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Exploratory study of factors affecting problem-solving competence among school administrators in Vietnam during the digital era

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Abstract

This study aims to identify the extent to which the staff believes the factors influencing problem-solving competencies among school administrators and to relate these beliefs to the perceived problem-solving competence of the administrators based on the perceptions among staff. This study designed a survey method that involved 731 teachers and administrators from various schools in the Central and Highlands areas, Ho Chi Minh City and the Southeast and Southwest Regions in Vietnam to accomplish these purposes. Structural equation modeling in the data analysis yields a robust model fit advocated by the socio-psychological theory of belief-behavior linkage. The conclusion is that the internal environment and the efforts made to develop science, technology and international collaborations have a significantly positive relationship in explaining the problem-solving competency of school administrators. However, the existing state of the external environment severely affects the problem-solving ability of school administrators. Improvements must be made to the facilities and equipment of the schools, the working conditions and the financial resources. Theoretical implications include environment-person fit, resource-based advantage, and development psychology which broaden the understanding of problem-solving abilities. School administrators should have a practical framework emphasizing the internal and external environments and procedural and investment-focused qualities.

Keywords: Beliefs, Education management, Problem-solving competence, School administrators, Socio-psychological theory, Vietnam.

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Contents

Contribution of this paper to the literature

This study uses the socio-psychological theory of belief behaviors to better understand school administrators' problem-solving abilities. The study also highlights a broader theoretical implication for environment-person fit, development psychology and resource-based advantage. The emphasis on the belief structure demonstrates a broad socio-technical perspective.

1. Introduction

At the center of improving educational quality in primary and secondary schools is the ability to manage the academic institution which involves the problems that arise (Donkoh et al., 2023). Nevertheless, the problems are never straightforward in primary and secondary schools which take wide variations such as students' performance (Salifu & Kala, 2024), students' depression (Hu et al., 2024), psychological well-being (Tommasi et al., 2022), mental health problems in children (Idowu et al., 2024) and students' adaptability and learning during the transition from primary to lower secondary school (Metsäpelto et al., 2017). In addition to matters concerning children, there are also concerns about infrastructure such as the air quality of classrooms (Bernardi & Keivabu, 2024), school bullying (Yang & Lu, 2024), parents' educational needs (Lebel, Aita, Landry, Martel, & Hamel-Hilaréguy, 2024) and teachers. For teachers, there are issues of emotions in teaching (Tarantul & Berkovich, 2024) the types of competencies of teachers in the Internet era (Yao et al., 2023) and how teachers communicate or have dialogues with the students (Muhonen et al., 2024) that the schools need to address. Schools find that they can have long-term consequences without solving these problems (Beatson et al., 2023).

To resolve these issues, schools' management teams or administrators play a critical role as they are caretakers and decision-makers of educational policies (Sirisookslip, Ariratana, & Ngang, 2015) which involve school food policy (Matela, Yadav, & Menon, 2024) and sustainable school transport policy (Chaudhry & Elumalai, 2024). Perez and Uline (2003) noted that "problem-solving lies at the heart of educational administrators." They argue for a need to offer a problem-solving perspective to studying school administrators. Accordingly, the problem-solving competencies of school administrators become essential (Palanci & Okutan, 2010) and their problem-solving proficiency can contribute significantly to corporate reputation (Akıllı, 2023).

A ScienceDirect.com and Emerald database search shows negligible publications relating to the problem-solving competency of school administrators. Perez and Uline (2003) advocate that educational leaders are problem solvers; thus, focusing on a problem-solving perspective on school administration is essential. Visone (2018) identified the importance of learning from one another in contributing to the problem-solving of school administrators using a one-group pre-and post-tests design. Thus, understanding the problem-solving competency of school administrators in primary and secondary schools becomes critical, both for contributing to the extant literature in aspects of practical and theoretical gaps. To close these gaps, this study approaches the aspect of belief-behavior linkage as research in, for instance addressing and closing these gaps can significantly improve public health clinicians' quality (Townsend-Chambers, Powers, Coffman, Okoro, & Robinson, 2022) resolve alcohol use problems (Baumann et al., 2015) and suggest strategies to improve consumption and pro-environmental supports of the consumers (Khan & Abbas, 2023). The school administrators are responsible for the following functions and tasks: Determining the directions and goals of school development, developing the school's strategic plan; mobilizing, arranging and using resources effectively; forecasting changes and drawing up school development plans, building information systems, establishing regulations, rules, and working conditions, creating a working environment and evaluating performances. To accomplish these tasks, school administrators need to be equipped with an appropriate system of competencies and qualities. Therefore, studying the influencing factors on the problem- solving competence of school administrators in the digital era is important and necessary. Accordingly, the purpose of this study is twofold: First, to identify the extent to which the school staff believes the factors influencing problem-solving competencies among school administrators, and second, to relate these beliefs to the perceived problem-solving competence of the school administrators based on the perceptions among school staff. This study raises three key questions to address these objectives:

1. What factors influence the problem- solving competencies?
2. What is the level of impact on the problem -solving competencies of these factors?
3. What factors have a profound impact on the school administrators' problem- solving competencies?

2. Literature Review

Problem-solving competence is significant for individuals and professionals alike as they face various challenges in life, careers and organizations that necessitate their attention and resolution (Seguin, 2003; Veríssimo, Pereira, Fernandes, & Martinho, 2024). There needs to be a unanimous consensus regarding the specific types of factors that impact problem-solving competence and the precise manner in which these factors exert their influence given the intricate nature of the challenges and problems that individuals must confront and overcome. Problem-solving competence is a highly situational phenomenon that depends on the types of organizations, leadership, industries and societies in which an organization is situated. For instance, in a software development context, the programming contents evolve with the advancement of technologies, industry types, societies, and as a result, inter-organizational and intra-organizational knowledge sharing becomes critical (Ajimati, Whelan, Aalbers, Morgan, & van Kranenburg, 2022). A similar trend of problem-solving competence which indicates generalization of concepts is indicated in Burmeister, Alterman, Fasbender, and Wang (2022) who advocate using social network theory that software developers who utilize their social networks to obtain advice and address knowledge or experience gaps to solve problems deliver better results.Lin, Chen, Hsu, and Fu (2015) argue that team knowledge is critical to developing and leveraging problem-solving competence without a particular contextual focus. Ajimati et al. (2022) emphasize the importance of contact quality which refers to employees' positive and cooperative interactions with peers of similar status to help them derive socioemotional significance in the workplace and improve insights in problem-solving. Others resolve to use novelties and technology to help them improve problem-solving competence such as an online game-based escape room approach that adds enjoyment to the learning experience, facilitating undergraduate students' problem-solving competence (Yang, Chang, & Jen, 2023).

The need for more research on the variables influencing school administrators' problem-solving abilities in the digital era in Vietnam inspired this study. Problem-solving competence among school administrators is defined as a specialized system of abilities, cognitive and affective skills and behaviors to close the gap between an existing state and a desired state, limited to school administration (Lin et al., 2015). This study offers ways implied by the examined factors to foster problem-solving skills which are vital for tackling the complexities of the 21st century (Lu & Xie, 2024). At the same time, the study recognizes that problem-solving processes, i.e., problem exploration, problem representation, and knowledge use (Salmon-Mordekovich & Leikin, 2023; Santos-Trigo, 2024) and the factors that influence problem-solving competence should be studied more. Thus, this study contributes to the growing research interest in problem-solving competence by targeting the factors influencing problem-solving competence and generating implications for school administrators in Vietnam.

This study approaches the theoretical lens of the belief-behavior linkage to understand the problem-solving competency situation in Vietnam's primary and secondary schools. A careful examination of the socio-psychological theory of behavior notes a linkage between belief and behavior such as in the theory of planned behavior (Al Mamun et al., 2024; Bélanger et al., 2023) with application in understanding consumer acceptance of innovative products and services (Razi-ur-Rahim, Uddin, Dwivedi, & Pandey, 2024) and students' practices (Cardoso et al., 2021). For instance, Wong, Pittig, and Engelhard (2024) show that "safety behaviors are responses that can reduce or even present an expected threat." Beliefs can inspire people to allocate resources and take essential measures to achieve their goals whether held by an individual or a group (Jankowski & Job, 2023) collectively shape individuals' subjective norms, and motivate them to change their perceptions, emotions and thoughts (Green, Shaw, & Kessler, 2023; Min & Tan, 2022). Thus, this study attempts to address problem-solving. The theoretical model is shown in Figure 1.

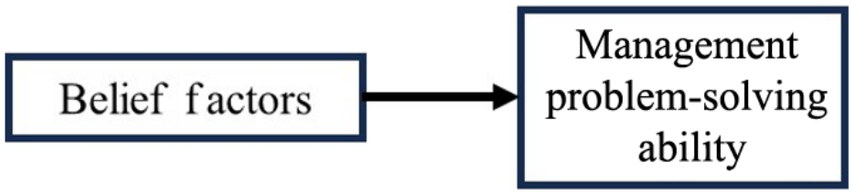

Figure 1. The theoretical model.

Furthermore, empirical evidence has demonstrated that self-efficacy beliefs (Artino, 2012) and motivational beliefs substantially influence creative problem-solving (Martinsen & Furnham, 2019) and students' ability to solve advanced mathematics (Hoffman, 2010).

3. Method

This study aims to address the belief-competency behavior linkage using a survey-based method due to a lack of substantial empirical and theoretical knowledge from existing literature relating to understanding the problem-solving competency of school administrators in primary and secondary schools.

3.1. Survey Sample Selection

This study used a deliberate methodology for selecting samples to achieve both convenience and representativeness. The selection of the sample was based on criteria such as accessibility and the ability to quickly reach respondents to ensure a thorough representation of different regions in the southern part of Vietnam. The areas encompassed consist of the Central region and Central Highlands (96 individuals accounting for 13.1% of the total), the Southeast region (101 individuals representing 13.8%), the Southwest region (128 individuals, making up 17.5%) and Ho Chi Minh City (406 individuals comprising 55.5%). This strategic selection method offers insights that accurately represent the many issues school administrators face in the digital age across various geographical contexts.

The information of the schools' names where data was collected as follows: (1) Central Region and Central Highlands: Phan Boi Chau High School , Ba Ngoi Primary School (Khanh Hoa Province), Nguyen Hue High School , Nguyen Viet Xuan High School (Lam Dong province). (2) Southeast Region: Tan Thanh High School, Đoan Thi Diem Primary School and An Binh B Primary School (Binh Duong Province). (3) Southwest Region: Huynh Man Đat High School , Kien Luong Primary School (Kien GiangProvince) and (4) Ho Chi Minh City: Bui Thi Xuan High School , Ha Huy Tap High School , Thoi Tam Primary School and Me Linh Primary School.

3.2. Questionnaire Design

A Vietnamese-language research questionnaire that was created to make the survey participants' lives easier and more convenient served as the study's data gathering tool. The theoretical underpinnings of educational administration (Al Mamun et al., 2024; Bélanger et al., 2023; Cardoso et al., 2021; Wong et al., 2024) and the factors influencing school administrators' problem-solving abilities were investigated to design the questionnaire. The soundness and consistency of the survey were based on the following procedures: 1) Employing open-ended questions to gather information and gain comprehension of survey participants. 2) Gather, choose, and organize the gathered information or issues into categories. 3) Perform an experiment by disseminating the research questionnaire to 10 participants who share comparable situations. 4) Utilize SPSS software to perform an analysis and determine reliability by calculating Cronbach's alpha coefficient. The Cronbach's alpha reliability coefficient analysis yielded a result of 0.926 while the Cronbach's alpha if the item was deleted ranged from 0.913 to 0.918 on a pre-test basis. Therefore, the constructed scale has been proven statistically significant and achieved the required reliability coefficient. Accordingly, the theoretical parts of the questionnaires were revised as shown in Appendix 1.

The questionnaire has two parts: Part one consists of questions about the demographic profile of the respondents, including their gender, age, qualifications, employment position and work experience. Part two consists of the research questions which encompass 20 factors that are categorized into three groups. These groups

include (1) factors about school administrators (consisting of six elements). (2) Factors related to the characteristics of schools and pedagogical teams (consisting of 5 elements) and factors associated with the working environment, mechanisms, policies and school regulations (consisting of 9 elements). The data was interpreted based on the following criteria: The scale ranges from 1 to 5 with 1 representing meager influence, 2 representing low influence, 3 representing medium influence, 4 representing high influence, and 5 representing very high influence. The distance value between each point on the scale is calculated as (maximum –minimum)/n = (5-1)/5 = 0.8. This value helps to interpret the meaning of the criteria used to explain the average value based on the content of the survey questions. The range of values from 1.00 to 1.80 indicates a shallow level of influence. A range of values from 1.81 to 2.60 indicates a low level of influence. A range of values from 2.61 to 3.40 indicates a medium level of influence. A range of values from 3.41 to 4.20 indicates moderate influence. Finally, a range of values from 4.21 to 5.00 indicates a very high level of influence. Table 1 presents the scale details.

Table 1. Guidelines for interpreting the surveyed data.

Score/Level	Expression	Likert scale range
1	Meager influence	1.00–1.80
2	Low influence	1.81–2.60
3	Medium influence	2.61–3.40
4	High influence	3.41–4.20
5	Very high influence	4.21–5.0

3.3. Data Analysis

This study first examines exploratory factor analysis to confirm the construct's one-dimensionality and determine the total variance explained to establish construct validity and reliability. Next, it evaluates factor loadings exceeding the 0.60 threshold (Hair, Black, Babin, Anderson, & Tatham, 2006). Cronbach's alpha coefficient which at least crossed the 0.70 threshold (Hair et al., 2006) and the convergent and discriminant validity of the constructs (Holden & Fekken, 1993). Additionally, this study employed the structural equation modeling (SEM) method regarding objective two (Fan, Thompson, & Wang, 1999; Hair et al., 2006).

4. Results

The number of samples is 731 school staff, including school administrators and teachers of the various schools in the Central and Highlands regions, the Southeast region, the Southwest region and Ho Chi Minh City in Vietnam. The survey sample includes respondents with relatively diverse localities, genders, job positions and training levels as shown in Table 2.

Table 2. Information of the research sample content.

Contents		Frequency	Percentage (%)
Gender	Male	206	28.2
	Female	525	71.8
Training level	Bachelor	566	77.4
	Postgraduate diploma	149	20.4
	Another level	16	2.2
Job position	Principal or vice principal	102	13.9
	Block leader	267	36.7
	Teacher	346	47.3
	Other position	16	2.2
Local	Central and Highlands region	96	13.2
	Southeast region	101	13.8
	Ho Chi Minh city	406	55.5
	Southwest region	128	17.5

The data shows that the educational workforce primarily comprises females who comprise the majority of school administrators and instructors at a significant 71.8%. In comparison, males make up the remaining 28.2%. When analyzing the job positions, the statistical breakdown reveals that 13.9% of the respondents occupy positions as principals or vice principals, 36.5% are block leaders, 47.3% are teachers, and 2.2% are involved in miscellaneous jobs.

The majority of 77.4% hold a bachelor's degree which fulfills the requirements set by the national standards for the schools in Vietnam regarding the educational qualifications of school administrators and teachers. In addition, 20.4% of individuals have achieved a postgraduate diploma. The significant level of academic achievement enables school administrators and instructors to have a strong basis, permitting them to handle the increasing needs and standards of general education efficiently.

Most participants (55.8%) are located in Ho Chi Minh City. The remaining participants are dispersed throughout the Central and Highlands regions accounting for 13.2% of the total, the Southeast region accounting for 13.8% of the total and the Southwest region accounting for 17.5% of the total including a wide range of geographical locations guarantees a thorough comprehension of the difficulties school administrators and teachers encounter in different settings.

Although the qualifications and geographic distribution are excellent, there is a pressing worry regarding the perennial problem of overcrowded schools in metropolitan areas which is particularly obvious in Ho Chi Minh City. This ongoing problem characterized by excessive classes, students and students per class significantly increases the workload for school administrators and teachers. Therefore, this circumstance presents a significant obstacle to the problem-solving ability of school administrators to manage these intricate and demanding educational settings.

The school administrators and teachers have a collective range of 5-20 years of professional experience. Over several years, school administrators and teachers have gained the essential skills and expertise needed for their work. They have also had the chance to enhance their professional activities (see Figure 2).

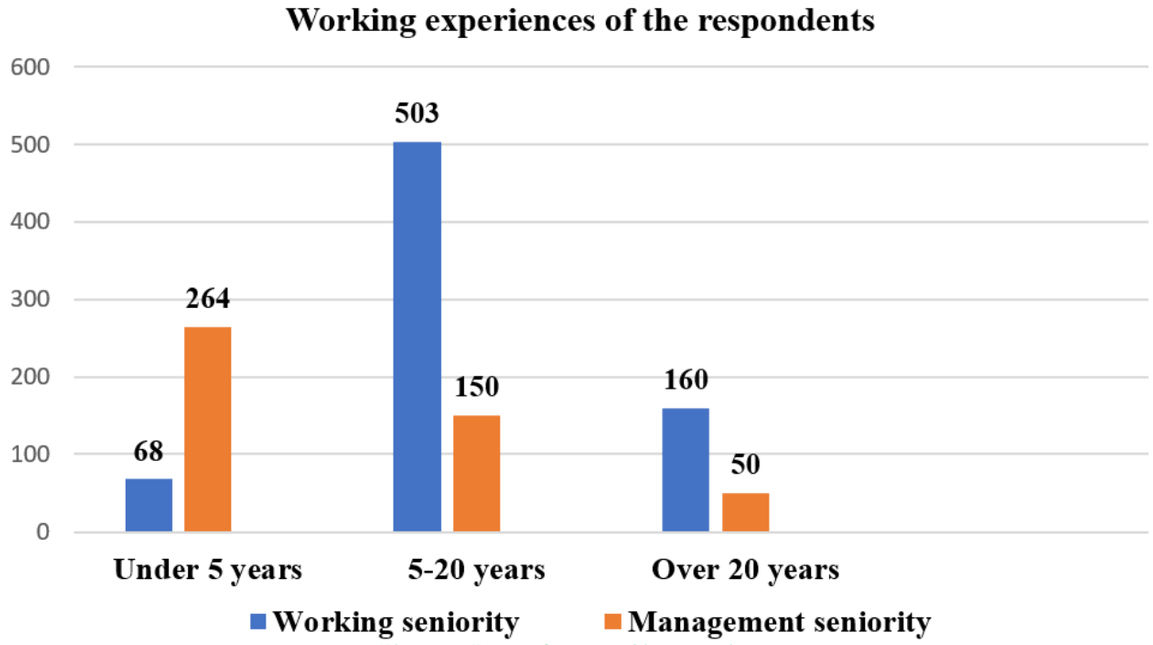

Figure 2. Respondents' working experiences.

The age distribution among school administrators and teachers is somewhat varied with the majority between the ages of 30 and 50 making up 61.9% of the total. Moreover, the proportion of individuals under 30 is 33.8%, exceeding that of those over 50 which is 4.3%. The result indicates a very even distribution of age groups with a predominantly young workforce. This creates favorable conditions for schools to promote sharing experiences and mutual support among educators as shown in Figure 3.

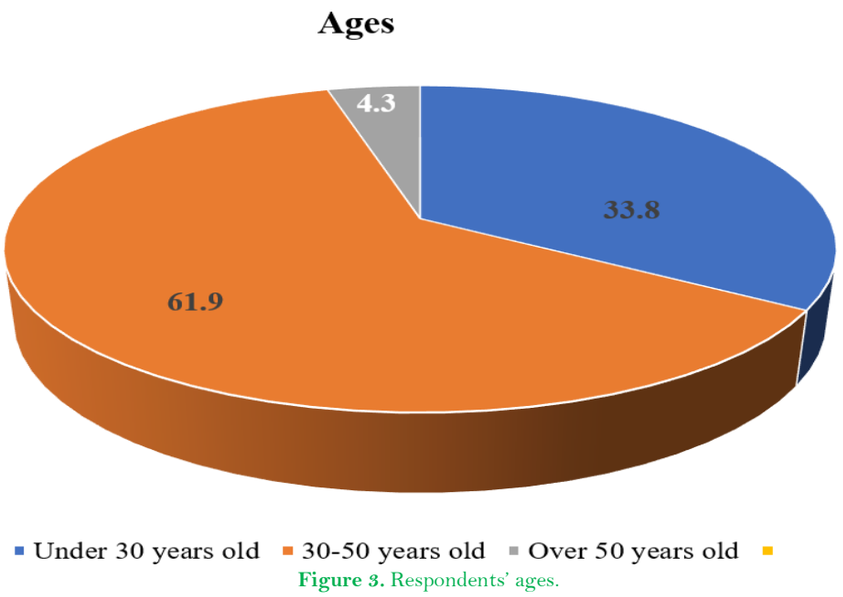

Figure 3. Respondents' ages.

Before assessing the structural equation modeling (SEM), the study subjects the questionnaire design to the reliability, convergent and discriminant assessments shown in Table 3. The results show that the square roots of the total variance explained (TVE) at the diagonal matrix on the right most 3X3 matrix are in value exceeding the cross-correlations. The result offers robust evidence on discriminant validity (Hair et al., 2006; Holden & Fekken, 1993). In addition, with the loading factors of V1, V2, and V3 exceeding the 0.70 threshold and reliability (Cronbach's alpha) more than the 0.80 threshold, and TVE exceeding 0.60, the study also concludes convergent validity (Hair et al., 2006).

Table 3. Reliability, convergence and discriminant validity.

Groups of variables	Reliability	TVE	V1	V2	V3
V1	0.87	0.85	0.92	-	-
V2	0.85	0.76	0.64	0.87	-
V3	0.91	0.86	0.63	0.81	0.93

Note: V1 = School administrator group, V2 = School's characteristics and teachers group, and V3 = Group of the working environment, mechanisms, policies, and school regulations.

4.1. Objective One

Objective one examines many factors that are believed to influence the problem-solving competencies of school administrators in Vietnam. The results are presented in Table 4. The study employed a 5-point Likert scale to measure the level of influence (ranging from 1 = very low to 5 = extremely high) of the factors believed to influence the problem-solving competencies of the school administrators. According to the results, most respondents think that the factors listed in Table 3 that is specific to school administrators impact their problem-solving ability. The average scores range from 3.94 to 4.21 with the standard deviation ranging from 0.5591 to 0.6723. The results show that the genetic and unique personal characteristics have the lower scores at 3.95 and 3.94, respectively. Professional qualifications, leadership and management capacity, practical experience, attitude, sense of responsibility, and reputation of school administrators are believed by the school staff to have a strong influence on the problem-solving competence of the school administrators.

The low standard deviation (SD 1) which indicates a strong consensus among the respondents in the statistical analysis reveals the significant influence of these characteristics on the competency of school administrators. The factors of attitude, sense of duty and reputation of school administrators received the highest average score of 4.21. Most respondents ranked this as having the highest level of influence on the scale.

Table 4. The group of influencing factors belonging to the school administrators.

No.	The group of influencing factors belongs to the school administrators	Influencing level (%)					Mean	Standard deviation
		1	2	3	4	5		
1	Professional qualifications	0	0.3	8.5	67.4	23.8	4.14	0.5591
2	Management or leadership capacity	0	0.4	11.0	60.6	28.0	4.16	0.6167
3	Practical experiences	0	0.1	13.6	59.5	26.7	4.12	0.6266
4	Attitude, sense of responsibility, and reputation of school managers	0	0.8	7.7	60.8	30.7	4.21	0.6096
5	School managers' genetic characteristics	0.1	0.5	20.9	60.2	18.2	3.95	0.6512
6	Factors related to unique personal characteristics	0.3	0.8	21.1	59.3	18.5	3.94	0.6723

Upon analyzing Table 5, it becomes evident that most viewpoints agree on the significant influence of school characteristics and teaching personnel on the problem-solving abilities of school administrators. The average scores exhibit a remarkable range spanning from 3.95 to 4.15: School situation, size and type of schools (mean at 3.95, standard deviation at 0.6677), geographic location and area where the school is headquartered, including traffic conditions (mean at 3.99 and standard deviation at 0.6463), school team is united and responsible (mean at 4.14, standard deviation at 0.5884), school team is dynamic and enthusiastic (mean at 4.15, standard deviation at 0.5919), and professional qualification of the school team that meets the requirements (mean at 4.15, and standard deviation at 0.5585).

The statistical analysis of these mean scores reveals a significant impact of school features and the pedagogical team on the competency of school administrators. The dataset has a standard deviation (SD < 0.5585-0.6677) indicating that the respondents have reached a general agreement with a notable level of agreement in their viewpoints.

Table 5. The group of influencing factors belonging to the school's characteristics and teachers.

No.	The group of influencing factors belongs to the school's characteristics and teachers.	Influencing level (%)					Mean	Standard deviation
		1	2	3	4	5		
1	School situation, school size and type of school.	0.1	1.0	20.9	59.2	18.7	3.95	0.6677
2	Geographic location, area where the school is located and traffic conditions.	0.1	0.7	18.5	61.4	19.3	3.99	0.6463
3	The school team is united and responsible.	0	0.4	9.7	64.4	25.4	4.14	0.5884
4	The school team is dynamic and enthusiastic.	0	0.8	8.6	65.2	25.3	4.15	0.5919
5	The professional qualifications of the school team meet the requirements.	0	0.3	8.4	67.4	24.0	4.15	0.5585

The study of Table 6 highlights the unanimous agreement that the problem-solving competency of school administrators is believed to be significantly influenced by several aspects of the working environment, methods, policies and school rules.

The average scores range from 3.89 to 4.12 explained as follows: Guidelines, mechanisms, policies, and management systems at mean of 4.06 and standard deviation at 0.6297, system of guiding documents and state regulations on school organization and activities at mean at 4.12 and standard deviation at 0.5798, healthy, friendly, and democratic organizational cultural environment at mean at 4.05 and standard deviation at 0.6625, external environment (e.g., community, time or economic era in which the school is situated, and space) at mean 4 and standard deviation at 0.6399, school's organization structure, internal rules and regulations at mean 4.07, and standard deviation at 0.6037, facilities, equipment, working conditions, and financial resources at mean 4.02 and standard deviation at 0.6453; development of science, technology, and international cooperation at mean 3.89 and standard deviation at 0.6948, economic-political and social-cultural situation at mean 3.97 and standard deviation at 0.6009, support of local governments, organizations, enterprises, and communities at mean 4.03 and standard deviation at 0.6466.

Furthermore, the results reveal a strong impact of these characteristics on the problem-solving ability of school administrators as seen by a low standard deviation (SD < 1) indicating a high level of agreement among respondents with minimal variety in their perspectives.

Table 6. Group of influencing factors related to the working environment, mechanisms, policies, and school regulations.

No	Group of influencing factors related to the working environment, mechanisms, policies, and school regulations	Influencing level (%)					Mean	Standard deviation
		1	2	3	4	5		
1	Policies, guidelines, mechanisms, and management systems.	0	1.4	12.7	64.1	21.8	4.06	0.6297
2	System of guiding documents and state regulations on school organization and activities.	0	0.4	10.3	66.2	23.1	4.12	0.5798
3	The organizational cultural environment is healthy, friendly and democratic.	1.2	0.5	10.1	67.3	20.8	4.05	0.6625
4	External environment (Community, time and space).	0	0.8	17.9	61.6	19.7	4.00	0.6399
5	The school's organizational structure, internal rules and regulations.	0	1.0	12.0	66.0	21.1	4.07	0.6037
6	Facilities, equipment, working conditions, and financial resources.	0	0.7	17.7	60.4	21.2	4.02	0.6453
7	The development of science, technology, and international cooperation.	0.1	2.3	22.3	58.7	16.6	3.89	0.6948
8	Economic-political and social-cultural situations.	0	0.5	17.5	65.5	16.4	3.97	0.6009
9	The support of local governments, organizations, enterprises and communities.	0	1.4	15.2	62.2	21.2	4.03	0.6466

4.2. Objective Two

The second research objective aims to determine the extent to which the school staff reckons the belief factors critical to the perceived problem-solving competencies of the school administrators relate to these competencies. The structural path equation as shown in Figure 4 supports the significance of the three belief factors: School administrator, school characteristics and teachers, working environment, mechanisms, policies and school regulation. These belief factors explain 12% of the variance in the school administrators' problem-solving ability. The statistics of the structural equation modeling (SEM) show meeting the threshold requirements for good model matching – that is, χ^2/df = 2.055 at p = 0.152 (> 0.05 threshold), Normed Fit Index (NFI) = 0.998, Relative Fit Index (RFI) = 0.984, Incremental Fit Index IFI) = 0.999, Tucker Lewis Index (TLI) = 0.992, Comparative Fit Index (CFI) = 0.999, and Root Mean Square Error Approximation (RMSEA) at 0.038 (< 0.05 threshold) (Hair et al., 2006). The SEM also shows that working environment, mechanisms, policies and school regulation have the most linkage to the school administrator's problem-solving ability (with a regression coefficient of 0.19) followed by school administrator proficiency (with a regression coefficient of 0.10) and school characteristics and teachers (with regression coefficient of 0.09) (Fan et al., 1999; Sonmez & Cemaloglu, 2024).

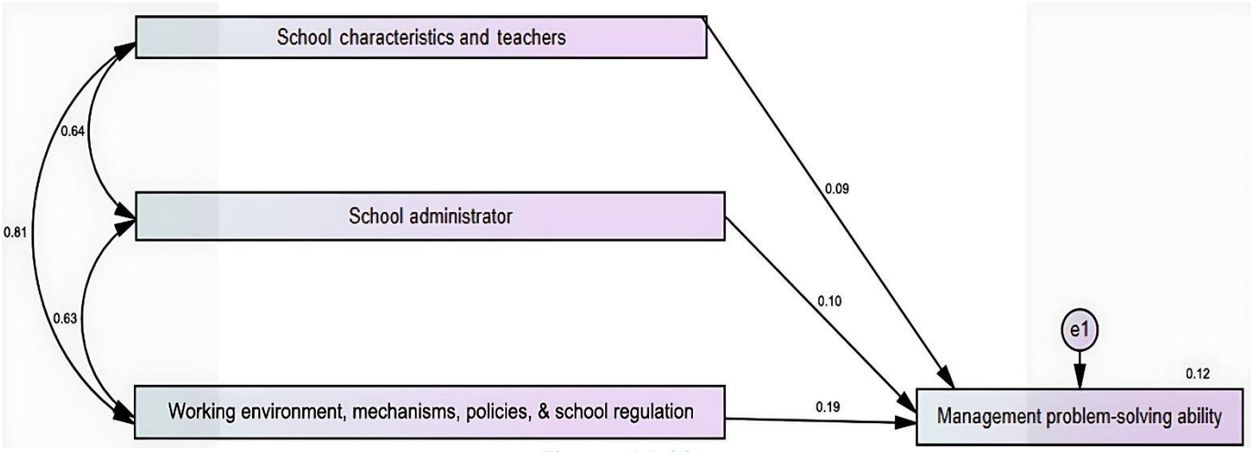

Figure 4. Model 1.

Nevertheless, the individual items are re-analyzed which yields the result shown in Figure 5 which highlights the significant roles of the internal environment represented by the organizational cultural environment and school situation (such as the type and size of schools), investments in sciences, technology, and intercultural cooperation to improve the variance percentages. In contrast, the external environment in which schools are located such as the community and the current socio-economic conditions as well as the allocation of resources such as facilities, equipment and working conditions have been found to have a negative correlation with the problem-solving abilities of school administrators in Vietnam. The SEM path yields the following statistics: The model fit at p = 0.034, χ^2/ /df = 4.506 and relative fit indexes, Normed Fit Index (NFI) = 0.998, Relative Fit Index (RFI) = 0.937, Incremental Fit Index (IFI) = 0.998, Tucker Lewis Index (TLI) = 0.95, Comparative Fit Index (CFI) = 0.998 and absolute fit Root Mean Square Error Approximation (RMSEA) = 0.069. RMSEA is an absolute fit index that Byrne (1994) suggests to be < 0.08 which is a parsimony-adjusted index. Byrne (1994), Schumacker and Lomax (2004) and Tucker and Lewis (1973) recommend them to be more than 0.90 with a value closer to 1 indicating optimal fit (Fan et al., 1999; Sonmez & Cemaloglu, 2024) as to other incremental model fit indexes.

The belief factors play the most impact on the school administrators' problem-solving ability. The SEM result in Figure 5 shows that a healthy and democratic organizational cultural environment has the most positive impact followed by the development of science, technology and international cooperation and school situation, school size

and type of school. On the negative relationship, the weights are relatively equal for the external environment and the facilities, equipment, working conditions and financial resources.

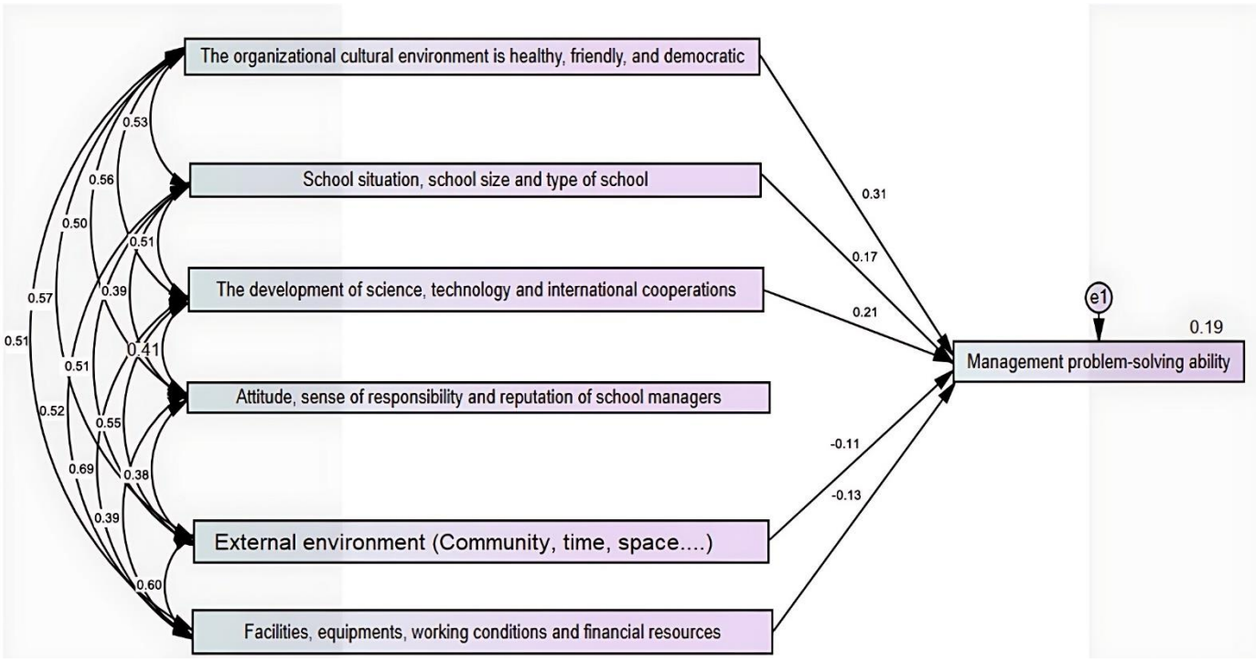

Figure 5. Model 2.

5. Discussion

This study establishes two objectives to address a research gap in understanding the factors influencing school staff's perceptions of school administrators' problem-solving abilities. The socio-psychological theories of behaviors that underpin belief as a base for influencing behaviors (Al Mamun et al., 2024; Cardoso et al., 2021; Razi-ur-Rahim et al., 2024) provide the theoretical foundation for addressing the two objectives: (1) to understand the extent to which the school staffs believe that the domains of the factors, namely, school characteristics and teachers, school administrator proficiency, and work environment, policies and school regulations, influence the competencies of the school administrators in solving problems in schools and (2) to identify the linkage between the beliefs and the perceived problem-solving competencies of the school administrators.

Regarding the first objective, the mean responses of the three domains of the belief factors show a scale between 4.02 and 4.09 indicating that the school staff is in general agreement that school administrators' proficiency and their attitude, sense of responsibility and personal reputation, the school's characteristics and teachers, and working environment, mechanisms, policies and school regulators can influence problem-solving competencies of the school administrators. The competence- or professional qualification-oriented requirements align with the findings of Peifer and Terstegen (2024) in solving socio-technical problems in a sustainable performance manner. Similarly, without professionalism and leadership meeting specific competency requirements, including the reputation of the school administrators (Akıllı, 2023), organizations would face more significant challenges in solving issues with digital transformation (Schiuma, Santarsiero, Carlucci, & Jarrar, 2024). The domain of school characteristics and teams is also evident in other researchers' findings such as the team effect on students' problem-solving (Benoliel, 2021) although they do not relate to school administrators. Scherer and Tiemann (2012) and Dudley-Marling (2023) highlight the socio-cultural and working environment that share the belief elements of this study.

Objective two of the study examines the relationship between belief factors and the perceived problem-solving competence of school administrators. The study identifies two significant relationships: (1) a positive relationship group that represents the internal environment of the school such as its culture, size, and development of science and technology, and international collaboration and (2) a negative association group that characterizes the external environment including the community and social situations in which the schools are located as well as the availability and quality of resources such as facilities, equipment, working conditions and financial resources. The negative relationship between resources and problem-solving skills is consistent with Varadarajan (2023) who states that a lack of resources can decrease schools' perceived problem-solving ability even though resources can provide a competitive edge to organizations. Otherwise, an organization should consider resource allocation systemically; problem-solving involves cognitive creation and psychological relevance to teams to improve problem-solving (Vallée-Tourangeau & Vallée-Tourangeau, 2020). The studies by Fadnavis, Najarzadeh, and Badurdeen (2020) which show the direct relationship between organizational culture which refers to the internal environment of a company and problem-solving competence also highlight the significant role of culture. As shown in this study, learning institutions should continually update with new technology such as immersive educational technology (Lu & Xie, 2024). Nowadays, society and industries are situational within technology-rich environments. The result is also reflected in Wang, Mousavi, Lu, and Gao's (2023) finding that adults' behavioral patterns of problem-solving evolve along with changes in the environment such as a technology-rich environment.

5.1. Theoretical Implications

The original conception of the socio-psychological base of belief behavior is well-established in this study as evidenced by the computed structural equation model. There are also subtle variations that this study can theoretically imply. A careful examination of the operationalization items of the constructs indicates that problem-solving competency is a dynamic process and requires elapses of experiences in which the theory of development

psychology can be applied. For instance, Enquist, Ghirlanda, Hattiangadi, Lind, and Gredebäck (2024) apply the theory of development psychology to develop staff behaviors and cognition through social and individual experiences. For instance, Enquist et al.'s (2024) illustration is depicted in this study as the practical experiences of the school administrators, the school situation and team characteristics and the cultural environment. Secondly, a re-examination of the factors that influence the problem-solving ability of the school administrators as shown in the SEM concludes that the belief factors can be collectively re-grouped into socio-technical perspectives. According to Bastidas et al. (2023) and Min and Tan (2022) the socio-technical approach is a relatively all-embracing perspective to solving strategic and operational issues in the digital era and industry 4.0. Third, the socio-technical perspective of the belief structure infers the role of resource-based advantage theory (Tan, 2024). This aligns with Veríssimo et al.'s (2024) finding that if systematically mastered, complex problem-solving can be a source of competitive advantage. Examples include the school systems and psychological characteristics of the resources (Vallée-Tourangeau & Vallée-Tourangeau, 2020). The role of culture as shown to have a significant impact on the problem-solving skills of the administrators highlights that environment-person fit theory is another essential theoretical concept. The environment-person fit theory ensures that the positive positioning of intra- and inter-psychological conditions remains stable (Kühner, Stein, & Zacher, 2024).

5.2. Practical Implications

This study presents numerous significant implications. Figure 6 shows the validated factors categorically. The revised framework of the factor structure demonstrates both procedural, investment-focused characteristics as well as the influence of both internal factors (such as culture) and external factors (such as the community or socio-economic conditions in which the schools are located). Those results are in line with what other researchers have found in areas like collaborative resource allocation (Li et al. 2024) multi-agent reinforcement learning (Wang et al., 2022) and individual motivation and behavioral approach in challenging environments (Schunk & DiBenedetto, 2020).

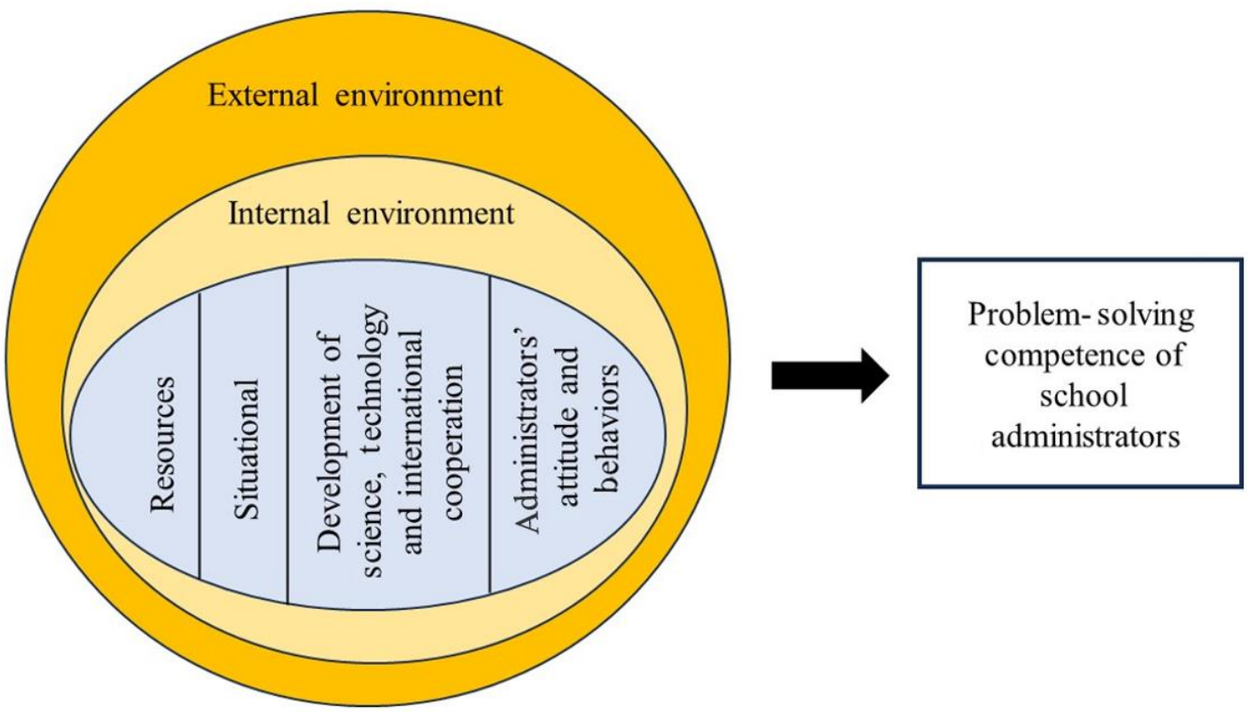

Figure 6. The identified factors that influence the problem-solving competency of the school administrators.

Furthermore, the advent of the digital era has significantly influenced leadership and management activities presenting both advantageous prospects and formidable obstacles. Figure 6 reveals that school administrators must ensure processual integrity and competitiveness while investing in both internal and external environments. This necessitates a novel paradigm of managerial aptitude as well as the problem-solving proficiencies of school administrators. For instance, with the digitization changes in the external environment, corporate managers must invest in digital leadership strategies as demonstrated by IKEA in its processual and value-chain competitiveness (Khan & Sarkar, 2024). Similarly, school administrators must undergo regular training and development to enhance their leadership, management and problem-solving skills (Mincu, 2022). School administrators are entrusted with specific tasks and authority that directly impact various stakeholders particularly individuals associated with the school and its reputation. In addition, school administrators are integral members of the school team and must possess a keen understanding of and diligently execute their designated positions, functions and responsibilities.

In the digital age, school administrators must prioritize promoting their autonomy and pioneering role in implementing new technical advancements. School administrators must consistently innovate, use digital technology and anticipate introducing new technologies. School administrators have the knowledge and skills to identify and capitalize on opportunities and assess the potential effects and hazards that may affect the school. School administrators have the knowledge and skills to incorporate cutting-edge technological advancements into various school operations effectively. In addition, school leaders must demonstrate their capacity to adjust to ongoing modifications. In the present era, there is a growing abundance of information and knowledge and an accelerated digitalization of all fields of economy and society (Lyu, 2024). Consequently, school administrators must accurately ascertain the school's fundamental value systems. The school's critical cultural values, an essential

element of the internal environment in Figure 6 should incorporate lifelong learning. Culture can foster the development of the ability to harness creative potential and innovation inside the educational institution, establishing a solid basis for educational advancement in the digital age.

6. Limitations and Further Research

This preliminary investigation needs a particular theoretical foundation. Subsequent research can use the initial findings from this study as a starting point for future exploration building upon established theoretical frameworks.

Research can integrate theories of creativity and resource advantage to enhance problem-solving competence, address issues and capitalize on opportunities. Calavia, Blanco, and Casas (2021) contend that the development of resources to cultivate creativity should be approached scientifically. This study illustrates the significant impact of investment on sciences, technology and international cooperation which aligns with Calavia et al. (2021) and the collaborative problem-solving skills demonstrated to contribute particularly to socio-economic inequality problems (Sum & Bădescu, 2023). Further research should also use qualitative, in-depth interviews to study the antecedent factors that drive the beliefs and attitudes of the school staff. For instance, Rini et al. (2024) examine the role of social media in studying plant-based behavior without stopping at the belief-and-attitude stage.

7. Conclusion

This study offers insights into the problem-solving perspective of school administrators by addressing belief-behavior linkage. In light of the fast digitalization of various sectors of the economy and society (Lyu, 2024), school administrators must develop precise, prompt, efficient and widely acceptable answers to their challenges (Palanci & Okutan, 2010). The organizational cultural environment is shown to have the most profound impact on the problem-solving competency of the school administrators followed by the development of science, technology, and international cooperation and school situation, school size, and the type of the schools in the context of the primary and secondary schools in Vietnam. Additionally, the external environment including the facilities and equipment of the schools, working conditions and financial resources will have to be improved as they currently negatively impact the school administrators' problem-solving competency. These socio-technical emphases explain the belief factors that influence the problem-solving competency of school administrators and fit into theories of socio-psychology of belief behaviors (Al Mamun et al., 2024; Cardoso et al., 2021; Razi-ur-Rahim et al., 2024), resource-based advantage (Hansen, McDonald, & Hatfield, 2023; Tan, 2024) development psychology (Enquist et al., 2024) and environment-person fit theory (Kühner et al., 2024).

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Appendix

Appendix 1. Questionnaire design.

Instruction: To what extent you agree with the following factors in influencing the problem-solving competency of the school administrators. 1 = Strongly disagreed to 5 = Strongly agreed.

Construct	Items	Source and reliability
School administrators	Professional qualifications	Self-developed, pre-tested to item-reliability over 0.80.
	Management/Leadership capacity	
	Practical experiences	
	Attitude, sense of responsibility, and reputation of school managers	
	School managers' genetic characteristics	
	Factors related to unique personal characteristics	
School's characteristics and teachers	School situation, school size, and type of school	Self-developed, pre-tested to item-reliability over 0.80.
	Geographic location, area where the school is located, traffic conditions	
	The school team is united and responsible	
	The school team is dynamic and enthusiastic	
	The professional qualifications of the school team meet the requirements	
Working environment, mechanisms, policies, and school regulations	Policies, guidelines, mechanisms, and management systems	Self-developed, pre-tested to item-reliability over 0.80.
	System of guiding documents and state regulations on school organization and activities	
	The organizational cultural environment is healthy, friendly, and democratic	
	External environment (Community, time, space...)	
	The school's organizational structure, internal rules and regulations	
	Facilities, equipment, working conditions, and financial resources	
	The development of science, technology, and international cooperation	
	Economic-political and social-cultural situations	
	The support of local governments, organizations, enterprises, and communities	