the organization's leaders to make efforts to demonstrate Servant Leadership and Authentic Leadership, which are

horizontal leaderships of human resource-oriented, communication-oriented, and value-oriented in order to take root in the organization. Third, in this study, it was found that POS completely mediated the influence relationship between Authentic Leadership and Empowerment. These findings suggest that even if a leader delegates authority by position or role to members, the effect of delegation of authority cannot be properly exerted unless they recognize that each member is receiving reliable support from the organization.

## 5.2 Study Limitations and Future Directions

The subjects of this study were restricted to employees of NACF and Nonghyup Agribusiness Group in Korea, limiting the generalization of the results to all industries. The future studies should extend the research scope to include companies with more various sizes and industries. In addition, to present a comprehensive methodology to organizations that plan to introduce Agile Culture, further studies on various organizational and environmental characteristics that have an impact on Agile Culture should be conducted.

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