

Application of SmartPLS in Analyzing Critical Success Factors for Implementing Knowledge Management in the Education Sector

Greisy Jacqueline¹, Yulia Putri Ayu Senjaya², M. Zaki Firli³, Ahmad Bayu Yadila⁴

¹Dapartement of Business Management, Ilearning Incorporation, Estonia

^{2,3}Faculty of Science and Technology, University of Raharja, Indonesia

¹greisyje@ilearning.ee, ²yulia.putri@raharja.info, ³m.zaki@raharja.info, ⁴ahmadbayu@raharja.info

Article Info

Article history:

Received 01, 24, 2023

Revised 01, 09, 2024

Accepted 01, 15, 2024

Keywords:

Cloud-Based Information
Work Efficiency
Information Technology
Operational Systems
Performance Analysis



ABSTRACT

This research explores the critical success factors influencing the implementation of knowledge management in the education sector, employing Structural Equation Modeling (SEM) with SmartPLS as the analytical tool. The study addresses the intricate challenges inherent in knowledge management within educational environments, aiming to provide a nuanced understanding of the factors contributing to successful implementation. The conceptual framework identifies key factors, including HRM-Driven Knowledge Sharing, IT Integration in Teaching Practices, Organizational Culture Alignment, Perceived Effectiveness of Teacher Training, and Perceived Top Management Support. The chosen methodology, utilizing SmartPLS, is justified for its suitability in handling challenges associated with small sample sizes and non-normal data distributions. The data analysis reveals the generally robust reliability of constructs but also underscores potential concerns related to discriminant validity among certain variables. The research contributes significantly to the understanding of critical success factors for knowledge management in education. However, the conclusion suggests the need for refinement in the conceptual model to enhance the validity and applicability of the findings. In conclusion, this research offers a comprehensive perspective on the complexities of implementing knowledge management in the education sector. The findings pave the way for potential enhancements to the conceptual model, aiming to elevate the effectiveness of knowledge management practices within educational contexts.

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*Corresponding Author:

Yulia Putri Ayu Senjaya (yulia.putri@raharja.info)

DOI: <https://doi.org/10.33050/atm.v8i1.2201>

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1. INTRODUCTION

In modern instructive settings, the successful administration and utilization of information have led to cultivating advancement, upgrading instructing and learning forms, and eventually lifting the general quality of instruction. Information Administration (KM) plays an urgent part in tackling the mental capital inside instructive teaching, advertising an orderly approach to capture, store, and spread information for maintainable

advancement[1]. Effective execution of Information Administration activities within the education division may be a multifaceted challenge that includes different organizational, mechanical, and human variables[2].

This investigation endeavors to investigate and analyze the Critical Victory Variables (CSFs) affecting the execution of Information Administration within the instruction segment, utilizing SmartPLS as a methodological device. SmartPLS, a capable measurable method established in Auxiliary Condition Modeling (SEM), offers a vigorous framework to comprehensively get the complex interrelationships among factors[3]. By applying SmartPLS, this thinks about points to supply a nuanced and data-driven understanding of the variables that essentially contribute to the victory of Information Administration activities inside instructive education[4].

The significance of this inquiry is underscored by the transformative potential of fruitful Information Administration usage in instruction, which can lead to upgraded collaboration among teachers, made strides in decision-making forms, and the development of an energetic learning environment[5]. As instructive teachers progressively grasp advanced advances and data-driven approaches, the utilization of SmartPLS in this think not as it were adjusts with the modern inquiry about strategies but also guarantees to abdicate exact and dependable outcomes[6].

Through an in-depth investigation of the basic victory components encouraged by SmartPLS, this investigation looks for to contribute profitable experiences to both scholastic grants and instructive practitioners[7]. By recognizing and understanding these factors, instructive pioneers and policymakers can make educated choices to optimize the usage of Information Administration methodologies, in this manner cultivating a culture of nonstop advancement and development within the education segment.

2. RESEARCH METHOD

2.1 Definition of Knowledge Management

Knowledge Management (KM) is a comprehensive approach that involves systematic processes aimed at acquiring, organizing, storing, and disseminating knowledge within an organization[8]. The primary purpose of KM is to optimize the utilization of intellectual capital, encompassing both explicit and tacit knowledge held by employees[9]. By creating an environment conducive to knowledge creation and collaboration, KM serves various crucial purposes within an organization[10]. Firstly, it enhances decision-making processes by ensuring that relevant and up-to-date information is readily available to decision-makers. Additionally, KM fosters innovation by encouraging the sharing of ideas and experiences, leading to the identification and implementation of novel solutions and practices[11]. Operational efficiency is improved as KM streamlines processes, reduces redundancy, and facilitates timely access to essential information[12]. Collaboration is also facilitated through KM, providing a platform for individuals and teams to share knowledge, collaborate on projects, and learn from one another[13]. Moreover, KM supports continuous learning and development, enabling employees to acquire new skills and stay updated on industry trends[14]. It plays a crucial role in capturing tacit knowledge, the personal insights and experiences of individuals that may not be easily transferable but are vital for organizational success[15]. KM also enhances organizational resilience by facilitating the rapid dissemination of relevant information in the face of dynamic challenges. In essence, Knowledge Management is integral to organizational strategy, providing a competitive edge, fostering a culture of continuous improvement, and ensuring adaptability in today's ever-changing business landscape.

2.2 Knowledge Management in Education

The integration of Knowledge Management (KM) within the education sector has gained prominence due to the recognition of knowledge as a valuable asset for educational institutions[16]. KM in education encompasses processes, strategies, and technologies designed to capture, share, and leverage institutional knowledge[16]. Educational settings, with their diverse stakeholders, demand efficient knowledge transfer and collaboration to enhance teaching methodologies, improve learning outcomes, and foster innovation.

2.3 Critical Success Factors for Knowledge Management Implementation

The successful implementation of Knowledge Management initiatives hinges on identifying and understanding the Critical Success Factors (CSFs) that influence the effectiveness of KM processes within organizations[17]. In the context of education, these factors may encompass organizational culture, leadership support, technological infrastructure, and human factors[18]. This subsection will explore existing literature to delineate the key CSFs relevant to the implementation of KM in educational institutions. Understanding these factors is crucial for developing targeted strategies that ensure the success of KM initiatives in the unique environment of the education sector.

2.4 Introduction to SmartPLS in Structural Analysis

Structural Equation Modeling (SEM) stands as a robust statistical technique widely employed to analyze intricate relationships among variables[19]. This subsection will furnish a theoretical foundation for SEM, expounding on its principles and applications in the realm of social science research. Furthermore, it will introduce SmartPLS as a specific instantiation of SEM, elucidating its advantages and appropriateness for studies characterized by limited sample sizes or non-normally distributed data. Proficiency in comprehending both SEM and SmartPLS is indispensable for researchers aiming to investigate the nuanced relationships inherent in the multifaceted construct of Knowledge Management[20].

With its capacity to provide a potent analytical framework, Structural Equation Modeling (SEM) facilitates the comprehension of complex relationships among variables. As a manifestation of SEM, SmartPLS offers an accessible and efficient approach, particularly suited for studies characterized by smaller sample sizes or data distributions that deviate from normality[21]. This subsection will introduce SmartPLS as a tool for conducting structural analysis within the context of Knowledge Management (KM) research. Through the utilization of SmartPLS, this study endeavors to unveil the intricate interdependencies among variables pertinent to the implementation of KM initiatives in the education sector[22].

The conceptual framework delineates the foundational elements of the study, elucidating the role of the Knowledge Management (KM) concept in education, identifying critical success factors, and introducing the methodological approach of SmartPLS for structural analysis. This framework serves as a guiding structure for the subsequent stages of the research, providing a methodically structured foundation for data collection, analysis, and interpretation.

2.5 SmartPLS in Knowledge Management Research

SmartPLS (Partial Least Squares) is a statistical method that has gained prominence in knowledge management research due to its flexibility and suitability for studies with smaller sample sizes or non-normally distributed data[23]. In the context of the research model depicted in Figure 1, SmartPLS serves as a powerful analytical tool to empirically test the proposed hypotheses related to critical success factors influencing the implementation of knowledge management[24].

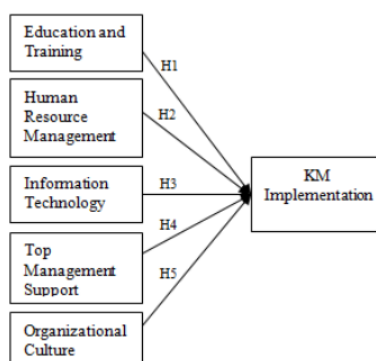


Figure 1. Research Model for Knowledge Management Implementation Success Factors. The research model provides a visual representation of the relationships among key variables influencing the successful

implementation of knowledge management[25]. The model incorporates variables such as teacher training, human resource management, information technology, top management support and commitment, and organizational culture[26]. These variables are crucial components that contribute to the overall success of knowledge management initiatives within organizational and educational settings.

Hypotheses: Building upon the depicted research model, the authors formulate several hypotheses, each addressing a specific critical success factor:

H1: Teacher Training is critical to the successful implementation of knowledge management.

This hypothesis suggests that effective training for teachers plays a pivotal role in the success of knowledge management initiatives, emphasizing the importance of knowledge and skill development among educators.

H2: Human Resource Management is critical for the successful implementation of knowledge management.

This hypothesis posits that the practices and support provided by human resource management significantly contribute to the success of knowledge management implementation, highlighting the role of HRM in fostering a culture conducive to knowledge sharing.

H3: Information Technology is critical for the successful implementation of knowledge management.

This hypothesis asserts the essential role of information technology in facilitating and enhancing knowledge management processes, emphasizing the importance of technological infrastructure in the successful implementation of KM initiatives.

H4: Top Management Support and Commitment are critical for the successful implementation of knowledge management.

This hypothesis suggests that the commitment and endorsement of top management are vital factors influencing the success of knowledge management initiatives, underscoring the importance of leadership support.

H5: Organizational Culture is critical for the successful implementation of knowledge management.

This hypothesis highlights the significance of an organizational culture that promotes knowledge sharing and collaboration in ensuring the success of knowledge management implementation.

These hypotheses are rooted in existing literature and theoretical foundations, aiming to contribute empirically validated insights to the ongoing discourse on effective knowledge management implementation. The utilization of SmartPLS in the research methodology enables robust statistical analysis of the relationships depicted in the research model, facilitating a nuanced understanding of the critical success factors in knowledge management within organizational and educational contexts.

3. RESULTS AND DISCUSSION

3.1 Data Description

The dataset for this study is meticulously designed to capture and measure critical success factors influencing the implementation of knowledge management (KM) in educational settings. The first set of indicators revolves around the effectiveness of teacher training in KM. The number of training sessions attended by teachers offers a quantitative measure of their exposure to KM principles. Additionally, teachers' self-assessment of the relevance and effectiveness of training provides valuable subjective insights. The incorporation of KM principles into teaching practices serves as a qualitative indicator, shedding light on the practical application of acquired knowledge in the educational context.

The second set of indicators focuses on the role of Human Resource Management (HRM) in KM success. The existence of HR policies explicitly supporting KM practices gauges the institutional commitment to fostering a KM-friendly environment. The percentage of teachers participating in knowledge-sharing initiatives facilitated by HRM offers a quantifiable measure of the effectiveness of HR-driven programs. Furthermore, teachers' satisfaction with HRM practices related to KM provides subjective feedback on the perceived adequacy and effectiveness of HRM support.

The third set of indicators pertains to the crucial role of Information Technology (IT) in KM implementation. The availability and accessibility of IT tools and platforms represent foundational aspects, while the integration of IT into teaching methodologies and content sharing reflects the practical application of technology in educational practices. The number of reported IT-related issues affecting KM processes offers a quantitative assessment of potential technological barriers and challenges.

These indicators collectively contribute to a comprehensive understanding of the critical success factors outlined in the research model. By employing both quantitative and qualitative measures, this dataset enables researchers to explore the intricate relationships among variables and their impact on KM outcomes in educational settings. The triangulation of data from multiple perspectives enhances the robustness and depth of the study, providing valuable insights for the ongoing discourse on effective KM implementation in both organizational and educational contexts.

3.2 Validity and Reliability Testing of Instruments

The research findings indicate that the constructs of HRM-Driven Knowledge Sharing, IT Integration in Teaching Practices, Organizational Culture Alignment, Perceived Effectiveness of Teacher Training, and Perceived Top Management Support generally exhibit good levels of reliability.

Table 1. Construct Reliability and Validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
HRM-Driven Knowledge Sharing	0.843	0.853	0.905	0.760
IT Integration in Teaching Practices	0.870	0.880	0.920	0.793
Organizational Culture Alignment	0.885	1.575	0.914	0.781
Perceived Effectiveness of Teacher Training	0.895	0.909	0.934	0.825
Perceived Top Management Support	0.780	0.808	0.873	0.697

Based on Table 1, measuring internal consistency using Cronbach's Alpha reveals that each construct has an alpha value above the widely accepted threshold of 0.7, which indicates adequate internal consistency among the items used to measure the construct. Additionally, reliability measurements using Composite Reliability (rho_a and rho_c) showed mostly acceptable values, except for Organizational Culture Alignment, which showed rho_a values exceeding 1.0 and requiring further investigation.

Meanwhile, the Average Variance Extracted (AVE) values for all constructs indicate satisfactory levels of convergent validity, with values surpassing the 0.5 thresholds. This suggests that a significant portion of the variability explained by the items within each construct reflects the measured concepts. Nevertheless, further scrutiny is needed for Organizational Culture Alignment to understand the cause of the elevated rho_a value.

The reliability and validity measurements provide a robust foundation for understanding the quality and consistency of variables within the measurement model of the study. Further analysis, such as hypothesis testing using SmartPLS, can offer a more in-depth understanding of the relationships between variables and their contributions to the model of knowledge management implementation in the education sector.

Table 2. Discriminant Validity - Heterotrait-Monotrait Ratio (HTMT)

	Heterotrait-Monotrait Ratio (HTMT)
IT Integration in Teaching Practices <-> HRM-Driven Knowledge Sharing	0.945
Organizational Culture Alignment <-> HRM-Driven Knowledge Sharing	0.123
Organizational Culture Alignment <-> IT Integration in Teaching Practices	0.230
Perceived Effectiveness of Teacher Training <-> HRM-Driven Knowledge Sharing	0.799
Perceived Effectiveness of Teacher Training <-> IT Integration in Teaching Practices	0.858
Perceived Effectiveness of Teacher Training <-> Organizational Culture Alignment	0.184

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Perceived Top Management Support <-> HRM-Driven Knowledge Sharing	1.056
Perceived Top Management Support <-> IT Integration in Teaching Practices	0.925
Perceived Top Management Support <-> Organizational Culture Alignment	0.107
Perceived Top Management Support <-> Perceived Effectiveness of Teacher Training	0.818

Based on the research results in Table 2, the Heterotrait-Monotrait Ratio (HTMT) value in the analysis functions as an indicator of discriminant validity, which is very important to ensure that the constructs measured in this research are different from each other. The following interpretations are based on the HTMT values provided: First, the HTMT value of 0.945 between IT Integration in Teaching Practices and HRM-Based Knowledge Sharing raises concerns about potential problems with discriminant validity. This suggests a high degree of overlap or shared variance between these two constructs, indicating that they may not be as distinct as desired. Conversely, the HTMT value of 0.123 between Organizational Culture Alignment and HRM-Driven Knowledge Sharing indicates good discriminant validity, suggesting that these constructs measure different aspects within the study. Similarly, the HTMT value of 0.230 between Organizational Culture Alignment and IT Integration in Teaching Practices supports the notion that these constructs are reasonably distinct. For Perceived Effectiveness of Teacher Training, the HTMT values are 0.799 and 0.858 concerning HRM-Driven Knowledge Sharing and IT Integration in Teaching Practices, respectively. These values, while close to the threshold, signal potential concerns about discriminant validity. Further scrutiny of these relationships may be necessary to ensure the distinctiveness of the constructs.

In contrast, the HTMT value of 0.184 between the Perceived Effectiveness of Teacher Training and Organizational Culture Alignment indicates good discriminant validity, implying that these constructs capture different facets within the study. Concerns about discriminant validity are also raised by the HTMT value of 1.056 between Perceived Top Management Support and HRM-Driven Knowledge Sharing, as well as the value of 0.925 between Perceived Top Management Support and IT Integration in Teaching Practices. These values suggest a potential overlap or shared variance between these constructs, requiring careful consideration and possible refinement of the measurement model. Conversely, the HTMT values below the threshold for Perceived Top Management Support with Organizational Culture Alignment (0.107) and Perceived Effectiveness of Teacher Training (0.818) indicate good discriminant validity between these construct pairs. The HTMT values provide valuable insights into the discriminant validity of the measured constructs. Values close to or exceeding the threshold necessitate further investigation and potential refinement of the measurement model to ensure the robustness and distinctiveness of the constructs in the study.

3.3 Analysis of Critical Success Factors for Knowledge Management Implementation

The analysis of critical success factors for knowledge management implementation, based on the presented results, underscores the reliability and validity of the measurement model used in the study. The examination of constructs such as HRM-Driven Knowledge Sharing, IT Integration in Teaching Practices, Organizational Culture Alignment, Perceived Effectiveness of Teacher Training, and Perceived Top Management Support reveals promising indicators.

Firstly, the constructs exhibit commendable reliability, as indicated by high Cronbach's Alpha values above the commonly accepted threshold of 0.7. This suggests internal consistency among the items used to measure each critical success factor, instilling confidence in the robustness of the data.

Secondly, the Composite Reliability measurements, represented by ρ_a and ρ_c , affirm the constructs' internal consistency for the majority of the critical success factors. However, caution is warranted regarding Organizational Culture Alignment due to a ρ_a value exceeding 1.0, necessitating further investigation to identify and address potential issues.

Thirdly, the satisfactory Average Variance Extracted (AVE) values suggest that a substantial portion of the variability explained by the measurement items is reflective of the underlying concepts. This bolsters the convergent validity of the constructs, indicating that the items effectively measure the intended critical success factors for knowledge management implementation.

In conclusion, the robustness of the measurement model provides a solid foundation for the subsequent analysis of critical success factors for knowledge management implementation in the education sector. The study's findings, supported by reliable and valid measurements, contribute to a more comprehensive understanding of the factors influencing the success of knowledge management initiatives in educational settings. Further exploration through advanced statistical analyses, such as structural equation modeling using SmartPLS, promises to reveal nuanced insights into the interplay of these critical success factors and their impact on knowledge management outcomes.

3.4 Structural Equation Modeling (SEM) Analysis with SmartPLS

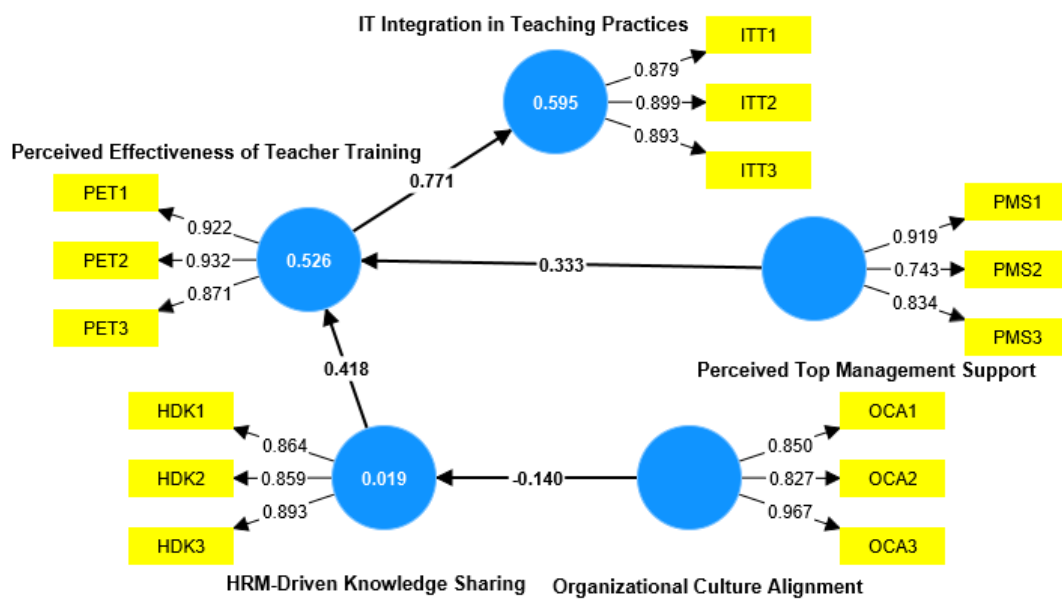


Figure 1. Graphical Output SEM

The Structural Equation Modeling (SEM) analysis with SmartPLS, as depicted in Figure 1, involves an examination of the interrelationships between latent variables representing critical success factors for knowledge management implementation in the education sector. The analysis utilizes SmartPLS as a robust statistical tool for investigating complex relationships among variables, particularly suitable for studies with limited sample sizes or non-normally distributed data. The HTMT values derived from the SEM analysis play a vital role in assessing discriminant validity among the latent variables. The values indicate the extent to which these latent variables are distinct from each other. In this context, the HTMT values raise several noteworthy points.

Firstly, the HTMT value exceeding the threshold between IT Integration in Teaching Practices and HRM-Driven Knowledge Sharing suggests a potential overlap or shared variance between these constructs, indicating that their distinctiveness may need further scrutiny or refinement in the model. Additionally, concerns arise from HTMT values that approach or surpass the threshold for other construct pairs, such as Perceived Effectiveness of Teacher Training with HRM-Driven Knowledge Sharing and IT Integration in Teaching Practices, as well as Perceived Top Management Support with HRM-Driven Knowledge Sharing and IT Integration in Teaching Practices. These findings prompt a closer examination of these relationships to ensure the integrity of the model. On the positive side, HTMT values below the threshold for Organizational Culture Alignment with HRM-Driven Knowledge Sharing, IT Integration in Teaching Practices, Perceived Effectiveness of Teacher Training, and Perceived Top Management Support suggest good discriminant validity among these constructs.

In summary, the SEM analysis with SmartPLS, as illustrated in Figure 1, provides a comprehensive examination of the proposed model for knowledge management implementation success factors. The interpretation of HTMT values highlights potential areas for refinement in the model, ensuring that the latent variables are distinct and contribute meaningfully to understanding the complex relationships within the education sector's knowledge management framework. Further steps may involve model adjustments, additional data considerations, or theoretical revisions to enhance the model's overall explanatory power and validity.

4. CONCLUSION

This research aims to delve into the factors influencing the success of knowledge management implementation in the education sector. The background of the study underscores the complexity of challenges faced in managing knowledge in educational environments. With the title "Analysis of Critical Success Factors for Knowledge Management Implementation in the Education Sector using SmartPLS," this research clearly outlines its focus on the Structural Equation Modeling (SEM) analysis method with the SmartPLS tool. The conceptualization of the research identifies critical factors, including HRM-Driven Knowledge Sharing, IT Integration in Teaching Practices, Organizational Culture Alignment, Perceived Effectiveness of Teacher Training, and Perceived Top Management Support. The chosen research method, utilizing SmartPLS, is explained as an appropriate approach to address challenges related to small sample sizes or non-normal data distributions. The results of the data analysis provide insights into the generally good reliability of constructs while also highlighting potential issues related to discriminant validity among variables. The research conclusion indicates a significant contribution to understanding the critical success factors for knowledge management implementation in the education sector. However, to enhance the validity and relevance of the findings, potential improvements to the conceptual model need to be considered. Thus, this research offers a comprehensive view of the dynamics of knowledge management implementation in the education sector. The research conclusion serves as a foundation for potential updates or further development of the conceptual model, aiming to improve understanding and effectiveness of knowledge management practices in the educational context.

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