



Human Capital, Work Culture, and Job Satisfaction Scales for Higher Education Institutions: A Bibliometric and Literature Review with Scale Development and Validation toward the Sustainable Development Goals (SDGs)

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ABSTRACT

This study developed and validated human capital, work culture, and job satisfaction scales for higher education institutions in support of the Sustainable Development Goals (SDGs). A bibliometric and literature review was used to identify key constructs related to human resource development, organizational culture, and employee well-being in higher education. The scale development process followed an adapted model through pre-development, development, and post-development stages. The instruments were tested with 42 lecturers and educational staff working at an Indonesian university in Indonesia. Item validity and Cronbach's Alpha reliability analyses showed that human capital, work culture, and job satisfaction items met acceptable psychometric standards. These findings indicate that validated instruments are needed to assess institutional human resources systematically. The scales can support data-driven institutional human resource development.

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1. INTRODUCTION

Indonesia provides an important context for discussing human resource development in higher education. The country has a large higher education system based on data in 2025, with 4,416 universities, 33,741 study programs, 303,067 lecturers, and 9,967,487 students, with a lecturer-to-student ratio of approximately 1:32. The management of lecturers and educational staff is crucial for maintaining institutional quality, academic productivity, learning services, and sustainable higher education governance. Universities require competent, resilient, and integrated human resources to realize their vision, mission, and institutional development strategies (Solehuddin et al., 2025; Emilio et al., 2026). Lecturers are professional educators and scientists who are responsible for transforming, developing, and disseminating science and technology through education, research, and community service. Educational staff also play an essential role in supporting academic administration, financial services, scheduling, infrastructure management, and other institutional services. Thus, the development of lecturers and educational staff must be planned based on accurate needs assessment and institutional performance mapping (Bagdasarjan et al., 2020; Muktamar et al., 2023).

Human resource development is a strategic issue for higher education institutions because universities depend on qualified lecturers and educational staff to achieve academic, administrative, and institutional goals. In higher education, human resources are not only personnel who perform institutional tasks but also human capital that supports education, research, community service, innovation, and organizational sustainability (Fenwick and Bierema, 2008; Kim, 2012; Stone and Deadrick, 2015; Zhao et al., 2021). Therefore, universities need systematic human resource development strategies supported by valid data, reliable instruments, and evidence-based decision-making. Human resource development in universities includes training, education, certification, career development, comparative studies, transfers, welfare improvement, and professional capacity building. These programs should be based on valid and reliable information about the condition of institutional human resources. Without appropriate measurement instruments, higher education leaders may face difficulties in identifying strengths, weaknesses, career development needs, work culture conditions, and job satisfaction levels among lecturers and educational staff. Therefore, valid and reliable scales are needed to support data-driven human resource development in higher education institutions (Golovina et al., 2021; Nwachukwu, 2024; Wahyuli et al., 2024).

Human capital, work culture, and job satisfaction are important constructs in higher education human resource development. Human capital refers to the knowledge, skills, abilities, experience, attitudes, creativity, and leadership potential owned by individuals and used to improve organizational productivity (Sodirjonov, 2020; Abraham and Justine, 2022). Work culture reflects organizational values, communication patterns, cooperation, openness, commitment, flexibility, responsibility, innovation, and decision-making practices that shape institutional performance (Fät, 2015; Tan, 2019). Job satisfaction represents employees' responses to welfare, career promotion, institutional concern, work-life balance, recognition, organizational justice, and security protection (Eyupoglu et al., 2017; Sabuharia et al., 2020).

The development of measurement scales for these constructs is relevant to the Sustainable Development Goals (SDGs), especially SDG 4 on quality education and SDG 8 on decent work and economic growth. Sustainable higher education requires institutions that can improve academic quality while also supporting fair, productive, and satisfying work environments. In

this context, the measurement of human capital, work culture, and job satisfaction can help universities design career development programs, strengthen organizational culture, improve employee well-being, and support institutional sustainability. Previous studies have also emphasized that educational innovation, human capital development, and institutional capacity are important for improving higher education quality and supporting sustainable development (Bagdasarian *et al.*, 2020; Awwalina *et al.*, 2025; Rohmah *et al.*, 2025; Resbiantoro and Widodo, 2026).

Although human capital, work culture, and job satisfaction have been widely discussed in human resource and organizational studies, these constructs are often examined separately. In higher education institutions, especially for lecturers and educational staff, integrated scales that measure these three constructs together remain limited. This gap is important because higher education leaders need valid and reliable instruments for needs assessment, institutional evaluation, career development planning, work culture improvement, and data-driven decision-making. Therefore, an integrated measurement instrument is needed to support systematic human resource development in higher education institutions. Based on this gap, this study develops and validates human capital, work culture, and job satisfaction scales for higher education institutions. By integrating bibliometric insight, literature review, scale development, and empirical validation, this study provides practical instruments to support needs assessment, human resource mapping, and SDG-oriented higher education management. The novelty of this study lies in its integration of human capital, work culture, and job satisfaction into a single set of measurement scales for lecturers and educational staff. Unlike previous studies that generally discuss these constructs separately, this study develops and validates integrated instruments for institutional human resource mapping, career development planning, organizational culture improvement, and evidence-based policy in higher education. This contribution is expected to support sustainable higher education management in line with the SDGs.

2. LITERATURE REVIEW

The relationship among the main constructs, their relevance to higher education, and their contribution to SDG-oriented institutional development is summarized in **Table 1**.

Table 1. Main constructs and their relevance to SDG-oriented higher education.

CONSTRUCT	MAIN FOCUS	RELEVANCE TO HIGHER EDUCATION	RELEVANCE TO SDGS
Human capital	Knowledge, skills, experience, attitude, creativity, and leadership	Supports lecturer and staff competence, productivity, and career development	Supports SDG 4 through quality education and institutional capacity
Work culture	Teamwork, communication, openness, responsibility, innovation, and decision-making	Strengthens collaboration, governance, and institutional performance	Supports sustainable and inclusive institutional work environments
Job satisfaction	Welfare, recognition, promotion, work-life balance, fairness, and security	Improves motivation, commitment, and employee well-being	Supports decent work, professional development, and sustainable higher education
Scale development	Construct definition, item development, validity, and reliability	Provides instruments for institutional assessment and decision-making	Supports data-driven policy and evidence-based human resource development

2.1. Human Resource Development in Higher Education

Human resource development is a structured process designed to improve employees' knowledge, skills, attitudes, performance, and career potential. In higher education institutions, human resource development is closely related to lecturers' academic performance, educational staff's administrative competence, institutional service quality, and organizational sustainability. Universities must respond to changing academic demands, technological transformation, quality assurance systems, and global competition; therefore, human resource development becomes an important strategy for institutional improvement (Fenwick and Bierema, 2008; Kim, 2012; Stone and Deadrick, 2015). Lecturers and educational staff have different but complementary roles in higher education. Lecturers are responsible for education, research, and community service, while educational staff support administrative, financial, technical, and managerial processes. Both groups require continuous professional development. Thus, universities can provide quality education and effective institutional services. Therefore, higher education institutions need development programs based on accurate information about employee competence, work behavior, motivation, and job satisfaction (Bagdasarian et al., 2020; Muktamar et al., 2023). Human resource development also requires data-based planning. Needs assessment is necessary to identify employee strengths, weaknesses, training needs, career potential, and institutional support systems. Such assessment requires valid and reliable instruments so that the results can be used as a basis for decision-making. Without appropriate instruments, development programs may not accurately reflect the real needs of lecturers and educational staff (Golovina et al., 2021; Wahyuli et al., 2024).

2.2. Human Capital in Higher Education

Human capital refers to the knowledge, skills, abilities, experience, and attitudes possessed by individuals and used to create value for an organization. In universities, human capital is reflected in lecturers' academic expertise, research capacity, teaching competence, professional experience, creativity, leadership, and ability to contribute to institutional development. Educational staff also represent human capital because their administrative and technical competencies support the effectiveness of academic services and institutional governance (Sodirjonov, 2020; Abraham and Justine, 2022). The human capital perspective places people as strategic assets rather than merely institutional employees. This perspective is important for higher education because universities depend on intellectual capability, professional competence, and innovation to improve academic performance. Human capital development can increase institutional productivity, strengthen organizational capacity, and support long-term educational quality (Jerzak, 2015; Tran and Vo, 2020; Lentjushenkova, 2021). In this study, the human capital scale is constructed from eight dimensions: talent, education, experience, knowledge, skills, attitude, creativity, and leadership. These dimensions reflect the capacity of lecturers and educational staff to perform their roles effectively. Previous studies show that intellectual capital, organizational learning, and employee performance are closely related in organizational contexts (Al-Husseini, 2023). Therefore, measuring human capital is important for identifying the potential and development needs of higher education human resources.

2.3. Work Culture in Higher Education Institutions

Work culture refers to the shared values, beliefs, habits, communication patterns, cooperation, expectations, and governance practices that influence employee behavior and

institutional performance. In higher education institutions, work culture shapes how lecturers and educational staff communicate, collaborate, solve problems, make decisions, respond to change, and support institutional goals (Fät, 2015; Tan, 2019). A positive work culture is important because it can strengthen teamwork, openness, responsibility, innovation, commitment, and work engagement. In universities, work culture affects not only employee performance but also the quality of academic services and institutional development. A strong work culture can help universities create a more productive, transparent, collaborative, and adaptive working environment. Previous research has shown that leadership style and work engagement are related to employee outcomes in organizational settings (Aboramadan and Dahleez, 2020). The work culture scale in this study includes teamwork, communication, openness, autonomy, commitment, involvement, flexibility, creativity, responsibility, goal orientation, continuous learning, risk-taking, adaptation, mindset, incentives, work atmosphere, decision-making, and promotion systems. These dimensions are relevant for assessing the organizational environment experienced by lecturers and educational staff. Measuring work culture can help university leaders identify whether institutional values and practices support employee development and sustainable organizational performance.

2.4. Job Satisfaction among Lecturers and Educational Staff

Job satisfaction refers to employees' positive or negative responses to their work conditions, institutional policies, welfare, career opportunities, recognition, communication, leadership, and organizational justice. In higher education, job satisfaction is important because satisfied lecturers and educational staff are more likely to show stronger motivation, commitment, productivity, and institutional loyalty (Eyupoglu *et al.*, 2017; Sabuharia *et al.*, 2020). Job satisfaction is closely related to human resource development because employees who feel appreciated, supported, and treated fairly are more motivated to improve their competence and contribute to institutional goals. In universities, job satisfaction can be influenced by salary, incentives, promotion systems, performance appraisal, work-life balance, institutional concern, recognition, innovation opportunities, and social security protection. These factors can determine whether lecturers and educational staff perceive their institution as supportive and fair. The job satisfaction scale in this study includes institutional concern, employee motivation, job promotion, respect among employees, two-way feedback, work-life balance, perceptions of performance appraisal, fair organizational policies, creativity development, and security protection. These dimensions are important for evaluating the extent to which higher education institutions provide a satisfying and supportive work environment for their employees.

2.5. Scale Development and Validation

Scale development is an important process in educational and organizational research because it provides instruments that can measure specific constructs systematically. A good scale must be developed based on clear theoretical constructs, relevant indicators, appropriate items, and psychometric testing. In this study, the scale development process follows an adapted model through pre-development, development, and post-development stages. The pre-development stage includes conceptual analysis and identification of the need for measurement instruments. The development stage includes defining constructs, preparing scale grids, writing items, and conducting expert review. The post-development stage includes pilot testing, item validity analysis, reliability testing, and final compilation of

valid and reliable items. This process is important to ensure that the resulting scales are theoretically grounded and empirically acceptable. Item validity is used to assess whether scale items are relevant to the constructs being measured. Reliability testing is used to examine the consistency of measurement results. Cronbach's Alpha is commonly used in educational and social science research to examine internal consistency reliability (Taber, 2018; Almasreh et al., 2019; McNeish, 2018; Schrepp, 2020). Likert scales are also widely used because they allow respondents to express levels of agreement with specific statements, although careful attention must be given to response options, validity, reliability, and potential bias (Kusmaryono et al., 2022; Tanujaya et al., 2022).

2.6. Relationship among Human Capital, Work Culture, Job Satisfaction, and SDGs

Human capital, work culture, and job satisfaction are interrelated constructs in higher education human resource development. Human capital provides the individual capacity needed for academic and administrative performance. Work culture provides the organizational environment that supports collaboration, responsibility, innovation, and institutional commitment. Job satisfaction reflects how lecturers and educational staff perceive institutional support, fairness, welfare, recognition, and career opportunities. These three constructs are also relevant to SDG-oriented higher education. SDG 4 emphasizes quality education, while SDG 8 emphasizes decent work and productive employment. In higher education institutions, quality education cannot be separated from the quality of lecturers and educational staff, the culture of the workplace, and the satisfaction of institutional employees. Studies on educational innovation and SDG-related learning show that education quality can be strengthened through innovation, critical thinking, creativity, and institutional support (Awwalina et al., 2025; Rohmah et al., 2025; Resbiantoro and Widodo, 2026).

3. METHODS

This study used a development research design combining bibliometric insight, literature review, scale development, and empirical validation. The purpose was to develop and validate three measurement scales for higher education institutions: human capital, work culture, and job satisfaction. These scales were designed to support human resource development and SDG-oriented institutional management in higher education.

Initially, the stage involved bibliometric insight and a literature review to identify key constructs and indicators related to human capital, work culture, job satisfaction, higher education management, and the SDGs. The review focused on previous studies on human resource development, organizational culture, job satisfaction, scale construction, item validity, Likert scale use, and Cronbach's Alpha reliability (Fenwick and Bierema, 2008; Kim, 2012; Stone and Deadrick, 2015; Sodikjonov, 2020; Abraham and Justine, 2022; Taber, 2018; Almasreh et al., 2019; Kusmaryono et al., 2022; Tanujaya et al., 2022).

The scale development process followed an adapted model through three stages: pre-development, development, and post-development.

- (i) The pre-development stage consisted of conceptual analysis and construct identification. Human capital was developed from eight dimensions: talent, education, experience, knowledge, skills, attitude, creativity, and leadership. Work culture was developed from eighteen dimensions, including teamwork, communication, openness, autonomy, commitment, involvement, flexibility, creativity, responsibility,

goal orientation, continuous learning, risk taking, adaptation, mindset, incentive, excitement, decision-making, and career promotion systems. Job satisfaction was developed from ten dimensions, including institutional concern, employee motivation, job promotion, respect between employees, two-way feedback, work life balance, perceptions of performance appraisal leaders, fair organizational policies, creativity development, and security protection.

- (ii) The development stage included preparing the scale grid, writing statement items, selecting a four-point Likert response format, and conducting expert review. The response options were strongly agree, agree, disagree, and strongly disagree. The four-point scale was used to reduce neutral responses and encourage clearer respondent choices (Kusmaryono *et al.*, 2022; Tanujaya *et al.*, 2022).
- (iii) The post-development stage involved pilot testing, validity analysis, reliability analysis, and final item selection. The instruments were tested on 42 lecturers and educational staff working at universities in Indonesia. Item validity was analyzed by correlating each item score with the total score. Items were considered valid when the calculated correlation coefficient was equal to or higher than the *r*-table value of 0.297 at *N* = 42 (Arfandi *et al.*, 2020). Invalid items were removed from the final scale.

Reliability was examined using Cronbach's Alpha to assess internal consistency (Taber, 2018; McNeish, 2018; Schrepp, 2020). The reliability categories with Alpha values of 0.93-0.94 were categorized as excellent, 0.91-0.93 as strong, and 0.84-0.90 as reliable. Statistical analyses were conducted using SPSS for Windows. The overall development procedure is illustrated in **Figure 1**.

4. RESULTS AND DISCUSSION

4.1. Bibliometric Analysis of Human Capital, Higher Education, and Job Satisfaction Research

A bibliometric analysis was conducted to identify the development of research related to human capital, higher education, and job satisfaction. The search was conducted using the Scopus database with the query TITLE-ABS-KEY ("human capital" AND "higher education" AND "job satisfaction"). The analysis covered publications from 2004 to 2026 and resulted in 32 documents. The annual publication trend is presented in **Figure 2**.

Research connecting human capital, higher education, and job satisfaction remains limited. Only 32 documents were identified from 2004 to 2026, indicating that this topic is still relatively underexplored in the Scopus-indexed literature. The publication trend also shows an irregular pattern. In the early period, the number of publications was very low, with only one document in 2004 and another in 2009. No publications appeared in several years, indicating that the topic had not yet become a consistent research concern.

A clearer increase began after 2014, when three documents were published. The number of publications increased again in 2017, with four documents, and reached another peak in 2020, also with four documents. After that, publication output fluctuated, with two documents in 2022, two documents in 2023, one document in 2024, and two documents in 2025. The highest number appeared in 2026, with six documents. This increase suggests growing academic attention to the relationship between human capital, higher education, and job satisfaction, especially in the context of institutional quality, human resource management, and sustainable higher education development.

The limited number of publications supports the relevance of the present study. Although human capital and job satisfaction have been widely discussed in organizational and educational studies, their integration with higher education and instrument development remains less developed. This finding strengthens the research gap that higher education institutions still require valid and reliable instruments to measure human capital, work culture, and job satisfaction among lecturers and educational staff. Therefore, the bibliometric result justifies developing integrated measurement scales that can support data-driven human resource development and institutional improvement toward the SDGs.

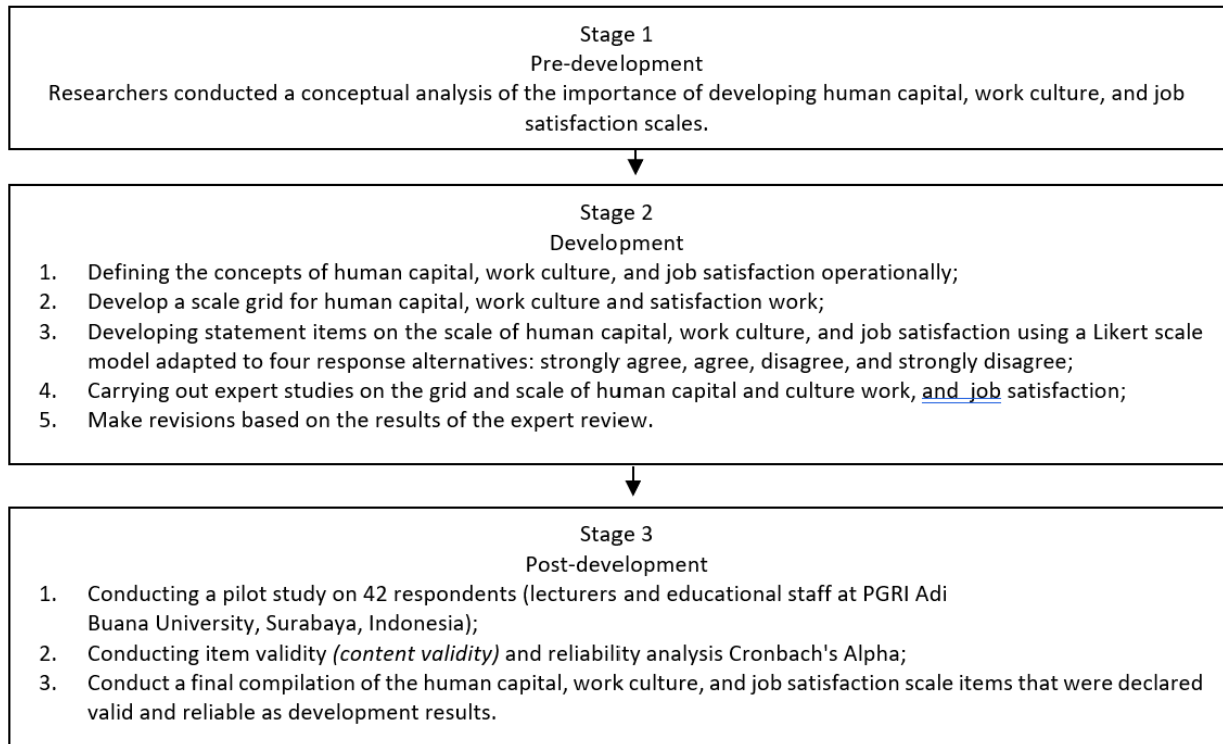


Figure 1. Adapted development model for scale development and validation.

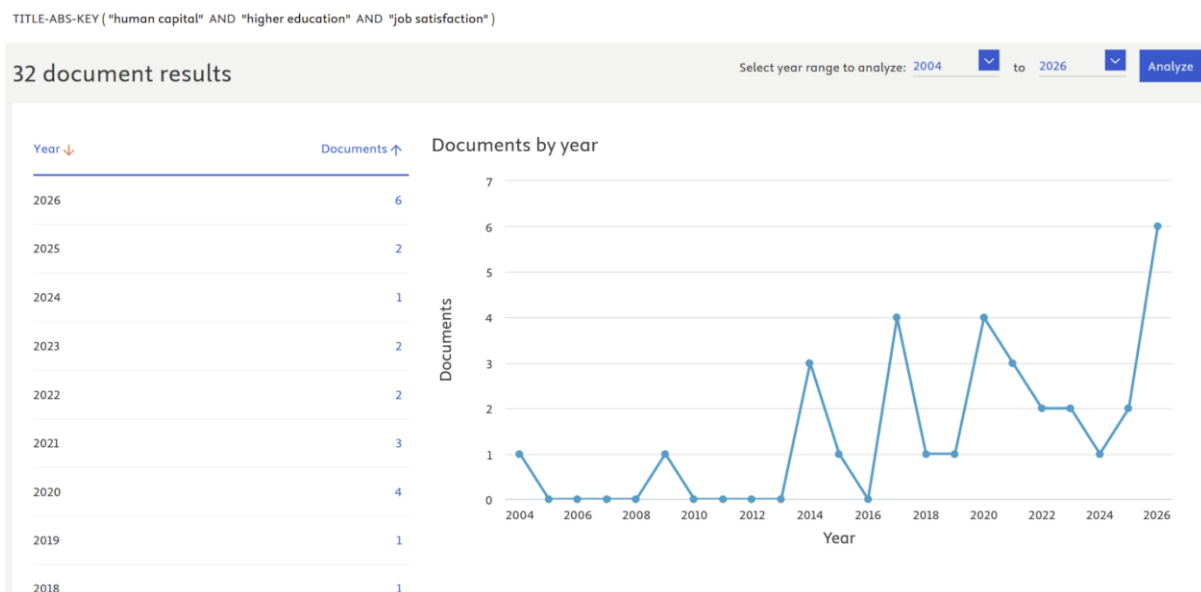


Figure 2. Annual publication trend on human capital, higher education, and job satisfaction based on Scopus data.

4.2. Development of Human Capital, Work Culture, and Job Satisfaction Scales

The scale development process followed an adapted model consisting of three stages: pre-development, development, and post-development. In the pre-development stage, the constructs of human capital, work culture, and job satisfaction were identified based on a literature review, institutional needs, and the results of bibliometric insight. In the development stage, the scale grids and statement items were prepared based on the indicators of each construct. The instruments used a four-point Likert scale with the response options strongly agree, agree, disagree, and strongly disagree.

The human capital scale was developed from eight dimensions: talent, education, experience, knowledge, skills, attitude, creativity, and leadership. The work culture scale was developed from eighteen dimensions, including teamwork, communication, openness, autonomy, commitment, involvement, flexibility, creativity, responsibility, goal orientation, continuous learning, risk-taking, adaptation, mindset, incentives, work atmosphere, decision-making, and promotion systems. The job satisfaction scale was developed from ten dimensions, including institutional concern, employee motivation, job promotion, respect among employees, two-way feedback, work-life balance, performance appraisal, organizational fairness, creativity development, and security protection.

The development process produced three initial instruments that were then reviewed and tested. The human capital instrument consisted of 68 items, the work culture instrument consisted of 46 items, and the job satisfaction instrument consisted of 27 items. These items were then analyzed through item validity and reliability testing to determine which items met the psychometric requirements.

4.3. Validity of the Human Capital Scale

The results of the validity analysis for the human capital scale are presented in **Table 2**. The human capital scale consisted of 68 initial statement items covering eight aspects: talent, education, experience, knowledge, skills, attitude, creativity, and leadership. Based on the item validity analysis involving 42 respondents, 55 items were declared valid, and 13 items were declared invalid. The valid items had correlation coefficients ranging from 0.320 to 0.671, which were higher than the r-table value of 0.297. Meanwhile, invalid items had correlation coefficients below the required value and were removed from the final scale. Most human capital items were suitable for measuring the capacity of lecturers and educational staff in higher education institutions. The valid items represent important dimensions of human capital, including competence, professional experience, knowledge application, responsibility, creativity, and leadership. Therefore, the final human capital scale can be used as an instrument to identify the strengths and development needs of higher education human resources.

Table 2. Results of item validity analysis of the human capital scale.

ASPECT	ITEM NO	STATEMENT	R PRODUCT MOMENT	R TABLE	RESULT
Talent	1	I keep learning while doing my job.	0.485	0.297	Valid
Talent	2	I do not get support from my workplace to develop myself.	0.544	0.297	Valid
Talent	3	Employee welfare is paramount at my workplace.	0.526	0.297	Valid

Table 2 (continue). Results of item validity analysis of the human capital scale.

ASPECT	ITEM NO	STATEMENT	R PRODUCT MOMENT	R TABLE	RESULT
Talent	4	I did not receive wages according to the work I did.	0.612	0.297	Valid
Talent	5	Cadre formation is part of my job.	0.432	0.297	Valid
Talent	6	I do evaluations on each job, both individually and in groups.	-0.391	0.297	Invalid
Talent	7	I can give proper direction to my coworkers.	0.338	0.297	Valid
Talent	8	My workplace does not support positive change.	0.451	0.297	Valid
Education	9	I got a job that fits my field of expertise.	0.512	0.297	Valid
Education	10	I did not get a job that matched the knowledge I received while studying at college.	0.472	0.297	Valid
Education	11	I took many courses to get a job.	0.030	0.297	Invalid
Education	12	I do not have a certificate of appreciation from the course results.	0.367	0.297	Valid
Education	13	The competencies I have make work enjoyable.	0.443	0.297	Valid
Education	14	I cannot work with talented people.	0.502	0.297	Valid
Education	15	I put my energy into doing the work.	0.280	0.297	Invalid
Education	16	I do not put my mind into doing the work.	0.385	0.297	Valid
Education	17	In my work, I am resilient in facing difficult conditions.	0.228	0.297	Invalid
Experience	18	I do not do my best on every job given.	0.470	0.297	Valid
Experience	19	Every time I take on a new job, I am challenged to do it optimally.	0.519	0.297	Valid
Experience	20	When I work, I do not start from the easiest to the most difficult.	0.109	0.297	Invalid
Experience	21	I apply time management in my work.	0.420	0.297	Valid
Experience	22	I did not make maximum use of the facilities provided at work.	0.497	0.297	Valid
Experience	23	I am able to operate tools in my work.	0.425	0.297	Valid
Experience	24	For the work to run smoothly, I do not make decisions in difficult conditions.	0.370	0.297	Valid
Experience	25	I work with full confidence.	0.290	0.297	Invalid
Knowledge	26	I do not analyze while working.	0.671	0.297	Valid
Knowledge	27	I can easily remember details of work that has been and will be done.	0.266	0.297	Invalid
Knowledge	28	The completeness of the data makes it difficult for me to work.	0.218	0.297	Invalid
Knowledge	29	In my work, I apply the studies I received during my education.	0.275	0.297	Invalid
Knowledge	30	I do not believe that maximum results are achieved due to employee involvement.	0.449	0.297	Valid
Knowledge	31	I have a good relationship with all the employees at work.	0.499	0.297	Valid
Knowledge	32	My workplace does not implement fast bureaucracy.	0.295	0.297	Invalid

Table 2 (continue). Results of item validity analysis of the human capital scale.

ASPECT	ITEM NO	STATEMENT	R PRODUCT MOMENT	R TABLE	RESULT
Knowledge	33	Giving awards is a culture in my workplace.	0.573	0.297	Valid
Skills	34	My job is not a noble thing.	0.431	0.297	Valid
Skills	35	I am proud of my current job.	0.493	0.297	Valid
Skills	36	I do not work responsibly.	0.516	0.297	Valid
Skills	37	I work sincerely.	0.450	0.297	Valid
Skills	38	I work sadly.	0.405	0.297	Valid
Skills	39	I work in accordance with the institution's vision.	0.467	0.297	Valid
Skills	40	I work in a way that is not in line with the institution's mission.	0.438	0.297	Valid
Skills	41	I completed the assignment on time.	0.202	0.297	Invalid
Skills	42	When I work, I feel that the personal atmosphere and environment are uncomfortable.	0.457	0.297	Valid
Skills	43	I work professionally.	0.491	0.297	Valid
Attitude	44	My work department has a team that is not solid.	0.438	0.297	Valid
Attitude	45	I feel comfortable working with this team.	0.457	0.297	Valid
Attitude	46	Teamwork makes it difficult to do the job.	0.528	0.297	Valid
Attitude	47	In my work department, I have divided the tasks according to competency.	0.494	0.297	Valid
Attitude	48	The place I work does not provide health insurance.	0.404	0.297	Valid
Attitude	49	The place where I work provides old-age security.	0.289	0.297	Invalid
Attitude	50	At my workplace, my boss does not give me proper attention.	0.542	0.297	Valid
Attitude	51	The data security system at my workplace provides a sense of security.	0.579	0.297	Valid
Attitude	52	I am not supported by information and communication technology facilities in my work.	0.366	0.297	Valid
Creativity	53	The freedom to develop working methods exists where I work.	0.578	0.297	Valid
Creativity	54	I do not have many references in troubleshooting work.	0.217	0.297	Invalid
Creativity	55	Efforts to make work easier are continually made every year at my workplace.	0.346	0.297	Valid
Creativity	56	Problem-solving references are not obtained from personal or group experience.	0.484	0.297	Valid
Creativity	57	I conducted a field analysis to map the problem.	0.518	0.297	Valid
Creativity	58	I did not get a comprehensive idea of the problem findings.	0.603	0.297	Valid
Creativity	59	I conducted expert testing of the established solutions.	0.275	0.297	Invalid
Creativity	60	I do not prescribe solutions to the problem findings.	0.426	0.297	Valid

Table 2 (continue). Results of item validity analysis of the human capital scale.

ASPECT	ITEM NO	STATEMENT	R PRODUCT MOMENT	R TABLE	RESULT
Leadership	61	I dare to face new things at work.	0.613	0.297	Valid
Leadership	62	I am not actively involved in taking advantage of opportunities.	0.639	0.297	Valid
Leadership	63	I correct the error in a calm state.	0.507	0.297	Valid
Leadership	64	I do not take advantage of my strengths at work.	0.629	0.297	Valid
Leadership	65	I encourage the team to develop themselves.	0.419	0.297	Valid
Leadership	66	I do not build positive communication with my coworkers.	0.438	0.297	Valid
Leadership	67	As an effort to advance the institution, I held discussions with work relations.	0.320	0.297	Valid
Leadership	68	I have a negative impression of work relations.	0.522	0.297	Valid

4.4. Validity of the Work Culture Scale

The results of the validity analysis for the work culture scale are presented in **Table 3**. The work culture scale consisted of 46 initial statement items covering eighteen aspects of organizational work culture. The results showed that 39 items were valid and 7 items were invalid. The valid items had correlation coefficients ranging from 0.305 to 0.678, exceeding the r-table value of 0.297. Invalid items were removed from the final version of the scale. The work culture scale has sufficient item validity to measure the organizational environment experienced by lecturers and educational staff. The valid items represent important aspects of work culture, such as teamwork, communication, openness, commitment, creativity, responsibility, goal orientation, adaptation, incentives, work atmosphere, decision-making, and career promotion systems. The scale can therefore help higher education leaders understand whether institutional culture supports collaboration, innovation, and sustainable employee development.

Table 3. Results of item validity analysis of the work culture scale.

ASPECT	ITEM NO	STATEMENT	R PRODUCT MOMENT	R TABLE	RESULT
Teamwork	1	I feel useful in my work/profession.	0.177	0.297	Invalid
Teamwork	2	I do not collaborate with certain parties in carrying out my duties.	0.446	0.297	Valid
Teamwork	3	I have to grow the institution where I work.	0.506	0.297	Valid
Communication	4	I do not communicate with the leadership to carry out my duties.	0.398	0.297	Valid
Communication	5	I communicate with colleagues to carry out tasks.	0.516	0.297	Valid
Openness	6	I do not dare to express my opinion freely while working.	0.428	0.297	Valid
Openness	7	I work objectively.	0.507	0.297	Valid
Openness	8	I work honestly.	0.481	0.297	Valid
Openness	9	I do not like being criticized while working.	0.225	0.297	Invalid
Autonomy	10	I feel capable of carrying out my duties at work.	0.427	0.297	Valid

Table 3 (continue). Results of item validity analysis of the work culture scale.

ASPECT	ITEM NO	STATEMENT	R PRODUCT MOMENT	R TABLE	RESULT
Autonomy	11	I find it difficult to find solutions when I experience difficulties at work.	0.420	0.297	Valid
Autonomy	12	I am free to use any method to carry out tasks at work.	0.124	0.297	Invalid
Commitment	13	I do not have a strong desire to achieve more.	0.422	0.297	Valid
Commitment	14	I am determined to advance the institution where I work.	0.310	0.297	Valid
Commitment	15	In difficult situations, I do not need to defend something.	0.486	0.297	Valid
Involvement	16	In principle, efforts to advance the institution where I work are an important need.	0.523	0.297	Valid
Involvement	17	I was not maximally involved in making this workplace a more advanced institution.	0.569	0.297	Valid
Involvement	18	I feel that work democracy is well maintained.	0.402	0.297	Valid
Involvement	19	The collaborative atmosphere where I work is not well maintained.	0.185	0.297	Invalid
Flexibility	20	If I make a mistake in carrying out my duties, I can make the appropriate corrections.	0.461	0.297	Valid
Flexibility	21	When doing assignments, I do not have to finish them on time.	0.204	0.297	Invalid
Creativity	22	I realize that work creativity is an important thing in work.	0.508	0.297	Valid
Creativity	23	I do not want to innovate to produce the best work in my field.	0.678	0.297	Valid
Creativity	24	I appreciate all forms of creative work.	0.510	0.297	Valid
Responsibility	25	I do not need to excel to advance the institution where I work.	0.451	0.297	Valid
Responsibility	26	I must complete the tasks that are my responsibility on time.	0.366	0.297	Valid
Goal orientation	27	I do not understand the vision of the institution where I work.	0.587	0.297	Valid
Goal orientation	28	I understand the mission of the institution where I work.	0.458	0.297	Valid
Goal orientation	29	I must be able to use strategies to achieve goals in the institution where I work.	0.550	0.297	Valid
Continuous learning	30	I did not have the opportunity to pursue further studies.	0.331	0.297	Valid
Continuous learning	31	I realize that developing my profession through training, seminars, further studies, and the like is important.	0.407	0.297	Valid
Risk taking	32	I have never received any sanctions from my superiors when I made mistakes at work.	0.305	0.297	Valid
Risk taking	33	I have to improve my lack of work skills.	0.631	0.297	Valid

Table 3 (continue). Results of item validity analysis of the work culture scale.

ASPECT	ITEM NO	STATEMENT	R PRODUCT MOMENT	R TABLE	RESULT
Adaptation	34	I am unable to adapt to the work environment.	0.492	0.297	Valid
Adaptation	35	I can change the work environment to be more conducive.	0.567	0.297	Valid
Mindset	36	I do not have a dynamic mindset.	0.456	0.297	Valid
Mindset	37	I have to think creatively at work.	0.471	0.297	Valid
Mindset	38	I am unable to think critically at work.	0.199	0.297	Invalid
Incentive	39	I receive incentives for work performance.	0.442	0.297	Valid
Incentive	40	The institution where I work does not give awards to employees who excel.	0.504	0.297	Valid
Excitement	41	I can feel that the working atmosphere at the institution where I work is very pleasant.	0.586	0.297	Valid
Excitement	42	I am not happy working in this institution.	0.582	0.297	Valid
Decision-making	43	The decision-making process at my workplace is only carried out by leaders at the rectorate level.	-0.471	0.297	Invalid
Decision-making	44	The way decisions are made where I work is not carried out by work units.	0.009	0.297	Invalid
Career promotion system	45	The career development system at the institution where I work is carried out transparently.	0.333	0.297	Valid
Career promotion system	46	The career development system at the institution where I work has no clear accountability.	0.470	0.297	Valid

4.5. Validity of the Job Satisfaction Scale

The results of the validity analysis for the job satisfaction scale are presented in **Table 4**. The job satisfaction scale consisted of 27 initial statement items covering ten aspects: institutional concern, employee motivation, job promotion, respect among employees, two-way feedback, work-life balance, performance appraisal, fair organizational policies, creativity development, and security protection. The validity analysis showed that 24 items were valid and 3 items were invalid. The valid items had correlation coefficients ranging from 0.348 to 0.764, which exceeded the r-table value of 0.297. The job satisfaction scale is suitable for assessing the level of satisfaction among lecturers and educational staff. The valid items reflect employees' perceptions of welfare, recognition, career opportunities, transparency, fairness, creativity support, and security protection. These aspects are important because job satisfaction is closely related to motivation, institutional commitment, and sustainable human resource development in higher education.

Table 4. Results of item validity analysis of the job satisfaction scale.

ASPECT	ITEM NO	STATEMENT	R PRODUCT MOMENT	R TABLE	RESULT
Institutional concern	1	I feel that employee welfare is in line with expectations.	0.658	0.297	Valid
Institutional concern	2	I do not receive periodic increases in my basic salary.	0.604	0.297	Valid

Table 4 (continue). Results of item validity analysis of the job satisfaction scale.

ASPECT	ITEM NO	STATEMENT	R PRODUCT MOMENT	R TABLE	RESULT
Institutional concern	3	I had the opportunity to participate in competency improvement activities.	0.608	0.297	Valid
Institutional concern	4	I do not see competency improvement activities being carried out continuously.	0.675	0.297	Valid
Motivate employees	5	My performance as an employee was evaluated objectively by the assessor.	0.546	0.297	Valid
Motivate employees	6	High-performing employees are not given awards.	0.761	0.297	Valid
Motivate employees	7	I receive incentives periodically in amounts that meet my expectations.	0.659	0.297	Valid
Job promotion	8	I do not see any socialization of the job promotion program.	0.409	0.297	Valid
Job promotion	9	I feel that job promotions are carried out objectively and transparently based on expertise.	0.710	0.297	Valid
Respect between employees	10	In my work environment, the communication relationship between employees feels uncomfortable.	0.480	0.297	Valid
Respect between employees	11	I feel that family values are well maintained in the work environment.	0.376	0.297	Valid
Two-way feedback	12	I do not accept criticism of the performance appraisal results.	0.230	0.297	Invalid
Two-way feedback	13	I strive to improve performance.	-0.022	0.297	Invalid
Work-life balance	14	Working hours are not applied flexibly.	0.359	0.297	Valid
Work-life balance	15	I agree that working hours should be arranged flexibly for work productivity.	0.232	0.297	Invalid
Perceptions of performance appraisal leaders	16	My performance appraisal was not carried out transparently by the management.	0.456	0.297	Valid
Perceptions of performance appraisal leaders	17	The results of my performance appraisal by my superiors can motivate my work.	0.526	0.297	Valid
Fair organizational policies	18	The policy formulation process at my workplace is carried out by the leadership without involving employees.	0.590	0.297	Valid
Fair organizational policies	19	Human resource development programs are transparently socialized to employees.	0.670	0.297	Valid
Fair organizational policies	20	Job promotions in my work environment are not carried out transparently.	0.665	0.297	Valid

Table 4 (continue). Results of item validity analysis of the job satisfaction scale.

ASPECT	ITEM NO	STATEMENT	R PRODUCT MOMENT	R TABLE	RESULT
Creativity development	21	Every employee is allowed to innovate in the fields of science and technology.	0.725	0.297	Valid
Creativity development	22	Leadership does not give awards to employees who excel in innovation in the fields of science and technology.	0.764	0.297	Valid
Creativity development	23	Every employee is allowed to improve their competence.	0.740	0.297	Valid
Security protection	24	Old age security does not meet my expectations.	0.348	0.297	Valid
Security protection	25	Health insurance is provided according to my expectations.	0.451	0.297	Valid
Security protection	26	The institution does not provide compensation to employees who die.	0.505	0.297	Valid
Security protection	27	Employment guarantees are provided to employees in amounts that meet expectations.	0.736	0.297	Valid

4.6. Reliability of the Developed Scales

The reliability results of the human capital, work culture, and job satisfaction scales are summarized in **Table 5**. The Cronbach's Alpha reliability analysis showed that the three scales had acceptable internal consistency. The human capital scale obtained a Cronbach's Alpha value of 0.939, which was categorized as excellent. The work culture scale obtained a Cronbach's Alpha value of 0.900, which was categorized as reliable. The job satisfaction scale obtained a Cronbach's Alpha value of 0.924, which was categorized as strong. The developed scales are reliable for measuring human capital, work culture, and job satisfaction among lecturers and educational staff. High reliability values show that the items in each scale consistently measure their respective constructs. Therefore, the instruments can be used for institutional assessment, human resource mapping, and the formulation of data-driven development programs in higher education institutions.

Table 5. The reliability test analysis of the human capital, work culture, and job satisfaction scales.

NUMBER	SCALE	CRONBACH'S ALPHA RELIABILITY	CATEGORY
1	Human capital	0.939	Excellent
2	Work culture	0.900	Reliable
3	Job satisfaction	0.924	Strong

4.7. Implications for SDG-Oriented Human Resource Development

The findings of this study have important implications for higher education management:

- (i) First, the developed scales provide practical instruments for mapping the condition of lecturers and educational staff. Through these instruments, higher education leaders can identify employee strengths, weaknesses, development needs, work culture conditions, and job satisfaction levels. This information can support evidence-based

- planning for training, career development, organizational improvement, and employee welfare programs.
- (ii) Second, the scales support SDG-oriented higher education development. Human capital is closely related to the quality of education because lecturers and educational staff are central actors in academic and institutional services. Work culture contributes to sustainable institutional governance by promoting collaboration, responsibility, innovation, and transparency. Job satisfaction supports employee well-being, motivation, and commitment. Together, these three constructs contribute to SDG 4 on quality education and SDG 8 on decent work and productive employment.
 - (iii) Third, the study contributes to methodological development in higher education research. The combination of bibliometric insight, literature review, scale development, validity testing, and reliability analysis provides a structured approach for developing institutional measurement instruments. The resulting scales can be used not only for research purposes but also for practical institutional evaluation and policy formulation.

The human capital, work culture, and job satisfaction scales meet acceptable validity and reliability standards. These instruments can help higher education institutions develop more systematic, data-driven, and sustainable human resource development strategies.

5. CONCLUSION

This study developed and validated human capital, work culture, and job satisfaction scales for higher education institutions to support SDGs-oriented human resource development. The bibliometric analysis showed that research connecting human capital, higher education, and job satisfaction is still limited, with only 32 Scopus-indexed documents identified from 2004 to 2026. This finding strengthens the need for integrated instruments that can help higher education institutions assess and improve their human resources systematically. The validation results showed that 55 human capital items, 39 work culture items, and 24 job satisfaction items met the validity criteria. The reliability analysis also showed acceptable internal consistency, with Cronbach's Alpha values of 0.939 for the human capital scale, 0.900 for the work culture scale, and 0.924 for the job satisfaction scale. These findings indicate that the three scales are suitable for measuring key aspects of lecturers and educational staff in higher education institutions. The developed scales can support data-driven institutional evaluation, human resource mapping, career development planning, work culture improvement, and job satisfaction enhancement. These contributions are relevant to SDG 4, which emphasizes quality education, and SDG 8, which emphasizes decent work and productive employment. However, this study was limited to item validity and Cronbach's Alpha reliability testing with 42 respondents. Future studies should involve broader samples from various higher education institutions and apply exploratory factor analysis (EFA), confirmatory factor analysis (CFA), or other psychometric procedures to strengthen the construct validity and generalizability of the scales.

6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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