

HUMAN RESOURCE DEVELOPMENT STRATEGIES FOR SUSTAINABLE DEVELOPMENT AT THE COLLEGE OF MACHINERY AND IRRIGATION

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ABSTRACT: Human resource development (HRD) has a vital role to play in the support of sustainable development within higher education institutions, especially with the emergence of globalization and the transformation of technology. The current study aimed to explore the current status, problems, and strategic solutions for human resource development at the College of Machinery and Irrigation. The current study employed a mixed-methods research design with a questionnaire survey among 45 members of the staff and semi-structured interviews with educational managers and senior lecturers. The findings from the quantitative survey revealed that the institution has successfully developed various human resource development activities, such as training workshops and professional seminars, with the perceptions of the staff members at a moderate level regarding training opportunities, research development, and digital competence support. The findings from the qualitative survey revealed various major problems, such as the lack of long-term strategic planning, insufficient funding for professional development programs, insufficient digital competence support, and insufficient opportunities for international collaborations. The current study suggests that it is essential to strengthen the strategic human resource development planning and develop various

professional development activities and digital competence support for the staff members to support the sustainable development of the institution.

Keywords: *human resource development, sustainable development, higher education, educational management, strategic planning.*

1. Introduction

Within the context of globalization and rapid technology development, higher education institutions have to adjust to the dynamic economic, social, and technology changes. The Fourth Industrial Revolution has dramatically changed the labor market, production systems, and knowledge systems. The Industrial Revolution 4.0 demands a highly skilled workforce with high technical knowledge, digital knowledge, and flexibility (Schwab, 2017). In this dynamic environment, higher education institutions have to innovate to remain competitive. In this dynamic environment, human resources have been identified as the most valuable asset for higher education organizations because the performance of lecturers, administrators, and staff members directly influences teaching effectiveness, research performance, institutional governance, and sustainability (Armstrong & Taylor, 2020). In this context, human resource development (HRD) has been identified as a strategic imperative for higher education organizations.

Human resource development is the "systematic and continuous process of improving employees' knowledge, skills, competence, and professional attitudes to enhance individual and organizational performance" (Swanson & Holton, 2019). HRD in the context of higher education includes the development of professional skills, research development, leadership development, and the development of digital competence skills of the faculty and administrative staff. HRD practices are essential for innovation, institutional adaptability, and organizational sustainability in dynamic and changing environments (Garavan et al., 2020). Therefore, HRD must be strategically integrated with the institutional vision and development goals to ensure sustainability in institutional performance.

At the same time, sustainable development has emerged as an essential concept in global educational discourse. Sustainability, in the context of education, is no longer

limited to the environment but encompasses the sustainability of institutions, quality, efficient governance, and social responsibility (Tilbury, 2011). Similarly, the United Nations' sustainable development goal 4 (SDG 4) stresses the importance of inclusive and equitable quality education and promotes lifelong learning (United Nations, 2015). Achieving these objectives requires institutions to invest in human capital development, strengthen governance systems, and promote innovation in teaching and research. UNESCO (2020) further underscores that human capacity development is fundamental to building sustainable education systems capable of adapting to digital transformation and global competition.

In the case of Vietnam, higher education and vocational institutions are in the process of major reforms with the aim of improving the quality, international integration, and digital transformation of the education sector. The national strategies aim to modernize the system of governance, innovate the methods of teaching, and raise the capacity of the workforce. However, the institutions are still struggling with challenges such as the need to enhance professional development, strategic HR planning, and research activities.

The College of Machinery and Irrigation is a vital part of the education system, providing training to technical professionals in the fields of mechanical and irrigation engineering, which are critical to infrastructure development, modernization of the agricultural sector, and the effective management of water resources. With the pace of technological innovation, the need to produce highly skilled technical professionals is increasing continually. However, the college is struggling with challenges such as the need to integrate digital technology, professional training, and the absence of a strategic HRD approach, which may become increasingly challenging to maintain the quality of education with the absence of strategic HRD interventions.

Considering these issues, it is important and timely to investigate and analyze the status of human resource development in the college. This study aims to assess existing human resource development practices, identify some of the key issues affecting human resource development, and finally suggest strategic ways of addressing these issues in order to improve human resource development and sustain

development in general. This study will be important in advancing the debate on sustainable human resource management and its relationship with sustainability in general, especially in technical and vocational schools during this global transformation era.

2. Literature Review

2.1 Human Resource Development in Higher Education

HRD is widely accepted as a vital factor in the success of organizations, especially in knowledge-based organizations such as universities and colleges. HRD is defined as “a systematic and continuous process aimed at developing the competencies, skills, knowledge, and professional attitudes of employees in order to improve their performance and increase organizational effectiveness” (Garavan et al., 2020; Swanson & Holton, 2019). HRD in educational institutions is not just training activities, but also includes other activities such as mentoring, leadership, research, and networking aimed at improving the performance of lecturers, administrators, and technical staff in order to improve the overall performance of the institution.

In relation to higher learning institutions, it is evident that human resource quality is a key determinant of the success of teaching, research, and community engagement activities. This is because these institutions rely on the academic staff's expertise and professionalism to deliver quality services and create new knowledge. Becker and Huselid (2018) suggest that investing in human capital development is essential for any organization because it is likely to lead to higher levels of innovation, productivity, and competitiveness. Armstrong and Taylor (2020) argue that effective human resource development practices are likely to lead to higher employee motivation and job satisfaction.

Several research works have shown that human resource development programs for lecturers are essential for improving teaching quality and academic performance. For instance, Guskey (2002) suggests that training programs for lecturers can help them become more student-centered and use new technologies for teaching. In addition, research capacity development such as providing support for academic publications, research grants, and international conferences can enhance the scholarly productivity

and global reputation of higher education institutions (Brew & Mantai, 2017). Therefore, HRD has become a strategic tool for institutions seeking to strengthen their academic competitiveness and institutional sustainability.

Furthermore, digital transformation has impacted HRD practices in higher education significantly. The adoption of digital learning platforms and online teaching tools is growing in higher education institutions. This has led to the need for educators and administrative personnel in higher education institutions to acquire new technological skills (Selwyn, 2016). For this reason, many higher education institutions have introduced digital training programs to ensure that their personnel are equipped with the relevant knowledge and skills needed to function effectively in a digital learning environment. This is evidence of the dynamic nature of HRD.

2.2 Sustainable Development in Education

Sustainable development is recognized as a crucial policy issue on the global agenda, including in education policy and practice. The notion of sustainability focuses on finding a balance between economic growth, social justice, and environmental protection for long-term social benefit (Brundtland Commission, 1987). In education policy and practice, sustainable development is recognized as the capacity of education systems and institutions to sustain long-term quality education and social responsibility while addressing pressing global issues and challenges (Tilbury, 2011).

The role of education in sustainable development is recognized globally through the UN's Sustainable Development Goals (SDGs). For instance, SDG 4 focuses on ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all (United Nations, 2015). This entails developing and improving the quality of education, access to education, and capacity of educators and administrators in education systems and institutions. Thus, education systems and institutions are increasingly integrating sustainable development principles into their strategic planning and management systems in higher education institutions.

Within higher education institutions, sustainable development involves multiple dimensions, including academic quality, institutional governance, environmental responsibility, and social engagement. Universities are increasingly expected to

integrate sustainability principles into their curricula, research agendas, and campus operations (Leal Filho et al., 2018). For instance, sustainability-oriented universities often promote interdisciplinary research, encourage community engagement projects, and implement environmentally responsible campus management practices.

Human resources play a central role in achieving these sustainability goals. According to UNESCO (2020), the success of education for sustainable development largely depends on the competencies and professional capacity of educators and institutional leaders. Teachers must possess not only subject-specific knowledge but also the ability to promote critical thinking, interdisciplinary learning, and global citizenship among students. Consequently, the development of qualified and motivated educational personnel is essential for building sustainable educational systems.

Moreover, sustainable development in education requires institutions to adopt long-term strategic approaches that prioritize innovation, collaboration, and continuous improvement. Educational institutions that successfully integrate sustainability into their organizational culture often invest heavily in staff development programs, research initiatives, and international partnerships (Sterling, 2013). These investments enable institutions to remain adaptive and resilient in an increasingly complex and interconnected global environment.

2.3 Strategic Human Resource Development

Strategic human resource development (SHRD) refers to the alignment of HRD policies and practices with the long-term strategic objectives of an organization. Unlike traditional HRD approaches that focus mainly on short-term training activities, SHRD emphasizes a proactive and integrated approach to developing human capital in support of organizational goals (Swanson & Holton, 2019). In higher education institutions, SHRD plays a crucial role in ensuring that staff development initiatives contribute directly to institutional growth, innovation, and sustainability.

One of the fundamental principles of SHRD is the alignment between human resource development initiatives and the strategic vision of the organization.

According to Garavan, Carbery, and Rock (2020), organizations that successfully integrate HRD into their strategic planning processes are better positioned to adapt to environmental changes and achieve sustainable competitive advantages. In educational institutions, this alignment may involve developing staff competencies that support digital transformation, internationalization, research excellence, and curriculum innovation.

Several key strategies have been identified in the literature as essential components of strategic HRD in higher education. First, continuous professional development programs are widely recognized as a cornerstone of effective HRD systems. These programs provide opportunities for educators and administrators to update their knowledge, improve teaching methods, and acquire new professional skills (Guskey, 2002). Continuous learning is particularly important in fields where technological and pedagogical innovations occur rapidly.

Second, leadership and management development programs are crucial for strengthening institutional governance and strategic decision-making. Educational leaders must possess strong management skills, strategic thinking abilities, and the capacity to guide institutional change (Bolden et al., 2012). Leadership training programs can therefore help institutions develop competent academic leaders who can effectively manage organizational transformation.

Third, digital competence development has become increasingly important in the era of digital education. Educators are expected to integrate information and communication technologies (ICT) into teaching and learning processes, while administrators must manage digital information systems and online learning platforms (Selwyn, 2016). As a result, many institutions have incorporated digital literacy training into their HRD strategies.

Fourth, research capacity building is another essential component of strategic HRD. Supporting academic staff in conducting research, publishing scholarly articles, and participating in international conferences can significantly enhance the academic reputation and research productivity of institutions (Brew & Mantai, 2017). Finally, international collaboration and academic networking provide opportunities for

knowledge exchange, joint research projects, and staff mobility programs, all of which contribute to institutional development and global integration.

Overall, strategic human resource development enables higher education institutions to strengthen their human capital, improve institutional resilience, and achieve long-term sustainability. By integrating HRD initiatives with broader institutional development strategies, educational organizations can better respond to global educational transformations and emerging societal demands.

3. Methodology

This study employed a mixed-methods research design, integrating both quantitative and qualitative approaches in order to obtain a comprehensive understanding of human resource development (HRD) practices at the College of Machinery and Irrigation. Mixed-methods research is widely used in educational and social science studies because it allows researchers to combine the strengths of quantitative and qualitative methods, thereby providing a more holistic analysis of complex research problems (Creswell & Creswell, 2018). The quantitative component of the study focused on collecting numerical data regarding staff perceptions of HR development policies, professional training opportunities, and institutional support mechanisms. Quantitative approaches are particularly useful for identifying patterns, measuring attitudes, and providing statistical descriptions of participants' responses (Bryman, 2016). In contrast, the qualitative component aimed to explore deeper insights into institutional strategies, challenges, and development priorities through interviews with key stakeholders. Qualitative research enables researchers to capture participants' experiences, interpretations, and perspectives in greater depth, which is essential when examining organizational practices and strategic development processes (Denzin & Lincoln, 2018). The combination of these two methods allowed the researcher to triangulate findings, thereby increasing the reliability and validity of the research outcomes.

The participants in this study consisted of 45 staff members currently working at the College of Machinery and Irrigation during the academic year 2025–2026. The sample included lecturers, administrative staff, and educational managers who play

important roles in implementing and managing human resource development activities within the institution. Specifically, the participants comprised 30 lecturers, 10 administrative staff members, and 5 educational managers, including department heads and senior administrators responsible for strategic decision-making and staff management. Lecturers represent the core academic workforce responsible for teaching and academic development, while administrative staff contribute to institutional governance and operational efficiency. Educational managers, on the other hand, are directly involved in designing and implementing policies related to staff development and institutional planning. Including participants from different professional roles helped provide diverse perspectives on HRD practices and institutional development strategies. According to Patton (2015), selecting participants from multiple organizational roles can enhance the credibility and richness of research findings by capturing a wide range of experiences and viewpoints.

Two primary instruments were used to collect data for this study: a questionnaire survey and semi-structured interviews. The questionnaire consisted of 20 Likert-scale items designed to examine participants' perceptions of human resource development policies and training opportunities within the institution. The survey items focused on several key areas, including the availability of professional development opportunities, institutional support for training and research activities, digital competence development, leadership and management training, and overall effectiveness of HRD policies. Participants were asked to indicate their level of agreement with each statement using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). Likert-scale questionnaires are commonly used in educational research because they allow researchers to quantify attitudes, perceptions, and levels of satisfaction in a systematic and reliable manner (DeVellis, 2017). The questionnaires were distributed to all participating staff members, and responses were collected anonymously to ensure confidentiality and encourage honest feedback.

In addition to the questionnaire survey, semi-structured interviews were conducted with five educational managers and senior lecturers in order to gain deeper insights

into institutional strategies and challenges related to human resource development. Semi-structured interviews are particularly useful in qualitative research because they provide a flexible framework that allows researchers to explore participants' experiences and perspectives while maintaining consistency across interviews (Kvale & Brinkmann, 2015). The interview questions focused on several topics, including institutional strategies for human resource development, challenges in implementing staff development programs, leadership perspectives on sustainable institutional growth, and future priorities for HRD initiatives. Each interview lasted approximately 30 to 40 minutes and was conducted in a quiet and comfortable setting to facilitate open discussion. With the consent of the participants, the interviews were recorded and later transcribed for analysis.

The data collected from the questionnaire survey were analyzed using descriptive statistical methods, including frequency distributions, mean scores, and percentage analysis. Descriptive statistics are widely used in educational research to summarize survey data and identify general trends in participants' responses (Field, 2018). These statistical results provided an overview of staff perceptions regarding the effectiveness of HRD policies and professional development opportunities within the institution. Meanwhile, the qualitative data obtained from the interviews were analyzed using thematic analysis, which involves identifying and interpreting recurring patterns or themes within qualitative data (Braun & Clarke, 2006). The interview transcripts were carefully reviewed, coded, and categorized into key themes related to HR development strategies, institutional challenges, and future development priorities. By combining quantitative statistical analysis with qualitative thematic analysis, the study was able to provide a comprehensive understanding of the current status of human resource development and its implications for sustainable institutional development at the College of Machinery and Irrigation.

4. Findings

4.1 Current Status of Human Resource Development

The results of the questionnaire survey provide important insights into the current status of HRD practices at the College of Machinery and Irrigation. Overall, the

findings indicate that the institution has made certain efforts to support staff development through a variety of professional activities. These activities include short-term training workshops, professional seminars, internal knowledge-sharing sessions, and occasional academic exchange programs with other institutions. Such initiatives are commonly implemented in higher education institutions as mechanisms to enhance teaching competencies, improve administrative efficiency, and promote professional collaboration among staff members (Garavan et al., 2020).

Many participants acknowledged that these initiatives have contributed positively to improving their professional skills and awareness of new educational practices. For example, training workshops organized by the institution have helped lecturers update their pedagogical approaches and familiarize themselves with new curriculum requirements. Similarly, professional seminars have provided opportunities for staff members to exchange experiences and discuss emerging trends in technical and vocational education. These findings are consistent with previous research indicating that professional development programs play a crucial role in improving teaching effectiveness and enhancing institutional performance in higher education institutions (Armstrong & Taylor, 2020).

However, despite these efforts, the survey results also reveal several limitations in the implementation of HRD activities at the institution. Many respondents indicated that existing training activities are not always systematically organized or aligned with long-term institutional development strategies. Instead, they are often implemented on a short-term or ad hoc basis, depending on immediate needs or available funding. As a result, the overall effectiveness of HRD initiatives remains moderate. According to Becker and Huselid (2018), organizations that fail to integrate human resource development into strategic planning processes may struggle to achieve sustainable improvements in employee performance and institutional competitiveness.

To examine staff perceptions in greater detail, participants were asked to evaluate several aspects of human resource development using a five-point Likert scale. The results are summarized in Table 1.

Table 1. Staff perceptions of human resource development activities

HR Development Aspect	Mean Score	Interpretation
Training opportunities	3.6	Moderate
Institutional support for professional development	3.4	Moderate
Opportunities for research development	3.2	Moderate
Digital training for staff	3.1	Low-Moderate

As shown in Table 1, the availability of training opportunities received the highest mean score (3.6), indicating that respondents generally perceive training activities as moderately available. Nevertheless, several participants noted that training programs are often limited in duration and scope, which may reduce their long-term impact on professional development. In many higher education institutions, continuous and structured training programs are considered essential for developing staff competencies and supporting institutional innovation (Swanson & Holton, 2019).

The level of institutional support for professional development received a mean score of 3.4, suggesting that participants perceive the institution's support as moderate but not fully sufficient. While the college occasionally provides opportunities for staff members to participate in workshops or short courses, respondents indicated that such opportunities are sometimes constrained by financial limitations or administrative procedures. Institutional support, including funding, policy encouragement, and administrative facilitation, has been identified as a critical factor influencing the success of HRD initiatives (Garavan et al., 2020).

Another aspect examined in the survey was opportunities for research development, which received a mean score of 3.2. This relatively low rating indicates that research-related activities such as academic publications, research projects, and participation in scholarly conferences remain limited within the institution. Research capacity development is widely recognized as an essential component of academic professionalism and institutional reputation in higher education (Brew & Mantai,

2017). Therefore, the limited availability of research opportunities may hinder lecturers' ability to engage in scholarly activities and contribute to knowledge creation.

The lowest score among the surveyed categories was related to digital training for staff, which received a mean score of 3.1. This result suggests that many staff members perceive the current level of digital competence development as insufficient. With the increasing integration of digital technologies into education, lecturers and administrative staff are expected to possess strong digital literacy skills in order to effectively use online learning platforms, digital assessment tools, and educational technologies (Selwyn, 2016). The limited availability of digital training programs may therefore pose a challenge to the institution's efforts to implement digital transformation in teaching and management activities.

Overall, the survey results indicate that although the College of Machinery and Irrigation has implemented several HRD initiatives, the effectiveness of these activities remains moderate. Strengthening the strategic coordination of HRD programs and expanding professional development opportunities may significantly enhance staff capacity and institutional performance.

4.2 Challenges in Human Resource Development

The qualitative data obtained from semi-structured interviews with educational managers and senior lecturers revealed several significant challenges affecting human resource development at the institution. One of the most frequently mentioned challenges is the lack of long-term strategic planning for HR development. Many participants indicated that existing training activities are often implemented in response to immediate needs rather than as part of a comprehensive long-term development strategy. Without clear strategic planning, it becomes difficult to systematically develop staff competencies and align professional development initiatives with institutional goals. Strategic human resource development literature emphasizes that aligning HRD initiatives with organizational strategy is essential for achieving sustainable institutional growth (Swanson & Holton, 2019).

Another major challenge identified by interview participants is insufficient funding for professional development programs. Financial constraints were frequently mentioned as a factor limiting the number and quality of training opportunities available for staff members. For instance, several respondents reported that limited budgets restrict their ability to attend advanced training programs, international conferences, or specialized technical courses. According to Armstrong and Taylor (2020), adequate financial investment is a key prerequisite for effective HRD implementation because it enables organizations to provide high-quality training programs and professional development opportunities.

The interviews also revealed a lack of systematic training in digital technology and modern teaching methods. As higher education institutions increasingly adopt digital learning platforms and technology-enhanced teaching methods, educators are expected to possess advanced digital competencies. However, several lecturers indicated that they have not received sufficient training in the use of educational technologies, such as learning management systems, digital assessment tools, or online collaboration platforms. This gap in digital competence development may reduce the effectiveness of technology-enhanced teaching and limit the institution's ability to adapt to digital transformation in education (Selwyn, 2016).

Furthermore, participants highlighted the limited opportunities for international collaboration as another important challenge affecting HRD at the college. International collaboration is widely recognized as an important mechanism for enhancing academic capacity, facilitating knowledge exchange, and improving institutional reputation (Altbach & Knight, 2007). However, many respondents indicated that opportunities for international academic exchanges, joint research projects, and staff mobility programs remain limited. As a result, lecturers may have fewer opportunities to engage with global academic networks and learn from international best practices in education and research.

Taken together, these challenges may significantly hinder the institution's ability to achieve its long-term development objectives and promote sustainable educational growth. Addressing these issues requires stronger strategic planning, increased investment in professional development programs, enhanced digital training

initiatives, and expanded international collaboration opportunities. By implementing comprehensive HRD strategies, the College of Machinery and Irrigation can strengthen its human resource capacity and support sustainable institutional development.

5. Conclusion

This study examined HRD practices at the College of Machinery and Irrigation in order to explore strategies that can support sustainable institutional development. In the context of globalization, rapid technological advancement, and increasing demands for skilled human capital, higher education institutions must continuously invest in the development of their academic and administrative workforce. The findings of this study indicate that although the college has implemented several HRD initiatives, including training workshops, professional seminars, and academic exchanges, the overall effectiveness of these initiatives remains moderate and requires further improvement.

The quantitative survey results reveal that staff members generally perceive the availability of training opportunities and institutional support for professional development as moderately satisfactory. However, opportunities for research development and digital competence training received relatively lower evaluations. These findings suggest that while the institution has made efforts to promote professional development, the existing HRD programs are not yet sufficiently comprehensive or strategically aligned with long-term institutional goals. In particular, the limited availability of digital training programs highlights the need for stronger support in developing technological competencies among staff members, which are increasingly essential in modern educational environments.

In addition to the survey findings, the qualitative interviews identified several key challenges affecting HRD implementation. These challenges include the absence of a clear long-term HRD strategy, limited financial resources for staff development programs, insufficient training in modern teaching methods and digital technologies, and restricted opportunities for international collaboration. Such challenges may hinder the institution's capacity to enhance teaching quality, research productivity,

and institutional innovation, which are critical components of sustainable development in higher education.

To address these issues, the institution should develop a more strategic and systematic approach to human resource development. Strengthening professional development programs, expanding research support, improving digital training initiatives, and promoting international academic collaboration will be essential steps toward enhancing staff capacity and institutional sustainability. By implementing these strategies, the College of Machinery and Irrigation can strengthen its human capital and better respond to the evolving demands of contemporary education and industry.

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