

Effective School Management in the 21st Century: A Case Study at SMK Grafika Desa Putera, Jakarta

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ABSTRACT

This study used a qualitative approach to identify key elements in effective school management, referred to as the 'DNA of Educational Excellence,' in facing the demands and dynamics of the 21st century. The study was conducted in May 2025 at SMK Grafika Desa Putera, involving ten teachers who were purposively selected based on their relevance and involvement in the school management process. Data were collected through document analysis, in-depth interviews and observation. The main focus of the study included six important indicators in school administration: transformational leadership of the principal, human resource management, curriculum and learning management, facilities and infrastructure management, financial management, and school and community relations (PR) management. The collected data were analysed through the stages of data reduction, data presentation, and conclusion drawing. It is hoped that the results of this study can provide a comprehensive picture of vocational school management practices that are adaptive to the demands of the times, as well as support initiatives aimed at developing educational institutions that are not only relevant, but also agents of revolutionary change for future generations.

INTRODUCTION

Fundamental transformations in the educational landscape have become a necessity in the 21st century. Globalization, technological disruption, and massive socio-economic shifts have changed the nature and expectations of educational institutions, especially schools. This institution can no longer survive as a static ivory tower, but must evolve into a center of innovation, adaptation, and development of a generation that is not only intellectually intelligent, but also resilient, creative, cooperative, and empathetic. In this transformative context, school management emerges as a crucial factor that determines the success or failure of educational institutions in addressing these contemporary challenges. Agile management theory in education is highly relevant, advocating a flexible, adaptive, and iterative approach in school management to respond to rapid change. Refer to previous studies in (Tobondo et al., 2024) mentioned that the Agile approach encourages stakeholder engagement, flexible teaching, and digitalization for individualized learning. The success of Agile depends on organizational change and strong leadership, encouraging educational innovation and adaptation, despite the resistance.

The Industrial Revolution 4.0 and the shift towards Society 5.0 have created a new era characterized by unlimited access to information, automation of work, and the constant evolution of skill demands. This forces educational institutions to critically rethink their goals and approaches. Rigid curriculums, monotonous teaching methods, and uninspiring learning environments will no longer be adequate to prepare students for a world full of uncertainty. Instead, graduates must be equipped with 21st-century skills, known as the 4Cs: critical thinking, creativity, effective communication, and collaboration, in addition to digital and financial literacy and other essential life skills.

This paradigm shift requires a school management system that is not only reactive, but also proactive, visionary, and adaptive. Transformative learning theory (Hardika et al., 2020), emphasizing that learning must result in a profound change in perspective, which in this context means that schools must change the way they operate to prepare students for an unpredictable future. Previous research (Zuhri et al., 2024), has shown that technology-based and strategically planned learning management plays a central role in learning success in the 21st century. Recent studies such as (Pertwi et al., 2024), also highlighting that a competency-based approach in curriculum management is essential to ensure graduates have relevant skills, both soft skills and hard skills, in line with industry needs.

Many existing studies tend to focus on key elements and practices of school management in the short or medium term. However, there are significant gaps in the analysis of the long-term impact of the implementation of the Education Excellence DNA. This impact includes student learning outcomes holistically, which includes not only cognitive aspects, but also affective and psychomotor aspects.

The career readiness of graduates and their contribution to society after education also needs to be a concern. The theory of human capital, put forward by (M. Hasan et al., 2020), emphasizing the importance of increasing individual

productivity and efficiency through education and training. It includes the analysis of human resources and the development of economic value that arises from interactions within society. This approach shows that human capital is not just about formal education, but also includes health, innovation, social networks, and diversity. Individuals who are equipped with relevant knowledge, skills, and competencies can work better, faster, and produce higher quality.

However, longitudinal research that tracks alumni progress and evaluates the relevance of the education they receive is still very limited. This leads to a lack of understanding of the cumulative and ongoing effects of effective school management. On the other hand, recent research trends, such as those carried out by (Efendi & Soleh, 2023), finding ways to manage education in schools effectively. It covers aspects such as leadership and teacher training. Various approaches are used to achieve these goals, such as cooperation and evidence-based. The results of these efforts show improvements in the quality of teaching, student academic achievement, and motivation and a positive atmosphere in schools.

In the school ecosystem, the principal plays a vital role as the leader of the school. The role of the principal is no longer limited to the day-to-day administration of operations, but has developed into a transformational leader who is able to inspire, encourage, and guide all elements of the school towards a common vision and goals. Transformational leadership theory initiated by Bernard M. Bass in (Suriagiri, 2020), affirms that effective leaders inspire followers to transcend self-interest for the collective good, a principle that is particularly relevant for principals in shaping innovative school cultures.

The principal's responsibilities include managing human resources (HR), developing relevant curriculum, optimizing infrastructure and facilities, managing accountable finances, and building strategic alliances with parents, communities, and the business-industry sector. Without strong leadership and administration, teacher motivation can decrease, students' potential will not be fully realized, and curriculum innovation will be hampered. In previous studies (Rahayu et al., 2022), affirmed that the transformational leadership of school principals helps stakeholders face the challenges of the 21st century, such as inspiring students, encouraging innovation and teamwork, developing leadership skills, and improving the quality of education with the 4C principles of capability development.

At the same time, the increasing expectations of society for educational excellence also present significant challenges. Parents not only want a school that provides an academic education, but also develops the moral character of children and guarantees a successful future. In this context, transparency, accountability, and public involvement become integral components of school administration. Sound management practices, including comprehensive planning, efficient implementation, and ongoing evaluation, are essential for schools to build and maintain public trust (Sari et al., 2023).

In line with this, (Harefa et al., 2025), said that with the help of organized curriculum management, efficient human resource management, and active

involvement of the community and other stakeholders, the implementation of School-Based Management (SBM) greatly improves the quality of education (Sunardi & Muallil, 2023). The stakeholder approach put forward by (Subroto & Endaryanti, 2024), that all parties involved have needs and interests that must be considered by the organization, not just focusing on profit. In other words, the success of an organization depends on how it manages relationships with all stakeholders, including parents, communities, and industry, to achieve long-term success. The implementation of SBM practically encourages adaptability, accountability, and collaboration, allowing schools to respond more quickly to regional and national demands.

However, there is a gap in the literature regarding specific models or best practices to empower school committees to play a more strategic and effective role as school management partners. In addition, there have not been many studies exploring how schools can effectively engage broader public stakeholders (other than parents and industry) in the school management process to improve accountability and community support.

Innovation has become a must, no longer an option, in the era of Industrial Revolution 4.0 and Society 5.0, and must be supported by a strong management framework. Without management that is able to encourage innovation, schools will stagnate and lose their relevance in the face of such rapid change (Kayido, 2023). Further (Usman, 2019), emphasizing that the achievement of national education goals depends on efficient education management, which includes systematic and integrated organizing, planning, implementation, and supervision to create an effective learning environment. Without this integration, the potential for academic success will be difficult to achieve to the fullest. The MBS model, as highlighted by Usman (2019), also encourages school autonomy in allocating resources and developing an independent and contextual curriculum to address 21st century social and skills problems. In this context, the Independent Learning Curriculum is very relevant because it encourages innovation and collaboration, aiming to produce superior and characterful human resources, with a focus on new literacy including data, technology, people and 21st century skills (Mustari, 2022).

However, the literature still lacks details on a truly dynamic and sustainable curriculum adaptation strategy in the face of rapidly changing industry needs in the digital era. These gaps include a lack of concrete models of how collaboration with industry can be strengthened to ensure curriculum remains relevant in real-time, as well as how schools can implement more flexible learning models, such as adaptive learning that adapts to individual student needs. In addition, although teachers' expectations of improved financial well-being are often mentioned, existing studies have not in depth addressed concrete strategies to improve this aspect, especially given the reliance on government funding and regional disparities.

Information and data management is also increasingly complex due to technological advances. Schools in the 21st century generate enormous volumes of data (finances, teachers, attendance, student grades), and superior school administration is characterized by the capacity to collect, examine, and apply this

data for decision-making (Suranto et al., 2022). In his study (Iraza & Nasution, 2023) stating that data-driven decision-making based on empirical data analysis tends to be more effective and accurate. However, there are substantial gaps in specific studies on how advanced technologies such as big data analytics and artificial intelligence (AI) can be effectively integrated in school data management processes to support more accurate, predictive, and evidence-based decisions. Datafication theory in education (Williamson, 2019), also shows how almost every aspect of learning and management is now transformed into data, requiring sophisticated management systems. Practical challenges related to infrastructure, capacity building of human resources (HR), and data privacy issues in the implementation of this technology have also not been discussed comprehensively in the context of Indonesian schools. Unfortunately, many schools still don't make optimal use of data, often making decisions based on premonitions or pre-existing practices rather than empirical data.

The impact of the COVID-19 pandemic in recent years has also tested the resilience of school management and the global education system, highlighting significant issues such as the availability of digital infrastructure, parental support, teacher and student readiness, and distance learning. This epidemic proves that crisis management and rapid adaptation are essential skills for educational institutions. Schools with strong management structures, effective backup plans, and resilient staff are better able to cope with these kinds of disruptions, reinforcing the claim that resilience and adaptability are an important part of the "DNA of Educational Excellence" in addition to operational efficiency. In his study (Afkarina et al., 2023), mentioning that adaptation and innovation management is periodically and continuously able to cope with unexpected environmental changes. Nevertheless, this research can be expanded to identify a more comprehensive risk management framework and proactive resilience strategies to deal with potential future disruptions, not only pandemics, but also other threats such as the impact of climate change, global economic crises, or disruptive technological developments, as well as the development of mitigation and adaptation plans that are integrated in school management.

LITERATURE REVIEW

The complexity of school administration is further complicated in Indonesia's socially, economically, and geographically diverse environment. Variation in teacher quality, unequal access to resources, and diverse student backgrounds require management strategies that take into account local situations. Intelligent adaptation and interpretation of central education policies is needed at the school level. (Wulandari et al., 2025), argues that education policies that are more contextual and in line with local needs can significantly improve the quality of education to address access disparities and improve school administrative performance. Effective education management is an indicator of educational success, which is closely related to the application of management in planning, organizing, directing, controlling, and supervising (Maryance et al., 2021). The practice of education management must go through

a process, as conveyed by the (Hidayah & Widodo, 2020), that Educational management includes planning to determine direction and resources, organizing to distribute tasks, leadership to motivate personnel, and control to ensure the effective achievement of goals.

Given the complexity and urgency of these issues, the research on "The DNA of Educational Excellence: Dissecting the Key to 21st Century School Management Success" has become particularly relevant and important. This research aims to thoroughly identify and investigate the essential components, best practices, and determinants that make up effective school management in the face of the demands and dynamics of the 21st century. It is hoped that by publishing the results of this identification, education professionals, decision-makers, and academics will obtain clear guidance, replicable models, and evidence-based policy recommendations to improve the quality of education in Indonesia. Furthermore, this research is expected to support initiatives oriented towards the development of educational institutions that are not only relevant, but also become agents of revolutionary change for future generations.

METHODOLOGY

This research uses a qualitative approach to identify important elements in effective management at SMK Grafika Desa Putera in facing the challenges of the 21st century. This approach was chosen because it allows for in-depth data mining regarding managerial experiences, views, and practices in the school environment. As stated by (Harahap, 2020), the qualitative approach is suitable to be used to understand the context and meaning of social behavior and humanities, this means including the educational environment in it because it is related to human behavior. The research was conducted in May 2025 by involving ten teachers who were purposively selected based on their relevance and involvement in the school management process. Three main techniques are used in data collection, namely document analysis, in-depth interviews, and observation. Data are analyzed through the stages of data reduction, data presentation, and conclusion drawing as described by Miles and Huberman in (Nasution, 2023). The main focus of the research includes six important indicators in school administration: transformational leadership of principals, professional development of teachers, innovation of industry-based curriculum, use of technology and infrastructure, and management of relationships with the industrial world and society. This research is expected to provide a comprehensive overview of vocational school management practices that are adaptive to the demands of the times.

RESEARCH RESULT

As an introduction before going further into the discussion of specific findings, this section will present an overview of the results obtained from research conducted by researchers through interviews, observations and document reviews. We will highlight key points and key trends emerging from data analysis, providing essential context for gaining a more in-depth discussion in the next section.

Transformational Leadership of the Principal

In this sub-chapter, the researcher conducts interviews, observations and document analysis to examine several crucial aspects related to the leadership of the principal and school management. The main focus of the interview was the relevance of the school's vision and mission to 21st Century developments, principals' strategies in motivating and inspiring staff, participatory decision-making processes, participatory change management and innovation, and how principal's management approaches are applied in the field.

The results of the interview analysis show that the school's vision and mission are considered relevant to the demands of the 21st Century, especially in terms of creativity, innovation, and digital skills. However, the implementation still varies between teachers. In terms of motivation, the principal is considered to be enough to provide support and appreciation, although it has not been felt equally by all staff. Some teachers feel very inspired, while others expect a more personalized approach. Regarding decision-making, teachers feel involved in the discussion and formulation of the program, although the final decision remains in the hands of the principal. Even so, their voices and input are still appreciated. For professional development, the school facilitates training and seminars, both internal and external. The principal actively shared information and supported teachers' initiatives, despite budget constraints. In change management, school principals are seen as proactive, risk-taking, and encouraging technological innovation. However, adaptation requires support and patience from all parties.

To support the validity of the interview results, the researcher conducted observation activities. In general, the observations reflect the vision and mission of the school that is relevant to the 21st Century, as seen from the variety of technology implementations and creative activities in the classroom. Some teachers are already proficient, while others are still adapting. In terms of motivation and inspiration, principal's interactions with teachers often show immediate appreciation and support, such as praise or trust in managing projects, which creates a positive work atmosphere. For participatory decision-making, meetings and discussion forums demonstrate the active involvement of teachers and staff in the formulation of the program, although the final decision remains in the hands of the principal. Support for continuous teacher development can also be seen from the documentation of training and the implementation of new methods by teachers, indicating that there is a facilitation for competency improvement. Finally, in change and innovation management, schools show proactivity in the adaptation of new technologies and learning methods, with teachers daring to experiment, although this process requires ongoing support.

The analysis of documents was carried out by the researcher to corroborate the findings of interviews and observations. The school's vision and mission are formally aligned with the demands of the 21st Century, explicitly listing keywords such as innovation and digital skills in planning documents. However, a review of teachers' Learning Implementation Plans (RPPs) shows variations in the integration of digital elements and creative activities, indicating uneven implementation. Teacher professional development documents and

meeting minutes show the active facilitation of the principal for training as well as the existence of discussion sessions that allow teacher input in the formulation of the program. Internal policies also strengthen the school's commitment to innovation. Overall, these documents affirm the existence of a strong formal foundation to support vision, teacher development, and participation, although their application in practice is still dynamic and varied.

Human Resource Management (HR)

The researcher developed the study by conducting interviews related to human resource management. Respondents stated that the work culture and collaboration at this school in general is very supportive, judging by the strong family spirit and teamwork. Teachers and staff are active in discussions and sharing ideas, which is strongly encouraged by the principal. However, collaboration between fields of study sometimes still needs to be improved to create wider synergy. Regarding the welfare of teachers and staff, respondents felt that schools paid attention to non-financial aspects such as a comfortable work environment, emotional support, and appreciation. School principals are considered to care about working conditions and motivation, but in terms of financial welfare, there are still many who hope for a more concrete increase in standards or incentives, considering that the main salary and benefits come from the government. The principal is considered to care about work conditions and motivation, often holds community activities, and provides personal attention, which overall contributes to motivation and a sense of appreciation among staff.

In observation, it is clear that positive interaction and open communication between teachers and staff are evident, evidenced by frequent productive discussions. Solid teamwork is also evident in the school's various projects, with all members actively contributing. The presence and involvement of the actively interacting principal confirms its role in encouraging collaboration and personal attention. A comfortable and clean work environment, as well as the existence of togetherness activities, further strengthen the nuances of family. However, gaps were identified in cross-field collaboration, which still need to be improved for broader synergy.

The analysis of school documents corroborates the findings of interviews and observations. Internal policies such as circulars and meeting minutes clearly encourage teacher collaboration in various aspects. The report on school activities shows the spirit of teamwork through the formation of a committee involving various staff. Teacher self-development documents also focus on collaboration and communication. Although the organizational structure shows the existence of cross-functional teams, it is not yet fully optimal. Lastly, the salary and benefits documents confirm that the main financial incentives for teachers come from the foundation.

Learning Curriculum Management

To examine aspects of curriculum management and learning, the researcher conducted interviews, observations and document analysis. In the interview activity, some respondents mentioned that the school curriculum has emphasized 4C skills and digital literacy through projects and research, other

respondents said that the understanding and implementation of teachers needs equity. Innovative learning with PBL and ICT is already actively implemented, but the variety of these methods needs to be expanded to all subjects consistently. The assessment system uses authentic assessments to measure the 4Cs and digital literacy, although the standardization of rubrics and teacher training still needs to be strengthened for objectivity. Lastly, SMK Grafika Desa Putera has strong industrial integration through Prakerin and curriculum synchronization, but facilities need to be continuously updated and the partnership network expanded for a more diverse intake of graduates.

While conducting observations, researchers found a phenomenon that showed students were active in the 4C project and the use of ICT, although the application in various subjects still varied. Authentic assessments are seen to focus on project results, but the standardization of rubrics needs special attention in the improvement aspect. In addition, strong integration with the Grafika industry is visible, although facility updates and partnership expansion are still needed.

The researcher conducted a document analysis, where the curriculum used by teachers emphasized the 4Cs and ICT, with evidence of PBL implementation. Authentic assessment documents exist, but consistency needs to be observed. Lastly, the industry MoU and curriculum synchronization are well archived, along with data indicating the need for facility updates and partnership network expansion.

Facilities and Infrastructure Management

The researcher continued the interview to explore aspects of facilities and infrastructure management. The data was analyzed by finding the phenomenon that eco-schools are actively optimizing the use of ICT in learning (e-learning platforms, educational applications, interactive projectors) and administration (digital systems). However, the quality of internet connections and teachers' ICT training needs to be improved. Learning facilities (classrooms, laboratories, libraries) are considered good and well maintained, and used optimally. Nevertheless, modernization of old facilities and the addition of collaboration spaces/creative studios are needed. Facilities and infrastructure in general support a safe, comfortable, and inspiring learning environment (green spaces, relaxation areas, cleanliness, safety). However, the density of classrooms and the need for more flexible space design are concerns to increase comfort and inspiration.

In the observation study, researchers found that schools actively optimize ICT in learning and administration, and have good learning facilities and are optimally utilized. Infrastructure also supports a safe, comfortable, and inspiring learning environment. However, improvements are needed in internet connections, ICT teacher training, modernization of old facilities, addition of collaboration spaces, and improvements in classroom design to overcome congestion and support innovative learning styles.

Document analysis shows that the curriculum and Learning Implementation Plan (RPP) integrate ICT as a medium and learning method,

supported by a continuous ICT teacher training program. In terms of facilities, inventory and maintenance reports confirm the good condition and completeness of classrooms, laboratories, and libraries, including digital collections. There is also a facility development plan that indicates modernization efforts and the addition of collaboration spaces. Finally, safety and hygiene SOPs and school plans reinforce evidence of a well-maintained learning environment, although data on the number of students per class confirm potential overcrowding at certain hours.

Financial Management

The researcher developed a study to examine aspects of financial management through interviews, observations and document analysis. In general, respondents mentioned that schools involve management, teachers, and committees in transparent budget planning through socialization meetings and information boards. Funds are allocated for curriculum development, teacher training, and facility maintenance. However, the involvement of teachers in the details of allocation and the transparency of budget justification still needs to be improved. The reporting and accountability system for funds has run well with periodic reports to committees and foundations, as well as audits. Proof of transactions is neatly stored, and teachers/staff make accountability reports. Even so, the accessibility and format of financial statements for the public need to be simplified. The school actively seeks additional funding through entrepreneurship, alumni, donations, and proposals to institutions/companies, which are used for innovative programs and facilities. However, the intensity and variety of fundraising and communication strategies to attract potential donors can still be improved.

The results of observations show that school budget planning involves many parties and is transparent at the beginning, but the involvement of teachers in the details of allocations and the clarity of budget justifications still need to be improved. The reporting and accountability system of funds is effective internally, but the accessibility and format of reports to the public need to be simplified. Although schools are actively seeking additional funding, the intensity and variety of fundraising efforts, as well as communication strategies for donors, can still be expanded. In short, schools have a good foundation but need improvements in the details of transparency, public accountability, and funding optimization.

Based on an analysis of the documents, researchers found that reporting and accountability are well organized internally, but the format may be too technical for the public, explaining why its accessibility needs to be improved. Regarding additional funding, the relevant documents indicate active efforts, but may not yet reflect a comprehensive strategy or clear communication plan for future fundraising optimization. In summary, school budget documents have a strong foundation, but they need to be improved in the details of transparency, public participation, and fund development strategies.

School and Community Relations Management (PR)

The researcher conducted an in-depth study on the management aspects of school relations and community through interviews, observations and document analysis. In in-depth interviews, respondents mentioned that schools try to involve parents through regular meetings, digital communication groups, and school activities. Although some parents feel informed, there is still a need for more proactive and personalized strategies to encourage active participation, especially in supporting learning at home. SMK Grafika Desa Putera has a close partnership with industry for internship programs (Prakerin), curriculum alignment, and graduate absorption, which is established through MoUs and industry visits. However, there is a need to expand the partner network to a more diverse sector that is adaptive to technological developments, as well as ensuring the continuity of graduate uptake. School committees are seen as strategic partners in budget planning and a liaison between schools and parents. However, it is necessary to increase the participation and understanding of committee members on managerial issues, as well as transparency of school committee decisions and contributions so that their role is more optimal.

At the time of observation, the researcher found that SMK Grafika Desa Putera has actively sought parental involvement through various communication initiatives, but a more personalized strategy is still needed to encourage active participation in supporting learning at home. Close partnerships with industry are a pillar of the school's strength in curriculum alignment, internship programs, and graduate uptake, although there is a need to expand the partner network to a more diverse and adaptive sector to new technologies, as well as ensure the continuity of graduate uptake. Meanwhile, the school committee has the potential to be a strategic partner, but it needs to increase the participation and understanding of members related to managerial issues, as well as decision transparency to optimize their roles.

The researcher continued the study with document analysis to complete the observations. Researchers found that parents' participation could be tracked through contact books, meeting attendance lists, surveys, and activity reports involving them, to understand the frequency of communication, attendance levels, and their views on home learning supports. Meanwhile, partnerships with industry can be seen from MoU/PKS, internship placement data, and graduate uptake, as well as curriculum and facility revisions that show how extensive the partner network is and how adaptable it is to new technologies. Finally, the role of the school committee is analyzed through AD/ART, meeting minutes, financial reports, and work programs, which will reveal the level of member participation, transparency of managerial decisions, and support for the school's strategic functions.

DISCUSSION

Principal Transformational Leadership

The principal of SMK Grafika Desa Putera has excellent transformational leadership qualities that actively promote innovation and adaptability to the demands of the 21st century, according to data collected from observations and interviews. The principal's efforts to inspire all employees and create a shared

vision reflect this. To guarantee that every aspect of the school feels motivated and fully involved in achieving the school's goals, a more individualized and equitable approach is needed. This is because additional observations show that the application of vision and motivational efforts to all staff still shows variation.

Fundamentally, a vision is an ideal picture of the future that the school wants to achieve. Meanwhile, the mission is a more concrete statement of the means or steps that will be taken to realize the vision. A vision is a compass that shows the direction in which the school wants to go, while a mission is a map and strategy that explains how we will get there. The two must be closely interrelated, logical, and consistently the basis of every decision and program in the school. In his study (Mu'in et al., 2025), in order for institutions to operate effectively and integrate in society, policymakers strive to manage the planning of vision, mission, and marketing strategies. Research shows that these elements are very important and have a positive impact on educational services.

The management of the vision, mission, and strategic marketing of educational institutions is closely related to the leadership of the principal. The principal is responsible for creating and informing all parties involved, about the vision and goals of the school. Principals must ensure that school programs and activities are attractive to the community by making decisions that align with the institution's goals when handling marketing initiatives. Furthermore, effective leadership can foster a healthy work atmosphere by inspiring educators and staff to help realize visions and goals. In addition, the principal is essential in fostering positive relationships with the community, which improves the school's reputation and attracts more students. To ensure the institution continues to grow and meet the requirements of the community, the principal must ultimately assess the impact of the vision, mission, and marketing plan. Therefore, to integrate these components and achieve better educational goals, the transformational leadership of the principal is essential (Rahayu & Iskandar, 2023).

In line with this (Permatasari et al., 2023), mentioning that as a transformational leader, the principal plays the role of a leader who oversees the administration and encourages the creation of an atmosphere that supports teacher excellence. They act as supervisors who supervise and assess the teaching and learning process, as well as mentors who offer guidance and assistance to improve the quality of teaching. The principal also plays the role of an innovator, involving the entire school community in the development of policy solutions that aim to improve the quality of teacher performance. By praising achievements and building a positive work environment, they inspire employees. As part of their managerial responsibilities, principals ensure that administrative tasks are completed efficiently so that educators can concentrate on teaching.

Human Resource Management (HR)

Regarding human resource management, the results of the study show that the teaching staff at SMK Grafika Desa Putera have a close family culture that contributes significantly to a productive work environment. Despite this encouraging work climate, surveys and interviews also show that there is still

room for improvement in terms of teachers' financial security. Therefore, to maximize staff synergy, schools must continue to support and encourage cross-disciplinary collaboration and find innovative ways to increase teacher incentives and compensation.

Teachers who are able to collaborate, will gain several benefits for the individual and the school as a whole. Cooperation is essential to improve teaching and learning standards. Teachers can improve their teaching, create a more creative curriculum, and work together to solve problems in the classroom by sharing ideas and tactics. In addition, collaboration enhances the instructors' professional growth, enhances their competencies, and offers moral support that boosts motivation. All of this ultimately improves student learning outcomes, fosters a better learning atmosphere, and teaches them how to work together (Kasmawati, 2020). In short, teacher collaboration is a wise investment that strengthens and adapts the educational ecosystem.

The spirit of collaboration will certainly create a culture of a comfortable work environment, because it gets support from colleagues who crystallize on job satisfaction. In his analysis (Krismawati & Manuaba, 2022), mentioning a good work environment and high motivation have a positive impact on job satisfaction. This shows that, if the work environment in an educational institution is supportive and conducive, and there is high motivation among the staff, then this will contribute to increasing their job satisfaction. A good work environment includes adequate facilities, harmonious relationships between colleagues, and support from management. Meanwhile, high motivation can come from recognition of achievements, opportunities to grow, and a sense of purpose at work.

In addition to the importance of collaboration, the leadership factor of school principals who are able to inspire by encouraging collaboration, innovation, and openness, while inspiring and motivating all school residents, from teachers to students, to achieve their best potential for the common vision. It also creates a conducive learning climate, reinforces positive norms such as teamwork and open communication, and builds a culture that is adaptive to changing educational needs. In his study (Tiftazani et al., 2025) Mentioning the transformational leadership of the principals is essential to create a positive and innovative school culture, which ultimately improves the quality of education.

Curriculum and Learning Management

Based on the results of the research, SMK Grafika Desa Putera has made great efforts to combine digital literacy and the 4Cs (Critical Thinking, Creativity, Communication, Collaboration) through the use of ICT and the Project Based Learning (PBL) methodology. Nonetheless, the results show that there is still room for improvement in terms of uniformity in the application of this approach and the standardization of accurate assessments among teachers. To ensure equitable quality of learning, schools must standardize assessment rubrics, enhance training in creative approaches, and match curriculum implementation knowledge and practices.

The reason why Project Based Learning (PBL) is great is because it helps students develop the 4Cs which are all important for their future. In addition, when learning becomes relevant and meaningful, learning will engage and motivate students in depth. As a result, students gain freedom and responsibility in addition to a better understanding of the subject through real-world application. In addition, PBL allows for a more authentic evaluation of students' learning progress and successfully prepares them for real-world situations. Based on previous studies in (Mayasari et al., 2022) that with PBL learning, it is effective in encouraging student involvement, such as asking, answering, expressing opinions, and discussing, which has a positive impact on the learning process.

Teachers can provide authentic learning evaluations that include critical thinking, teamwork, and communication skills as students are more engaged. Increased activity allows teachers to provide more detailed and relevant feedback, which helps students understand their areas of weakness. Teachers can also better assess students' understanding of subject matter through increased engagement in activities such as presentations and conversations. Because they feel more respected and engaged in the learning process, students may be more motivated to learn as a result of this diversity of assessments. In his study (Angkat et al., 2024), mentioning that assessments conducted by teachers are not only a tool to measure the achievement of learning objectives, but also serve as a detector of changes in student behavior, allowing for continuous efforts to improve the learning process more effectively.

Facilities and Infrastructure Management

Another key area of concentration is the management of facilities and infrastructure that support the learning process. Based on the results of the research, SMK Grafika Desa Putera has made optimal use of facilities and technology. However, there are several obstacles that need to be resolved immediately, such as the unstable quality of internet connections and the need for more comprehensive ICT training for teachers. To provide a more comfortable, motivating, and adaptive learning environment for future needs, it is also necessary to update outdated facilities, add collaborative areas or creative studios, and redesign classrooms that are more flexible.

Based on previous studies in (Suranto et al., 2022) mentioning the importance of facilities and infrastructure management. This indicates that there are activities to manage and utilize these assets effectively for optimal learning in schools. This management process involves planning, procurement, use, inventory, maintenance, and disposal. This management adheres to the principles of achieving goals, administrative, clarity of responsibility, and cohesiveness. According to (Febriansyah & Handayani, 2025) emphasized that utilizing all resources and infrastructure owned by schools is essentially a process of managing educational facilities and infrastructure in schools. In order to support the learning process and be used properly, all school infrastructure and facilities must be managed properly. This will ensure that classroom learning runs smoothly and educational goals are achieved.

The quality and integration of educational infrastructure is greatly improved with the use of technology. Educational institutions can use technology to manage assets digitally to improve budget planning and real-time monitoring of conditions. Additionally, incorporating technology into the classroom through interactive whiteboards and virtual labs can greatly enhance the educational process. Finally, with smart building management systems, technology contributes to the creation of a more sustainable and energy-efficient environment. Based on previous studies in (Fransisca, 2023) mentioning that technology can help with the maintenance of infrastructure and facilities, security management, and monitoring of conditions in educational institutions. The goal of all of this is to provide students with a contemporary, safe, and comfortable learning environment.

Financial Management

School financial management is another important area that is researched. The study's findings show that budget planning involving a wide range of stakeholders, including administration, teacher representatives, and school committees, is transparent. However, there are still some things that can be done better, such as providing financial data that is more accessible and understandable and involving teachers in the budget allocation process. As a result, the proposal emphasizes the need to improve clarity of budget disbursement details, simplify the format of financial statements for public consumption, and maximize other fundraising tactics through efficient donor outreach.

In order for the use of funds to run optimally and efficiently and every rupiah can be used optimally for teaching and learning activities, educational institutions must implement good financial management. In addition, school financial management must also be able to prevent budget abuse and foster high accountability and transparency, so that all stakeholders can see school financial management.

Financial management involves several important steps to ensure stability and growth. It starts with planning, which includes cash management, profit and loss calculation, and cash flow planning. Furthermore, budgeting allocates funds minimally but effectively for all the company's needs. Then, controlling evaluates ongoing financial activities to identify and fix any problems, for the sake of the company's sustainability. After that, the audit carefully examines financial records to prevent misappropriation and mismanagement of funds by adhering to accounting rules. Finally, reporting communicates the company's financial status transparently to all stakeholders, providing important insights into the overall state of the company (S. Hasan et al., 2022).

To support financial accountability and transparency, of course, technology can be utilized. That way, tracking and reporting financial transactions can be done more efficiently and accurately. According to the study conducted (Azkiyah et al., 2024), that the School's financial transparency can improve their relationships with parents, foster an inclusive learning environment, and increase parental involvement in their children's academic

endeavors by promoting effective financial transparency. In addition, teacher performance is greatly influenced by the accountability of school financial management. The level of accountability of schools in the decision-making process by responsible parties will increase if accountability is implemented correctly, which will motivate teachers to perform better (Sari et al., 2023).

School and Community Relations Management (PR)

Finally, this study found that SMK Grafika Desa Putera has strong industrial relations and is active in promoting internships and job placement of graduates with reference to school-community relations management (PR). Despite these advantages, there is still room for improvement in terms of expanding the partner network to cover a more diverse industry and increasing the involvement of school committees and parents in school-related activities. To promote parent engagement, expand industry alliances to include additional sectors, and increase the understanding and involvement of school committee members on managerial issues, it is critical for schools to create more proactive and tailored initiatives.

In his study (Rahman et al., 2024) mentioned that as a form of innovation in technology and vocational education in Indonesia, the cooperative relationship between schools and industry plays a big role in determining, encouraging, and driving technology education. Students must be able to understand theory and practice by applying them directly in the workplace.

In vocational education in Indonesia, the cooperative relationship between industry and schools is very important to prepare students to enter the workforce. A clear institutional framework, practice-based learning through internships and real projects, collaborative human resource development (e.g., teacher training by practitioners), alignment of curriculum with industry demands, and the use of industrial facilities and technologies are some of the processes that exist. All of this essentially seeks to guarantee that vocational graduates are ready to participate in the job market and have relevant theoretical and practical skills.

According to previous studies in (Sunardi & Muallil, 2023), to improve the standard of education, this cooperation between internal stakeholders is essential. Together, teachers, principals, and administrative staff create programs, track and assess student progress, and make decisions about quality improvement. Overcoming obstacles and achieving common goals requires effective communication. The internal cooperation is developed by collaborating with parents, the community, industry and parties that help improve the quality of education in schools.

Of course, in the management aspect, the functions and duties of public relations play an important role in this. Refer to previous studies in (Rahmawati, 2022), the main task of school Public Relations is to build, maintain, and maintain the sustainability of cooperation with the Business and Industrial World (DUDI) synergistically to improve the competence of graduates. This includes effective communication and interaction with DUDI partners, direct coordination with the Principal to align strategies, and the development of school programs such as the

Teaching Factory (entrepreneurial learning). Public Relations also plays a role in developing human resources by producing productive teachers and facilitating the improvement of teacher competence through collaboration with DUDI. Ultimately, the role of Public Relations with DUDI has implications for increasing students' creativity and competence, as well as expanding their entrepreneurial horizons both inside and outside the classroom.

CONCLUSIONS AND RECOMMENDATIONS

This study identifies six key indicators ("DNA of Educational Excellence") in 21st century school management at SMK Grafika Desa Putera: transformational leadership, human resource management, curriculum and learning, facilities and infrastructure, finance, and public relations. Principals are proactive in innovation, but the implementation of the vision and motivation of staff still varies. The culture of collaboration in HR is strong, but the financial well-being of teachers needs to be improved. The curriculum integrates the 4Cs and digital literacy, but the consistency of implementation and standardization of assessments still needs improvement. The use of technology and facilities has been optimal, but internet connection, ICT teacher training, as well as modernization and addition of collaboration spaces are still areas of development. Financial management is transparent in planning, but teacher involvement in allocation details and accessibility of public reports needs to be improved. Relationships with industry are strong, but the expansion of partner networks, parent participation, and school committees is still needed. SMK Grafika Desa Putera has a good and adaptive management foundation, but it is necessary to continue to innovate and synergize for sustainable excellence

ADVANCED RESEARCH

For further optimization, SMK Grafika Desa Putera is recommended to develop a more personal and equitable motivation strategy and strengthen vision-mission communication under Transformational Leadership. In HR Management, it is necessary to find solutions to improve the financial welfare of teachers and facilitate collaboration across fields of study. Curriculum and Learning must be aligned in implementation with the 4Cs and digital literacy, complemented by innovative method training and standardization of authentic assessments. Improving internet quality, teacher ICT training, modernizing facilities, and adding collaboration space are priorities in Facilities and Infrastructure. In the financial aspect, transparency in budget allocation details and simplification of reports for the public need to be improved, accompanied by optimizing fundraising strategies. Finally, in School and Community Relations, it is necessary to develop proactive strategies for parent participation, expand diverse networks of industry partnerships, and increase school committee participation and transparency.

This research is limited to a qualitative approach and a single case study. Going forward, research may use a mixed approach with a larger sample for better generalizations. There are gaps in the analysis of the long-term impact of school management on student outcomes and career readiness, so longitudinal studies are recommended. The integration of advanced technologies such as big

data analytics and AI in school data management needs to be explored further, including practical challenges and data privacy issues. The model of school committee empowerment and broader public engagement is also less detailed. In addition, a dynamic and sustainable curriculum adaptation strategy to industry changes, as well as risk management and resilience to future disruptions, requires a more in-depth study

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