

Research Article

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Author for correspondence:

Bambang Budi Wiyono

✉ bambang.budi.fip@um.ac.id

✉ Universitas Negeri Malang, Indonesia



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The Effect of the Enhancement of Tacit and Explicit Knowledge in Knowledge Management on the Principal's Digital Leadership and the Improvement of School Organization

Bambang Budi Wiyono^{ID}, Ahmad Yusuf Sobri^{ID}, Burhanuddin^{ID}, Khalip Musa^{ID}, Mochammad Fahlevi^{ID}

Abstract

Background/purpose. There are two types of knowledge in an organization, namely tacit and explicit knowledge. This research aims to test the effects of the enhancement techniques of both types of knowledge on the principal's digital leadership and school organization improvement, to find the relationship among the variables, and to find effective techniques to enhance the endogenous variables.

Materials/methods. The explanatory research design was used in this study. The research sample was taken from 105 schools in Indonesia through cluster random sampling. Data collection techniques used questionnaires, interviews, and documentation. Descriptive statistics and structural equation modeling were used as the data analysis techniques.

Results. The enhancement techniques of tacit and explicit knowledge had a direct impact on the digital leadership of principals and affected school organization improvement directly and indirectly. The digital leadership of principals had a strong influence on school organization improvement. Several tacit and explicit knowledge-enhancement techniques had a strong effect on school organization improvement, but several other techniques had a less significant effect.

Conclusion. From a theoretical perspective, this study contributes effective tacit and explicit knowledge-sharing techniques in knowledge management and their impact on digital leadership and organizational improvement. From a managerial perspective, the research findings can be used by leaders to develop organizations. The present study expands the literature on knowledge management that has not been widely studied. It also finds the relationship among the variables in line with the development of information technology.

1. Introduction

There have been enormous changes in the lives of people around the world. Science and technology are developing very rapidly. It affects human life in all aspects, including education. Schools as educational organizations need to be constantly changing and developing by the demands of life. Moreover, the rapid development of information and communication technology demands changes in the management of educational organizations. Therefore, the application of information and communication technology is a must to achieve good quality education (Prince, 2018).

Organizational change is a process of adaptation to environmental developments. Organizations will be able to survive and develop well if they always make changes (Ghavifekr et al., 2017). There is a significant effect of change management on innovation behavior and organizational innovation (Sung & Kim, 2021). The better the change is well managed, the higher the level of an individual's attitudes towards innovative behavior and organizational innovation is. Hence, individual innovation behavior and organizational innovation are the keys to developing an organization effectively.

When examined further, to be able to manage organizational change and development well, good leadership is needed. Leadership is the behavior of developing team members toward achieving organizational goals. Some research results show that leadership affects organizational effectiveness. The more effective leadership is applied by leaders, the more effective the organization is (Reinhartz & Beach, 2004). In addition to that, leadership has a positive effect on organizational change (Bah et al., 2024). It also affects motivation, the effectiveness of teamwork, and organizational improvement (Wiyono, 2018).

With the rapid development of technology, the role of leadership in organizations is increasing. Leadership cannot be carried out effectively without using information and communication technology (Blau & Presser, 2013). Even the enhancement of leadership needs to utilize information technology (Pawar & Dhumal, 2024). For this reason, it is necessary to examine more deeply how the implementation of the principal's digital leadership concerning organizational development in schools. Therefore, it is inseparable from the information management applied in schools. Moreover, digital leadership emphasizes the creation of an organizational culture that is open to innovation and collaboration. As a result, leaders are expected to encourage and facilitate personnel to share knowledge for organizational development. It becomes one of the characteristics of knowledge management. Thus, the relationship between the three variables is still a question and needs to be studied in depth. The effects of knowledge enhancement on the digital leadership of principals and the improvement of school organizations structurally need to be studied precisely. That is the background of this research.

2. Literature Review

2.1. The Digital Leadership

Leadership is the process of mobilizing members to achieve organizational goals. Initially, the leadership theory developed was the trait theory. Some research results show that the theory was less well-proven (Owens & Valesky, 2013). Subsequently, experts developed a leadership theory based on behavior, which emphasizes task and people-oriented (Hoy & Miskel, 2012). Based on these two orientations of leadership behavior, Hersey and Blanchard developed a situational leadership theory, which was then divided into four leadership styles, namely directing style which is highly oriented on tasks but low on human relations; coaching style, which is a style that is highly oriented on tasks and human relations; supporting style, it is oriented low on tasks but high on human relations; and delegating style which is oriented low on tasks and human relations. The implementation of the four leadership styles is adjusted to the conditions of the members.

In the next development, the effectiveness of the leadership is not only seen in team members' conditions but also in organizational conditions. Many leadership theories have been developed, including charismatic leadership, participative leadership, and transformational leadership. Transformational leadership emphasizes the behavior of principals who can transform values to members so that they have high commitment and work optimally to achieve organizational goals. Four main behaviors are applied, namely showing charismatic behavior that is recognized by members as a model, providing motivation based on high ambition, encouraging members to always improve themselves, and paying attention to members individually. Therefore, transformational leadership is a modern form of leadership that is considered effective for developing organizations.

In line with technological development, the leadership style cannot only be seen in leadership behavior in the organization, but it is also influenced by the use of information and communication technology within the organization. Information technology devices are a component of the situation that must be considered. Furthermore, digital technology is an important element in organizational innovation (Mamonov & Peterson, 2021). Some research results show that the use of information technology affected organizational performance, but the coefficient was relatively small (Wiyono, Wedi, et al., 2021). In addition, not all uses of technology could improve the effectiveness of organizational management (Wiyono et al., 2020). Hence, this needs to be studied more deeply.

When examined in reality, even until now, many principals have not been able to apply information technology-based leadership well, so there is a high gap (Hassan & Berkovich, 2023). Partially, principals' digital leadership competencies affected teachers' digital competencies (Zeng et al., 2024). Also, principal digital leadership influences teachers' commitment and school effectiveness (Berkovich & Hassan, 2023). It also enhanced school organizational development (Wiyono et al., 2023). The principal's digital leadership could even create a digital cultural transformation in schools (Navaridas-Nalda et al., 2020; Rasdiana et al., 2024). However, which dimensions of digital leadership of principals have a significant effect on the development of school organizations remains a question.

Based on the theory, there are five dimensions of digital leadership, namely equity and citizenship advocate, visionary planner, empowering leader, systems designer, and connected learner. What is more, the leader acts as a learner, leader, citizen, collaborator, designer, facilitator, and also an analyst (Crompton, 2023). The application of technology in leadership was not just utilizing technology in school management, but needed to be integrated with the dimensions of leadership behavior (Abbu et al., 2022).

2.2. The Tacit and Explicit Knowledge in Knowledge Management

The rapid development of information technology has changed the way organizations operate. They no longer rely solely on physical resources, but also on the knowledge possessed by individuals and groups within the organization. The ability to manage and utilize knowledge is an essential factor in developing organizations, which is why knowledge management in organizations is needed. Knowledge management is a systematic process of identifying, collecting, storing, and distributing knowledge within an organization. The main goal is to optimize the use of knowledge owned by individuals and teams, so it can increase innovation, efficiency, effectiveness, and better organizational decisions. With the knowledge that continues to be developed and utilized, the organization will be able to face challenges and competition.

Knowledge management can be seen from the types, components, models, and processes. It is the process of managing knowledge. Knowledge itself can be divided into three, namely tacit knowledge, explicit knowledge, and potential knowledge. Tacit knowledge is knowledge that is not easily described and shared, and it can be in the form of experience, knowledge, and expertise that each individual has. Explicit knowledge is knowledge that has been documented and can be communicated and shared with others, for example, in the form of books, journals, or other

references. Meanwhile, potential knowledge is knowledge that is used for data analysis and converting data into knowledge. In terms of components, knowledge management can be divided into three, namely people, process, and technology. People are the source of knowledge because people are the ones who have knowledge, share knowledge, and utilize knowledge. Process refers to the process of storing, channeling, sharing, and using knowledge. Meanwhile, technology refers to the use of technological devices to facilitate knowledge management.

In terms of the model, knowledge management is divided into four stages, namely socialization, externalization, combination, and internalization. Socialization is the process of transferring experiences owned by individuals to others. Externalization is the process of articulating tacit knowledge into an explicit form, such as books, reports, forums, etc. Combination is the process of combining different explicit knowledge into new explicit knowledge through the analysis, grouping, and rearrangement stages. Externalization is the process of extracting explicit knowledge into tacit knowledge.

Based on the process, knowledge management can be divided into eight stages, namely knowledge assessment, knowledge goals, knowledge identification, knowledge acquisition, knowledge development, knowledge sharing, knowledge utilization, and knowledge retention. Those eight steps are called the core process of knowledge management. Knowledge assessment is a process of assessing the organization's capacity to manage knowledge. Knowledge goal refers to the goals achieved in knowledge management, which can be divided into normative, strategic, and operational knowledge goals. Knowledge identification is the process of identifying tacit and explicit knowledge. Knowledge acquisition is the process of collecting data into a system. Knowledge development is the process of generating new knowledge based on existing knowledge. Knowledge sharing is the stage of sharing and disseminating the knowledge that the organization already has. Knowledge utilization is the stage of storing and utilizing knowledge to support organizational activities. Whereas, knowledge retention is the stage of selecting, storing, and updating knowledge.

To achieve organizational goals, both tacit and explicit knowledge need to be managed properly. Some effort to improve the sharing of tacit and explicit knowledge needs to be carried out continuously. Knowledge sharing can be done through several techniques, including training, workshops, questions and answers, guidance, coaching, discussions, meetings, collegial supervision, personal conversations, seminars, conferences, or through online media, such as WhatsApp, Facebook, email, intranet, or other information technology-based communication techniques. These techniques are widely used, but which techniques are effective is still a question. This is the background of why this research needs to be conducted.

2.3. The Effect of Tacit Knowledge and Explicit Knowledge on Digital Leadership and School Organization Improvement

Based on the data, to improve the quality of education, it is necessary to improve the leadership of principals. The principal is the educational leader in a school who is fully responsible for mobilizing all school resources and coordinating the implementation of the education system in a school. If the principal can apply good leadership, the implementation of the education system will run well, and its goals will be achieved optimally. Several research results in the last decade showed that there was a very strong relationship between leadership and organizational effectiveness (Reinhartz & Beach, 2004).

When examined further, the techniques for developing effective principal leadership competencies have not been found. So far, many principal leadership development techniques have been carried out through training, workshops, working group meetings, etc. Some research results show that there was no significant influence of coaching activities on the competence of school personnel (Azar, 2010; Sahbaz, 2011; Yavuz, 2010). The results of Wiyono's research also showed

that the principal coaching implemented so far had no significant effect on the principal's competence (Wiyono et al., 2019). Therefore, it is necessary to develop effective development techniques to improve the digital leadership of principals.

The research study done by Kartal shows that effective development models for improving leadership competencies emphasize the sharing of experiences (Kartal, 2010). Effective capacity-building models are needs-based, emphasizing collegial interaction and personal development. The result of Kolb, McCall, Lombardo, Morrison, and Argyris' study also shows that learning from experience was the best technique to improve leadership from various perspectives (Hughes et al., 2015). Through this model, it is expected to improve the leadership competence of principals sustainably.

In terms of theory, there is a connection between some characteristics of digital leadership and knowledge management. Digital leadership encourages a collaborative culture and shares knowledge within organizations, and in line with this, knowledge management also emphasizes both of those. In addition, digital leadership facilitates access and distribution of knowledge, and so does knowledge management, which also emphasizes both of them. Transformational leadership integrates technology in education management and knowledge management, and also emphasizes this area. Furthermore, digital leadership develops adaptation and innovation skills, and so does knowledge management, which focuses on these as well. Hence, there is a very strong relationship between knowledge management and digital leadership.

To date, many existing studies have examined the influence of leadership on the knowledge-sharing practices of organizational members. Leadership style or orientation has an impact on knowledge sharing behavior (Shafique et al., 2023; Vaca et al., 2017). Other studies have also examined the impact of knowledge management on organizational performance (Muthuveloo et al., 2017). Knowledge sharing has an impact on organizational change and innovation (Castaneda & Cuellar, 2020; Gamble, 2020). Other studies have positioned knowledge sharing as a mediating variable. Both tacit and explicit knowledge sharing mediate the relationship between leadership and frugal innovation (Lei et al., 2021). Knowledge sharing has also been found to mediate the effect of distributed leadership on organizational trust (Berraies et al., 2020). Another study has explored the influence of transformational leadership on both tacit and explicit knowledge sharing within the context of school culture (Hoang & Le, 2024) or the relationship between leadership and organizational commitment (Sharif et al., 2023). However, limited research has examined how knowledge sharing influences digital leadership and organizational development. Likewise, the effectiveness of specific techniques for sharing tacit and explicit knowledge with digital leadership remains underexplored. Furthermore, the structural impact of strengthening tacit and explicit knowledge on digital leadership and organizational improvement, either directly or indirectly, has not been widely studied. These gaps form the basis for this research.

Starting from those characteristics, improving knowledge management is expected to improve the digital leadership of principals. As the quality of knowledge management improves, so does the transformational leadership of principals. When examined further, improving knowledge management depends a lot on sharing tacit and explicit knowledge. If knowledge sharing can be implemented intensively, knowledge management will be implemented effectively. The question is whether increasing the sharing of tacit and explicit knowledge can also improve the digital leadership of principals. It has still become a question that it is the reason why research needs to be done. That rationale is the background of this research. If it is proven that the technique is effective in improving the principal's digital leadership competence, then it is a major finding about the strategic principal leadership development model in line with the development of information and communication technology in the era of Industrial Revolution 4.0 and Industrial Society 5.0.

Following the background, this study aims to (1) explore the techniques of reinforcing tacit and explicit knowledge of knowledge management implemented in schools, (2) find the effects of the tacit and explicit knowledge enhancement on the principals' digital leadership, (3) find the effects of the tacit and explicit knowledge Enhancement of knowledge management on school organization improvement, both directly and indirectly, and (4) to find effective techniques to enhance the digital leadership and school organization improvement. Through the findings of this research, it is hoped that effective techniques for strengthening principals' digital leadership based on knowledge management for school organization improvement can be found.

3. Methodology

3.1. Study Design

Following the objectives, an explanatory research design was used in this study. Explanatory research is research that seeks to test hypotheses and theories that explain how and why a phenomenon operates (Johnson & Christensen, 2016). The main goal is to understand the phenomenon itself and prove the causal relationship between phenomena. This research aims to explain the effect of tacit and explicit knowledge enhancement on principals' digital leadership and school organization improvement. Thus, it is very appropriate to use an explanatory research design. This research design is also known as a causal modeling research design, which formulates a theory-based causal model hypothesis and tests it empirically in the field (Johnson & Christensen, 2016). The whole process of this research refers to explanatory research procedures. First, the theory, along with relevant previous research results, was deeply and comprehensively reviewed. Second, a model of the causal influence of exogenous variables on endogenous variables was formulated, as well as the influence of endogenous variables on each other. Third, the model of the effect of exogenous variables on endogenous variables was tested, as well as endogenous variables on endogenous variables. In simple terms, the structural influence of exogenous and endogenous variables is presented in Figure 1.

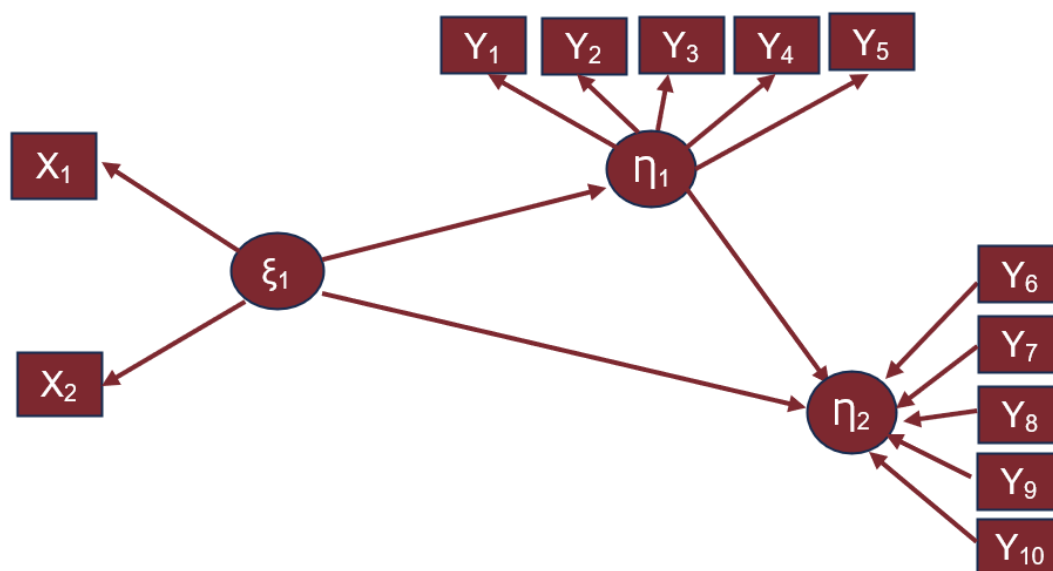


Figure 1. The Hypothetical Model of the Structural Effect of Exogenous Variables on Endogenous Variables

ξ_1 = Enhancement of Knowledge

X_1 = Tacit Knowledge Enhancement Technique

X_2 = Explicit Knowledge Enhancement Technique

η_1 = Principal's Digital Leadership

Y1 = Equity and Citizenship Advocate

Y2 = Visionary Planner

Y3 = Empowering Leader

Y4 = Systems Designer

Y5 = Connected Learner

η_2 = School Organization Improvement

Y6 = Improvement Programs

Y7 = Response to Improvement Programs

Y8 = Improvement Program Management

Y9 = Member Involvement in Improvement

Y10 = Improvement of the Program Outcomes

3.2. Research Samples

To empirically test the model, field research data were needed. The three main variables tested are strengthening knowledge management through sharing tacit and explicit knowledge, digital leadership, and school organization improvement. Referring to the analysis standard, a minimum of 100 - 150 data points was required (Schumacker & Lomax, 2015). The research sample could also be 100 – 200 (Hair et al., 2013). Based on this view, a sample of 105 schools was taken in this study. Cluster random sampling was used as the sampling technique in three cities and three districts, in the East Java region of Indonesia, namely Malang, Batu, and Probolinggo, and three districts, namely Malang Regency, Sidoarjo Regency, and Tulungagung Regency.

The sampling process was carried out systematically and representatively. In the first stage, three regencies were selected from the total number of regencies in East Java, Indonesia, and three cities were also selected from the total number of cities. There were 405 junior high schools in total. From this population, a cluster random sampling technique was used to select 105 schools as the research sample. Subsequently, teachers from each selected school were chosen as samples for the study.

3.3. Data Collection Instruments

The data collection techniques in this study were questionnaires and documentation. Questionnaires were used to collect data on the variables of reinforcing knowledge management through sharing tacit and explicit knowledge, digital leadership, and school organization improvement, while documentation was used to collect documentary data, such as school characteristics, principal characteristics, teacher characteristics, and other school documents.

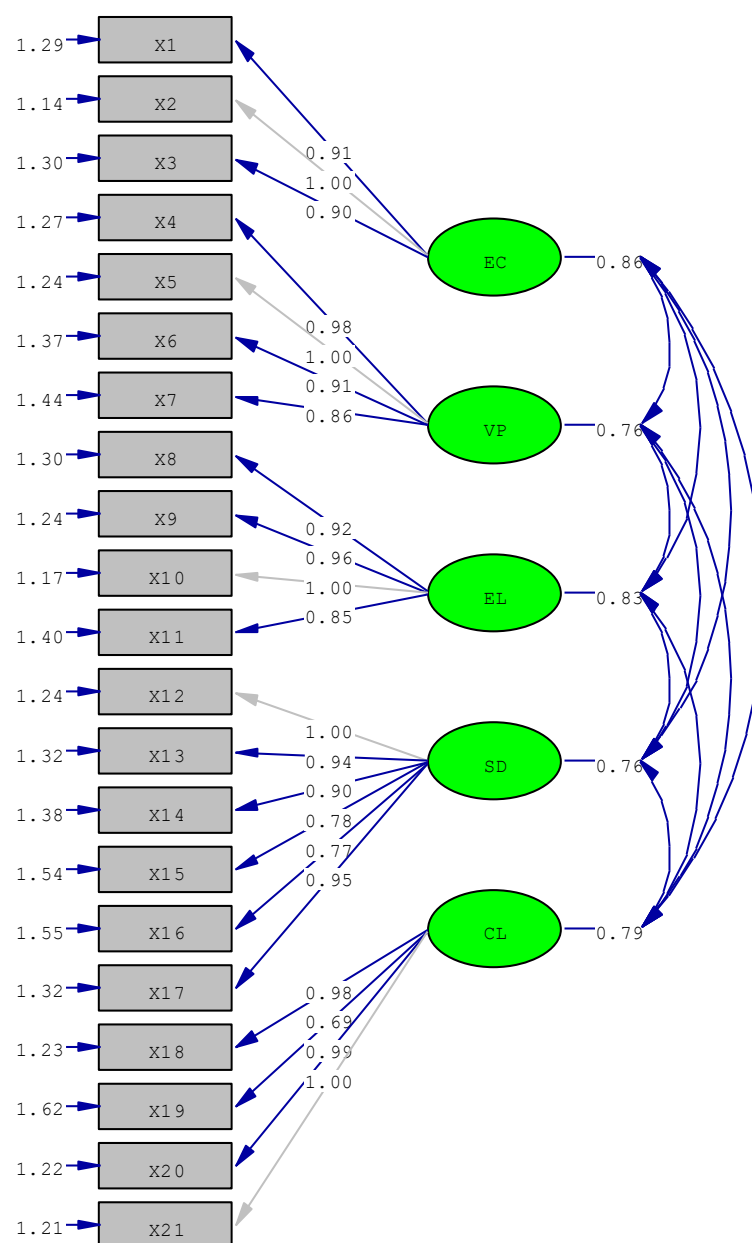
The research instrument was then developed based on the constructs of the variables studied. The types of instruments developed were closed and open questionnaires. The closed-ended questionnaire used a summated rating or Likert scale, with four answer options, namely always with a score of 4, often with a score of 3, rarely with a score of 2, and never with a score of 1. To enrich the data obtained from the closed-ended questionnaire, an open-ended questionnaire was also administered to provide additional qualitative insights.

The instrument for measuring knowledge management through sharing tacit and explicit knowledge consists of 32 items, which are divided into two dimensions, namely tacit knowledge sharing techniques and explicit knowledge sharing techniques. The instrument for measuring digital leadership consists of 21 items, divided into five dimensions, namely equity and citizenship, visionary

planner, empowering leader, connected leader, and system designer. The instrument used to measure school improvement consisted of 25 items, divided into five dimensions, namely the improvement program, the management of the improvement program, the members' response to the improvement program, the members' involvement in the improvement program, and the results of the improvement program. To test the validity of the instrument, an analysis of construct validity with confirmatory factor analysis was conducted.

3.3.1. The Measurement Instrument of the Principal Digital Leadership

Before being used to collect data, a tryout was conducted to test its validity and reliability. The tryout was conducted on 100 teachers, drawn from the same population that is not a research sample. The validity of the instrument reviewed was construct validity through confirmatory factor analysis, which in structural equation modeling is known as analysis of the instrument's measurement model (Hair et al., 2022; Hoyle, 2023). The results of the analysis of the principal's digital leadership instrument are presented in Figure 2.



Chi-Square=68.12, df=179, P-value=1.00000, RMSEA=0.000

Figure 2. The Measurement Model of Principal Digital Leadership

The results of the analysis of the principal's digital leadership measurement model obtained a Chi-Square value with $p > 0.05$, and a Root Mean Square Error of Approximation (RMSEA) value < 0.08 , as well as a Goodness of Fit Index (GFI) value of 0.938, and a Normed Fit Index (NFI) = 0.906. It shows that the model fits the data in the field, so it can be concluded that the principal's digital leadership measurement instrument shows good spectrum validity. It is confirmed by the loading factor value of each item > 0.7 . The results of the reliability analysis with Cronbach's Alpha formula obtained the value of the CV (Equity and Citizenship Advocate) dimension, amounting to 0.823, VP (Visionary Planner) of 0.822, EL (Empowering Leader) of 0.835, SD (System Designer) of 0.843, and CL (Connected Leader) of 0.821. All reliability coefficients are > 0.7 , so it can be concluded that the principal's digital leadership measurement instrument has good validity and reliability.

3.3.2. The Measurement Instrument of the School Organization Improvement

The results of the analysis of the school organization improvement instrument are presented in Figure 3.

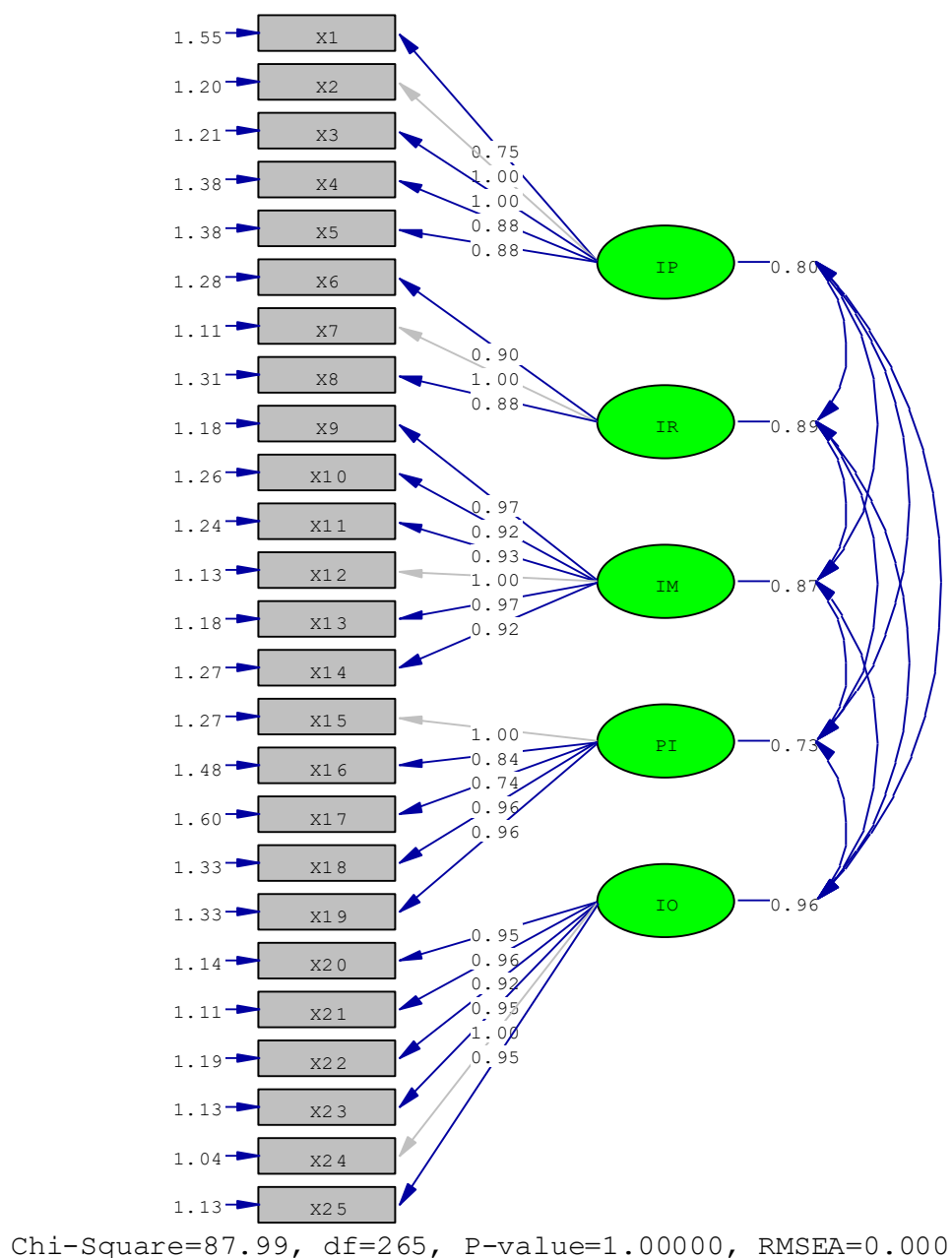


Figure 3. The Measurement Model of School Organization Improvement

The results of the analysis of the school organization improvement measurement model obtained a Chi-Square value with $p > 0.05$, and a Root Mean Square Error of Approximation (RMSEA) value < 0.08 , as well as a Goodness of Fit Index (GFI) value of 0.914, and a Normed Fit Index (NFI) = 0.911. It shows that the model fits the data in the field, indicating that the school organization improvement measurement instrument shows good construct validity. This is corroborated by the loading factor value of each item > 0.7 . The results of the reliability analysis with Cronbach's Alpha formula obtained the value of the SI dimension (improvement programs) of 0.840, Response to Improvement (RI) of 0.827, IM (Improvement Management) of 0.910, PI (Participation in Improvement) of 0.827, and IO (Improvement Output) of 0.940. All reliability coefficients are > 0.7 , so it can be concluded that the school organization improvement measurement instrument has good validity and reliability.

3.3.3. The Measurement Instrument of the Tacit and Explicit Knowledge Enhancement

The results of the analysis of the instrument for the enhancement of the tacit and explicit knowledge are outlined in Figure 4.

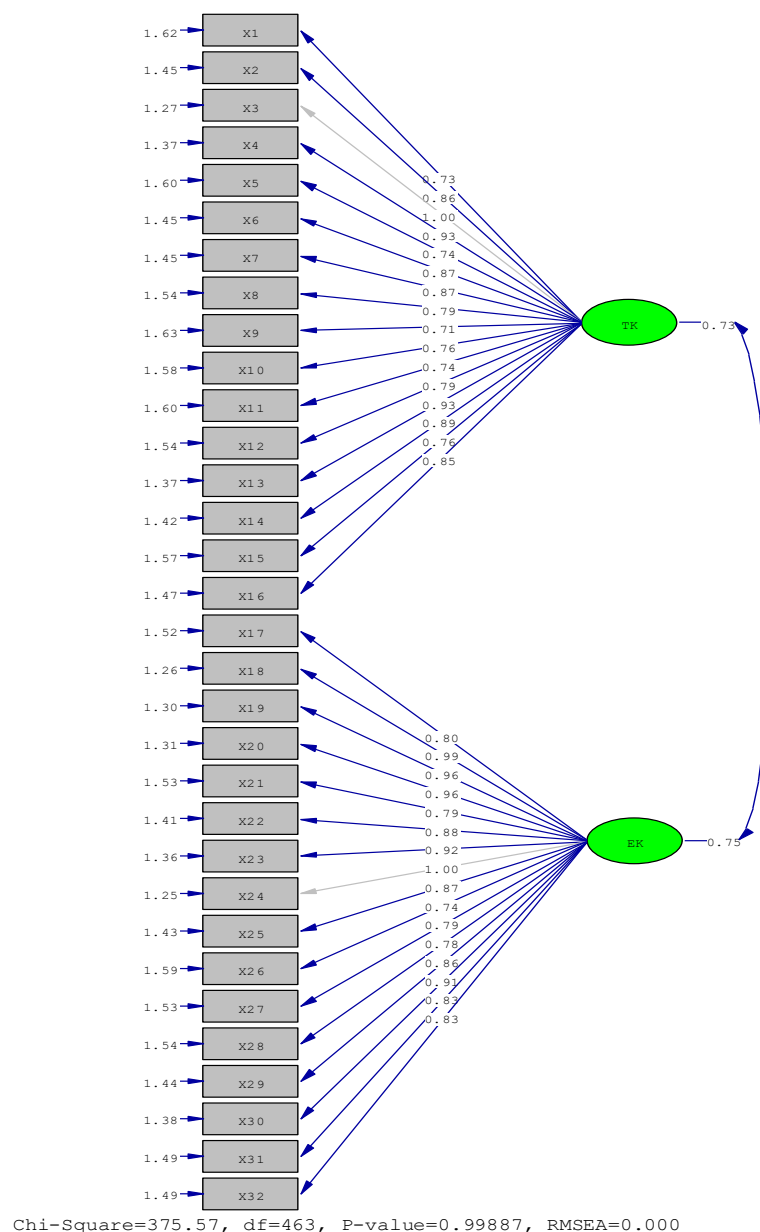


Figure 4. The Measurement Model of the Enhancement of Tacit and Explicit Knowledge

The results of the analysis of the measurement model for enhancement of tacit and explicit knowledge obtained a Chi-Square value with $p > 0.05$, and a Root Mean Square Error of Approximation (RMSEA) value < 0.08 , as well as a Goodness of Fit Index (GFI) value of 0.808, and Normed Fit Index (NFI) = 0.722. It shows that the model fits the data in the field, so it can be concluded that the instrument for measuring tacit and explicit knowledge enhancement shows good construct validity. This is corroborated by the loading factor value of each item > 0.7 . The results of the reliability analysis using Cronbach's Alpha formula obtained a dimension value of enhancement of the tacit knowledge of 0.911 and explicit knowledge of 0.929. All reliability coefficients are > 0.7 , so it can be concluded that the measurement instruments for the enhancement of tacit and explicit knowledge have good validity and reliability.

3.4. Data Analysis

To process the research data, several data analysis techniques were used. Descriptive statistics were used to describe the variable data of the tacit and explicit knowledge-enhancement techniques, digital leadership, and school organization improvement.

Structural Equation Modeling was used to describe the measurement model of the three variables, test the model, and examine the structural influence of exogenous variables on endogenous variables, as well as the influence of endogenous variables on endogenous variables, both directly and indirectly. Data normality was tested using the Kolmogorov-Smirnov technique, while qualitative data was analyzed using qualitative data analysis techniques. The analysis program used SPSS (*Statistical Program for Social Sciences*) and LISREL (*Linear Structural Relations*).

4. Results

4.1. The Descriptions of the Dimensions of the Tacit and Explicit Knowledge Enhancement Techniques, Digital Leadership, and School Organization Improvement

Based on the results of the analysis, the techniques applied in strengthening tacit and explicit knowledge in schools can be described, and they are presented in Figure 5.

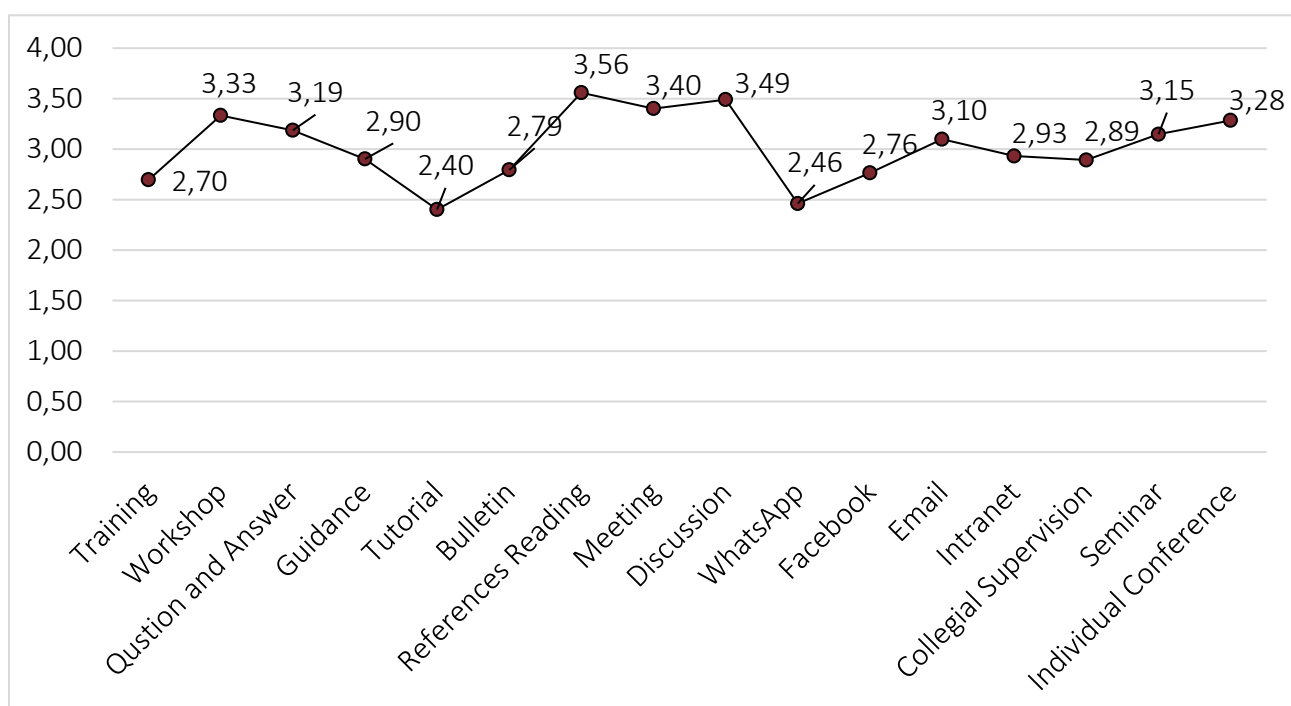


Figure 5. The Intensity of the Tacit Knowledge Enhancement Techniques in Schools

Figure 5 shows the intensity of tacit knowledge-enhancement techniques in schools. From this figure, it can be underlined that some of the techniques that are widely used are reference books, discussions, meetings, workshops, personal conversations, questions and answers, seminars, email, intranet, mentoring, collegial supervision, bulletins, and Facebook. Some of these techniques are used relatively high. Other techniques that are used relatively low are training, WhatsApp, and tutorials. The average application of the techniques is obtained at 3.02. In line with these techniques, the techniques applied to the enhancement of explicit knowledge are presented in Figure 6.

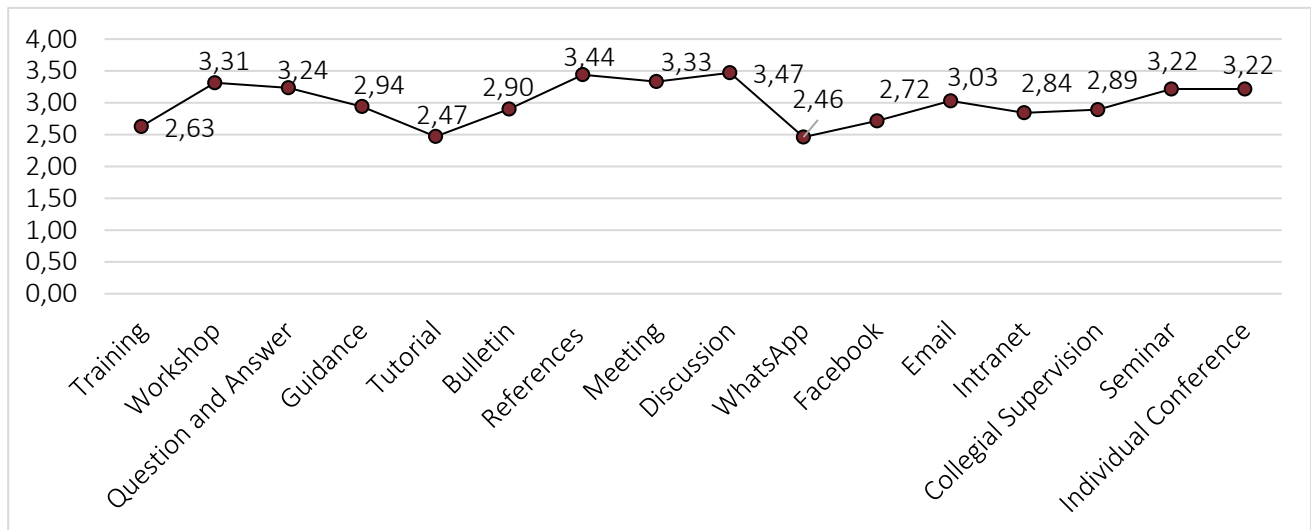


Figure 6. The Intensity of the Explicit Knowledge Enhancement Techniques in Schools

Figure 6 shows the techniques for enhancing explicit knowledge that are widely applied, are discussions, reference books, meetings, workshops, seminars, guidance, bulletins, personal conversations, emails, collegial supervision, intranet, and Facebook. Meanwhile, some techniques that are applied relatively low are training, tutorials, and WhatsApp. When examined further, there is no significant difference in the enhancement of tacit knowledge. The average strengthening obtained is 2.92. Next, the digital leadership applied by principals is presented in Figure 7.

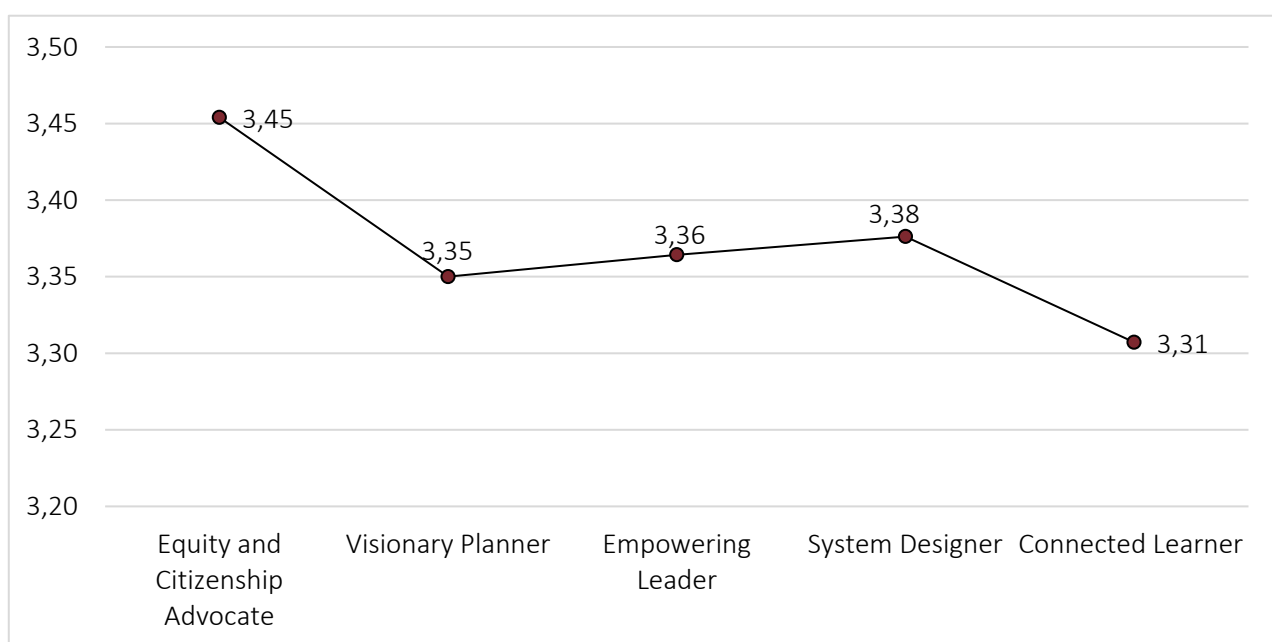


Figure 7. The Dimension of the Principal's Digital Leadership

Figure 7 shows the dimensions of the digital leadership applied by the principal. Firstly, equity and citizenship involve the principal using technology in the practice of equity among school members. The second dimension applied is system designer, which builds teams and systems to implement and develop the use of technology. This is followed by empowering a leader, who empowers members, is a visionary planner, and a connected leader, who promotes technology-based continuous learning to themselves and others.

The school organization improvement is also reviewed from five dimensions, namely the improvement program, the management of the improvement program, the members' response to the improvement program, the members' involvement in the improvement program, and the results of the improvement program. The description of the results of the five dimensions is presented in Figure 8.

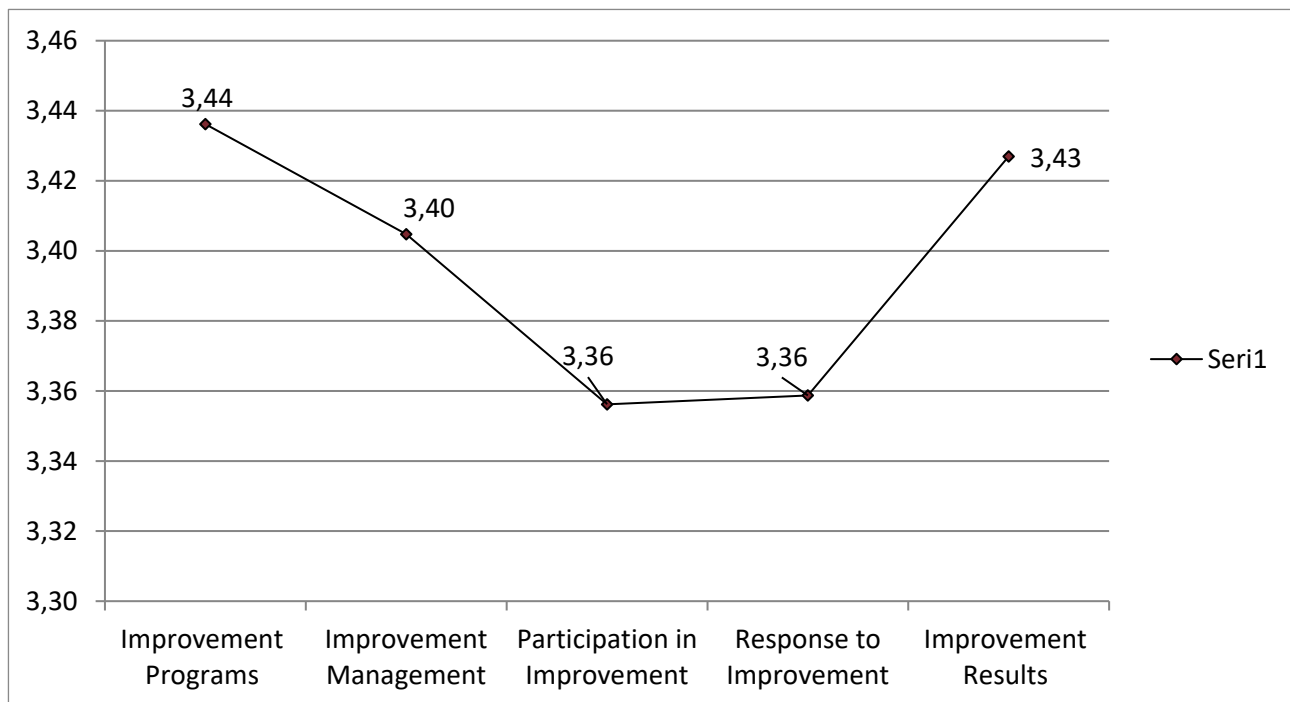


Figure 8. The Dimension of the School Organization Improvement

4.2. The Effect of the Tacit and Explicit Knowledge Enhancement on Digital Leadership and School Organization Improvement

The results of the Structural Equation Modeling analysis that examined the effect of tacit and explicit knowledge Enhancement on digital leadership showed a Goodness of Fit Index value of 0.855 and a Normed Fit Index of 0.845. This value is close to 0.9. Thus, it can be concluded that the proposed model fits the data in the field empirically (Schumacker & Lomax, 2015). The magnitude of the coefficient of the influence of exogenous variables on endogenous (gamma) or endogenous variables on endogenous (beta) is outlined in Figure 9.

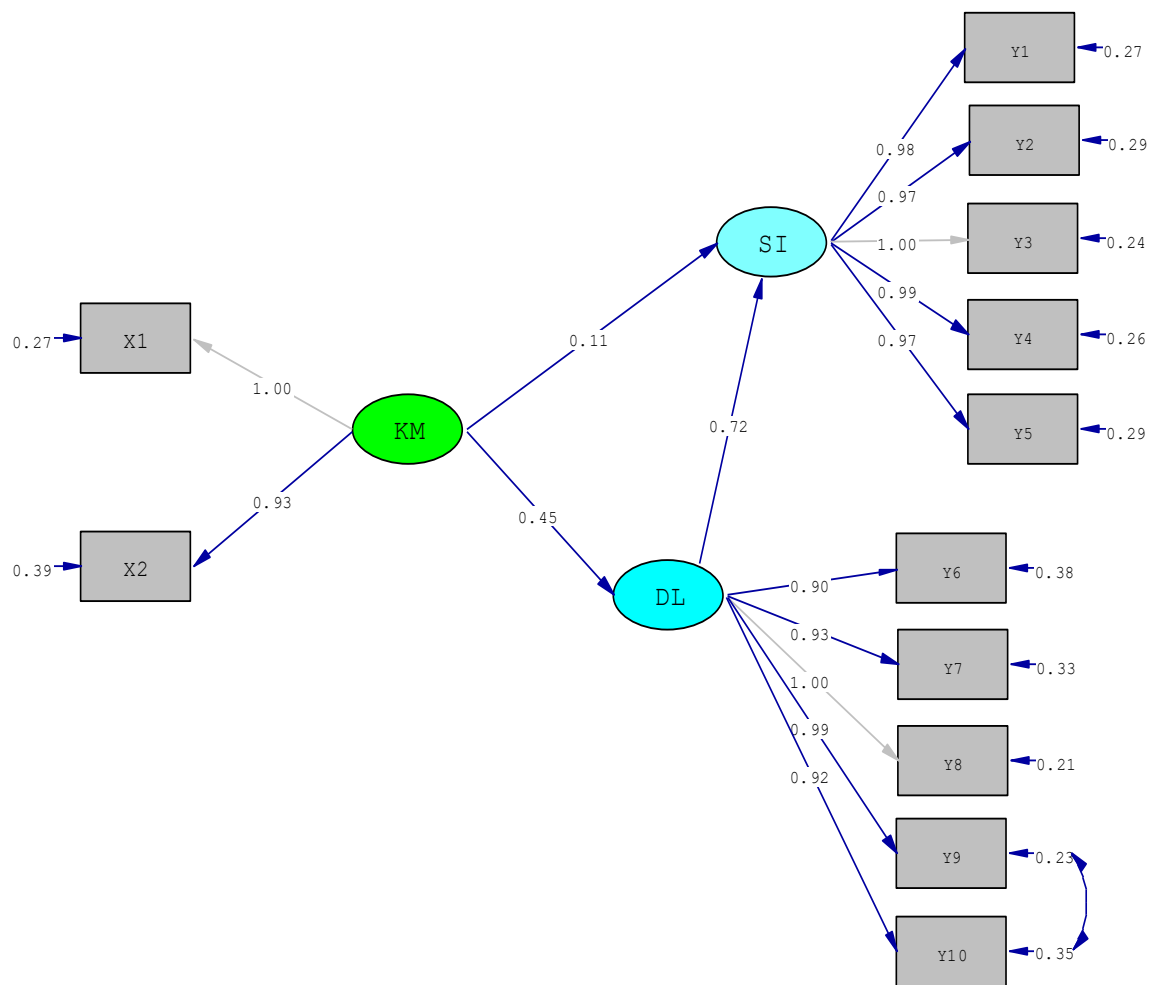


Figure 9. The Effect of the Tacit and Explicit Knowledge Enhancement on Digital Leadership and School Organization Improvement

Description

KM = Knowledge Enhancement

X1 = Tacit Knowledge Enhancement

X2 = Explicit Knowledge Enhancement

DL = Digital leadership

Y1 = Equity and Citizenship Advocate

Y2 = Visionary Planner

Y3 = Empowering Leader

Y4= Systems Designer

Y5 = Connected Learner

SI = School Organization Improvement

Y6 = Improvement Programs

Y7 = Response to Improvement Programs

Y8 = Improvement Program Management

Y9 = Member Involvement in Improvement

Y10 = Improvement Program Outcomes

Figure 9 shows that there is a strong influence of tacit and explicit knowledge enhancement on principals' digital leadership and school organization improvement, and there is a strong influence of digital leadership on school organization improvement. The coefficients of direct and indirect effects between the three variables are presented in Table 1.

Table 1. The Influence of the Variables of Tacit and Explicit Knowledge Enhancement On Digital Leadership and School Organization Improvement

Exogenous Variables	Endogenous Variables	Direct Effect	Indirect Effect	Total Effect
Knowledge Enhancement	Digital leadership	0.445		0.445
	School Organization Improvement	0.108	0.319	0.427
Endogenous Variable	Endogenous Variable			
Digital Leadership	School Organization Improvement	0.718		0.718

Table 1 shows that the direct effect of the tacit and explicit knowledge enhancement on the principal's digital leadership is quite strong, reaching 0.445. The direct effect of the knowledge enhancement on the school organization improvement is obtained at 0.108, and the indirect effect is 0.319. Thus, the tacit and explicit knowledge Enhancement has a fairly strong indirect effect through the principal's digital leadership. There is a significant direct influence of the principal's digital leadership on school organization improvement. To see the measurement model, it is necessary to examine the dimensions of support for the three exogenous and endogenous variables, which can be presented in Table 2.

Table 2. The Measurement Model of Exogenous and Endogenous Variables

Latent Variables	Observed Variables	Lambda
Knowledge Enhancement	Tacit Knowledge	0.909
	Explicit Knowledge	0.842
Digital Leadership	Equity and Citizenship Advocate	0.911
	Visionary Planner	0.897
	Empowering Leader	0.927
	Systems Designer	0.919
	Connected Learner	0.900
School Organization Improvement	Improvement Programs	0.848
	Response to the Improvement Programs	0.875
	Management of the Improvement Programs	0.943
	Involvement of Team Members	0.932
	Results of the Improvement Programs	0.868

Table 2 shows that the lambda value is > 0.7 for all dimensions of the variables studied, both exogenous and endogenous variables. Thus, the variables studied have good loading factors. Therefore, it can be concluded that all factors or dimensions support the variable constructs studied. When viewed in terms of the Enhancement techniques used, it shows different results. In general, the coefficient of the variable relationship of tacit knowledge-enhancement techniques to the principal's digital leadership and school organization improvement is presented in Table 3.

Table 3. The Correlation Coefficient of the Tacit Knowledge Enhancement Techniques with The Principal's Digital Leadership and School Organization Improvement

No	The Tacit Knowledge Enhancement Techniques	The Digital Leadership	The School Organization Improvement
1	Individual Conference	0.514*	0.496*
2	Workshops	0.476*	0.469*
3	Guidance	0.471*	0.444*
4	Training	0.464*	0.350*
5	Questions and Answers	0.457*	0.400*
6	Journals	0.423*	0.430*
7	Reference Books	0.414*	0.439*
8	Meetings	0.401*	0.412*
9	Collegial Supervision	0.362*	0.421*
10	Tutorials	0.326*	0.297*
11	Intranet	0.309*	0.413*
12	Emails	0.305*	0.403*
13	Facebook	0.268*	0.291*
14	WhatsApp	0.268*	0.240*
15	Discussions	0.243*	0.263*
16	Seminars	0.182	0.294*

Table 3 shows that to strengthen the tacit knowledge, the technique that gives the strongest influence on the principals' digital leadership is individual conference, followed by workshops, guidance, training, questions and answers, journals, books, meetings, collegial supervision, tutorials, intranet, email, Facebook, WhatsApp, and discussions. As for explicit knowledge, it is outlined in Table 4.

Table 4. The Correlation Coefficient of the Explicit Knowledge Enhancement Techniques with The Principal's Digital Leadership and School Organization Improvement

No	The Explicit Knowledge Enhancement Techniques	The Digital Leadership	The School Organization Improvement
1	Workshops	0.519*	0.482*
2	Questions and Answers	0.477*	0.443*
3	Reference Books	0.437*	0.475*
4	Collegial Supervision	0.423*	0.452*
5	Training	0.417*	0.338*
6	Journals	0.397*	0.385*
7	Meetings	0.385*	0.436*
8	Guidance	0.373*	0.391*
9	Discussions	0.367*	0.416*
10	Emails	0.346*	0.343*
11	Facebook	0.318*	0.318*
12	WhatsApp	0.263*	0.259*
13	Tutorials	0.255*	0.278*
14	Intranet	0.230*	0.319*
15	Seminars	0.156	0.235*
16	Individual Conference	0.156	0.235*

Table 4 shows that to strengthen explicit knowledge, the techniques that have the strongest influence on the principals' digital leadership are workshops, questions and answers, books, collegial supervision, training, journals, meetings, guidance, discussions, emails, Facebook, WhatsApp, tutorials, intranet, seminars, and individual conferences. Based on the two analysis results, it can be underlined that there are differences in the effectiveness of techniques in the enhancement of tacit and explicit knowledge. For example, personal conversations are suitable for reinforcing tacit knowledge, but it is less effective for reinforcing explicit knowledge.

5. Discussion

The purpose of this study is to examine the enhancement of tacit and explicit knowledge as part of improving knowledge management in organizations, focusing on the principal's digital leadership and school organization improvement. The results show that there is a significant effect of enhancement of the tacit and explicit knowledge on the principal's digital leadership, with a moderately high coefficient. The higher the enhancement of the tacit and explicit knowledge, the higher the principal's digital leadership. The results of the study are in line with the previous research (Shafique et al., 2023), which shows that there is a strong prediction coefficient between knowledge-oriented leadership and tacit and explicit knowledge-sharing behaviors. The results of the research

(Kho et al., 2020) also show that there is a strong correlation between digital leadership styles and knowledge-based empowering interaction for increasing organizational innovativeness.

On the other hand, transformational leadership significantly affects tacit and explicit knowledge sharing, but transactional leadership encourages hidden tacit and explicit knowledge sharing (Vaca et al., 2017; Zahoor et al., 2024). Thus, the relationship between the enhancement of tacit and explicit knowledge and leadership is not always significant, depending on the leadership style applied. The Enhancement of tacit and explicit knowledge shows a strong influence on digital leadership that emphasizes information sharing.

The second research finding shows that there is a significant direct effect of the enhancement of tacit and explicit knowledge on the school organization's improvement, and there is an indirect effect of both knowledge through the principal's digital leadership. When examined, the indirect effect is stronger than the direct effect. This finding is in line with the previous research that shows a significant effect of the enhancement of tacit and explicit knowledge on organizational development. Developing an organization requires the implementation of both knowledge by leadership. In addition, leaders use tacit and explicit knowledge for organizational change (Gamble, 2020). As a result, tacit knowledge management has a significant effect on organizational Performance (Muthuveloo et al., 2017).

When examined further, the magnitude of the influence coefficient is higher for indirect influence through digital leadership than for direct influence. This shows that the enhancement of tacit and explicit knowledge does not automatically have a positive impact on organizational improvement, but coordinating behavior is needed so that it has a positive effect on organizational development. Some studies show that knowledge creation or knowledge sharing depends on the leadership behavior of the leader (Awan & Ather, 2024). Thus, there is a reciprocal relationship between leadership and knowledge sharing. The enhancement of tacit and explicit knowledge is also influenced by leadership behavior in the implementation or development of the organization (Sharif et al., 2023; Taylor et al., 2015).

The third finding shows that there is a significant positive effect of digital leadership on school organization improvement. The findings of this study corroborate several previous research results, that the principal's digital leadership has a positive effect on the effectiveness of the school organization (Wiyono et al., 2023). Digital leadership affects organizational innovation (Benitez et al., 2022). The higher the principal applies digital leadership, the higher the change or improvement of the school will be. The fourth finding shows that some tacit and explicit knowledge-enhancement techniques have a strong correlation with school organization improvement, but some other techniques have a low coefficient, and some are even insignificant. It shows that not all tacit and explicit knowledge-enhancement techniques are effective for developing school organizations. There are even differences in the significance of the effect of enhancing the tacit and explicit knowledge. Some techniques that emphasize in-depth communication, such as personal conversations, are effective for the enhancement of the tacit knowledge that tends to be stored in each person. Some other techniques that emphasize personnel activeness show a more dominant influence, such as workshops, questions and answers, training, guidance, and collegial supervision, as well as the use of reference books. The technique that emphasizes fewer participants' activity has less significant effects, such as seminars. This finding is in line with the research that shows individualized supervision techniques can increase personnel motivation, and group supervision techniques can improve personnel performance (Wiyono, Widayati, et al., 2022). In addition, the use of information technology in the process also improves the results achieved (Wiyono, Kulidtod, et al., 2022; Wiyono, Supriyanto, et al., 2021; Wiyono, Valdez, et al., 2021).

The fourth result shows that the dimension of knowledge enhancement, the main one, is tacit knowledge. This shows that strengthening tacit knowledge, which is still in human resources, is an essential dimension in the organization. The results of the analysis of the implementation of tacit and explicit knowledge-strengthening techniques also show that the average is still at a sufficient level. This shows that the knowledge management implemented by schools is still not optimal. This finding is in line with several previous research results. The use of information technology in knowledge management is also still relatively poor (Eftekharzade & Mohammadi, 2011). Knowledge management is crucial for driving innovation, developing new products, and enhancing organizational performance (Mubarak et al., 2025; Ngoc Huynh et al., 2024; Sobaih et al., 2025). For this reason, an effective model is needed to manage knowledge, based on the development of modern science and existing culture (Celino et al., 2025; Terán-Bustamante et al., 2025). Knowledge management and information science are integrated in generating innovation (Bruxvoort, 2025). Knowledge management mediates innovation technology to enhance organizational excellence (Nyuga & Tanova, 2024). The results of this study are in line with the findings of this study.

The fifth finding indicates that the dimension of digital leadership, the dominant dimension, is empowering leaders. This shows that the empowerment of human resources needs to be the main concern in implementing digital leadership. This finding is in line with several previous research results. Previous research results show that the main digital leadership is the ability to utilize its resources, not only the completeness of the technological tools (Kafa, 2025). If human resources have good technological competence, it will drive the progress of the organization. Therefore, empowering human resources is the main thing in implementing digital leadership. The high involvement of human resources in management influences employee digital performance (Wang et al., 2024). The more human resources are involved and empowered in management, the higher the digital competence of members.

The sixth study result shows that the dominant dimension in improving school organizations is the management of improvement programs. This finding strengthens previous research that management is the main factor that determines organizational achievement (Wiyono, 2017). Human resource management influences the innovation behavior of members (Yang & Li, 2023). Therefore, the management of improvement programs is the main dimension in improving school organizations. The better the management of school improvement programs, the higher the achievement of school renewal programs. It also has an impact on leadership behavior. Leadership behavior influences organizational change management (Jinga et al., 2024).

Based on the findings of previous studies, the position of the current research can be highlighted as sides. On the one hand, it reinforces earlier findings. On the other hand, it generates new insights. This study confirms previous research that there is a strong relationship between leadership, both tacit and explicit knowledge sharing, and organizational performance and culture, both directly and indirectly (Hoang & Le, 2024; Shafique et al., 2023; Vaca et al., 2017). Several new findings indicate that leadership may also serve as a mediating variable in the relationship between knowledge sharing and school organizational performance and development. This suggests the presence of a reciprocal relationship between knowledge sharing and leadership. As the effectiveness of leadership behavior increases, the level of knowledge sharing within the organization also improves. Conversely, enhanced knowledge sharing within the organization contributes to more effective leadership practices. Leadership can act as a significant mediating variable in the influence of knowledge sharing on organizational performance and innovation. Conversely, knowledge sharing may also serve as a significant mediating variable in the influence of leadership on organizational performance and culture (Berraies et al., 2020; Lei et al., 2021; Lei et al., 2023).

Another novelty of finding of this study lies in the effectiveness of various tacit and explicit knowledge sharing techniques, which showed differing coefficient values. Some techniques were

found to have a significant impact on enhancing principals' digital leadership, while others demonstrated a less dominant effect on both digital leadership and school organizational development. These findings contribute to the development of supervisory techniques for coaching and improving principals' leadership competencies, indicating that the effectiveness of such techniques varies, whether applied directly or indirectly, individually or in group-based contexts (Wiyono et al., 2022; Wiyono, Rasyad, et al., 2021). Thus, the findings of this study enrich the theory of supervision for the development of principals' competencies.

Another novelty contribution of this study lies in its examination not only of leadership behavior theories but also of their integration with digital technology. The findings support and extend existing theories by demonstrating that leadership behavior and organizational change are increasingly interconnected with the advancement of information technology. To implement effective leadership and drive organizational development or transformation, alignment with the current evolution of information and communication technology is essential (Wiyono et al., 2023).

6. Conclusion

The enhancement of tacit and explicit knowledge in knowledge management has a positive effect on the principal's digital leadership. The higher the sharing of tacit knowledge and explicit knowledge, the higher the principal's digital leadership. There are five main dimensions of digital leadership, namely equity and citizenship advocate, visionary planner, empowering leader, systems designer, and connected learner. The findings of this study corroborate and develop previous studies further.

The tacit and explicit knowledge enhancement also has a direct effect on the school organization's improvement and an indirect effect through the principal's digital leadership. The indirect effect of the enhancement of the tacit and explicit knowledge is higher than the direct effect. This is because the utilization of tacit and explicit knowledge depends a lot on the principal's leadership. There is a reciprocal relationship between tacit and explicit knowledge enhancement and leadership behavior. There are five dimensions found in the school organization improvement, namely the improvement program, the response to the improvement program, the management of the improvement program, the involvement of members in the improvement program, and the results of the improvement program. These findings corroborate and expand on the previous research results.

There are several techniques used in tacit and explicit knowledge enhancement that have a significant effect on the principals' digital leadership and school organization improvement. There are group and individual techniques, some of which are direct and others indirect. Individualized techniques for tacit knowledge enhancement have a stronger effect on the principals' digital leadership and school organization improvement. Whereas, techniques that emphasize activeness to strengthen tacit and explicit knowledge have a strong effect on the principals' digital leadership and school organization improvement.

One limitation of this study is that the measurement of research variables relied on a single data source, namely, teachers. According to theoretical perspectives, there are several methods for assessing leadership, knowledge sharing, and organizational development, including self-rating, subordinate rating, peer rating, and performance-based outcomes (Hughes et al., 2015). This choice was based on the consideration that teachers, as subordinates, tend to be more objective and better understand the leadership behavior demonstrated by school principals and the organizational conditions they experience. Administering questionnaires that solicit responses from teachers as subordinates can provide deeper and more accurate insights into leadership practices and organizational development (Hughes et al., 2015; Ubben et al., 2001, 2015). Geographically, this

study was conducted in East Java, Indonesia. Therefore, the findings may be generalized to populations with characteristics similar to the accessible population targeted in this study.

7. Suggestion

The findings of this study indicate that the enhancement of knowledge influences organizational development through the implementation of digital leadership. Strengthening tacit and explicit knowledge has a significant effect on the digital leadership of the principal as the mediator variable. The principals' digital leadership has a significant effect on the improvement of the school organization. This is the novelty of this study. Workshops, questions and answers, reference books, collegial supervision, and training are effective techniques of explicit knowledge enhancement. Individual conferences, workshops, guidance, training, questions and answers, journals, reference books, and meetings are effective techniques for explicit knowledge enhancement. The techniques can be classified into two categories, namely direct and indirect techniques. Workshops, questions and answers, collegial supervision, training, individual conferences, guidance, and meetings are the direct techniques, and reference books and journals are the indirect techniques. To increase knowledge in an organization, it is necessary to apply these techniques. By increasing knowledge, we will be able to develop school organizations effectively. The limitation of this research is that it has not explored the implementation process of each technique in depth. Therefore, this can be used as a consideration for conducting further research.

Declarations

Author Contributions. Bambang Budi Wiyono: Writing – review & editing, Writing – original draft, Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization, Project administration. Ahmad Yusuf Sobri: Resources, Investigation, Project administration. Burhanuddin: Resources, Investigation. Khalip Musa: Investigation, Data curation, Project administration. Mochamad Pahlevi: Investigation, Writing - review.

Conflicts of Interest. The authors declare that they have no potential conflict of interest in the study.

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Ethical Approval. The protocol of this study was approved by the Research Ethics Committee of Universitas Negeri Malang. Informed Consent was obtained from all the participants involved in the study. The respondents were reassured that their participation was voluntary, and the study design assured adequate protection of study participants.

Data Availability Statement. All data generated or analyzed during this study are included in this published article and are available from the corresponding author upon reasonable request.

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About the Contributor(s)

Bambang Budi Wiyono is a Professor in Education and Dean of the Faculty of Education at Universitas Negeri Malang, Indonesia, from 2014 to 2022. He has conducted many studies on educational management and leadership, supervision, teaching and learning, and assessment. He has also authored books and published many articles in international journals on these topics.

Email: bambang.budi.fip@um.ac.id

ORCID: <https://orcid.org/0000-0001-8351-5453>

Ahmad Yusuf Sobri is a Doctor in Educational Management. He is the Dean of the Faculty of Education of Universitas Negeri Malang Indonesia, period 2022 to 2027. He is an active professional in the field of educational management and leadership. He also authored many books and published some articles in international journals on these topics.

Email: ahmad.yusuf.fip@um.ac.id

ORCID: <https://orcid.org/0000-0002-2334-5736>

Burhanuddin is a Professor in Educational Leadership. He was the Vice Dean of Personnel and Finance Affairs of the Faculty of Education of Universitas Negeri Malang Indonesia, period 2004 to 2010. He is an active researcher in the field of educational management and educational leadership. He authored many books on these topics as well. He also published some articles in some international journals.

Email: burhanuddin.fip@um.ac.id

ORCID: <https://orcid.org/0000-0002-7389-5138>

Khalip Musa is a Professor in Educational Management. He has been Head of Educational Management at the Faculty of Management and Economics of Sultan Idris Education University, Malaysia. He is an active researcher in the field of educational management and leadership. He authored many books and published some articles in international journals on these topics as well.

Email: khalip@fpe.upsi.edu.my

ORCID: <https://orcid.org/0000-0002-9285-6046>

Mochammad Fahlevi is a Doctor in Management. He is a lecturer at Binus University Indonesia. He is an active researcher in the field of management and leadership. He published many articles in international journals on these topics as well.

Email: mochammad.fahlevi@binus.ac.id

ORCID: <https://orcid.org/0000-0002-1419-8308>

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