Productivity Lecturer in the Era of the Industrial Revolution 4.0: Confirmatory Factor Analysis (CFA)

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Abstract

Confirmatory Factor Analysis (CFA) is a technique for finding some indicator variables that form variables/constructs that are not directly measured based on existing theories or previous studies. The purpose of this study is to find out the indicators of the most dominant variance/construction affecting it. The results of the analysis will show variables forming indicators that can explain variables. The research method used is the technique of taking respondents through simple random sampling — the number of sample respondents used as many as 100 lecturers at the university. The IBM AMOS Program is used to analyze the Confirmatory Factor Analysis (CFA). Leadership, Organizational Culture (campus), and Work Productivity are variables in the study. The results of the Goodness of Fit test obtained all parameters showing excellent results, and the analysis can continue. The results showed that the most dominant indicators were effectiveness for productivity variables, motivational indicators for leadership variables, and professionalism indicators for organizational culture (campus) variables. There is still an indicator that has not fulfilled the requirements (loading factor worth <0.500) of each research variable, which indicates a tendency to shift value towards each variable.

Introduction

Human resources play an essential role in carrying out organizational activities even though the parts and functions of labor have replaced by industrial technology. However, in fact, until now, labor is still an essential factor in determining the course of the work process. Therefore, each organization wants every workforce to work effectively and efficiently. Work productivity is a crucial factor because work productivity has a significant role in determining the success or failure of an institution in achieving its goals [1]. Productivity can see from two dimensions, namely individual dimensions and organizational dimensions. Productivity from the personal size of our personality characteristics, such as mental attitude that always has the view that the quality of life today must be better than yesterday, and tomorrow must be better than today. The modernization of higher education in the face of the demands of the global market is a necessity and is inevitable by implementing strategic patterns to adapt to the global environment. It is as stated by Parakhina [2], that in general the contemporary management model applied by universities in Russia assessed as having a low level of efficiency. It is because of the lack of strategic flexibility in the competitiveness of Russian universities. The weak management of the university due to a conflict of interest at the structural level results in a management crisis affecting the university's education system as a whole.

According to Robbins [3], organizational culture is the overall perception of the organization based on factors such as the level of risk tolerance, the emphasis of the team, and support from people. This overall perception influences the culture or personality of the organization is profitable or not profitable; this perception influences employee performance and satisfaction, with a more significant impact on a stronger culture. If the culture is influential and encourages high ethical standards, it will have a strong and positive influence on employee behavior. So, from that, the corporate culture needs to be maintained and must progress in maintaining survival. Robbins [4], adds that organizational culture is a shared perception adopted by members of the organization and is a system of shared meaning.

Research also proves that other factors that influence job satisfaction are organizational culture [5,6]. Organizational culture is vital in connecting companies with employees. Gibson [7], defines organizational culture as a system that penetrates the values, beliefs, and norms that exist in each organization. Organizational culture is a system obtained and developed by the organization and the underlying patterns and philosophies of its founders, which formed into rules that are used as guidelines in thinking and acting in achieving organizational goals [8]. The research results prove that one of the factors that influence job satisfaction is leadership [9]. Leadership is a process where a person can become a leader through continuous activities so that he can influence those he leads in order to achieve the goals of the organization or company. Conducive leadership, a corporate culture, which is also a work culture, will provide motivation and work discipline of employees. Then employees will contribute better to the company. The relationship between leadership and work culture on employee job satisfaction, where employee job satisfaction and organizational culture is one key to the success of the company. The better leadership and work culture, the higher the job satisfaction of employees [10].

Education is a crucial factor in accelerating the nation's development process, becoming an independent and competitive nation in the face of the industrial era 4.0. Given that education in the process is a vehicle for mobilization to be intelligent, moral, independent, and professional human beings in their fields [11]. Therefore, according to Bernie Trilling [12], awareness of the importance of education can provide better hopes and possibilities in the future, has encouraged various efforts and attention of all levels of society towards every step of movement and development in the world of education. Work productivity is an essential factor because work productivity has a significant role in determining the success or failure of an institution in achieving its goals[13]. Productivity can be seen from two dimensions, namely individual dimensions and organizational dimensions. Productivity from the individual dimension concerning individual personality characteristics, such as mental attitude that always has the view that the quality of life today must be better than yesterday, and tomorrow must be better than today [14]. Lecturer's work productivity is an essential aspect of increasing Higher Education has a strategic role and function in preparing quality human resources, namely having knowledge and mastery of technology, adaptive, creative, innovative, and personality [15,16]. Strategic roles and functions can only be realized by upgrading the system and making various constructive, adaptive policy programs in line with the dynamics of society.

Universities as formal education institutions are expected to be able to prepare graduates and be able to fill market needs in providing professional experts at various levels and types of abilities. In this connection John N. Hawkins states that today's leading universities play an essential role as a means of socio-economic mobility, to produce economic and social leaders, produce knowledge and encourage innovation and social reflection of society [17]. In an effort to produce college graduates who are able to meet the needs of the labor market, universities are required to make partnership with the industrial world as users of graduates, the partnership between universities and the industrial world and the labor market are mutually beneficial and mutually beneficial by exchanging science and skills through industrial research. In this connection, Vinnie Jauhari and Rhodri Thomas [18], states that the partnership between universities and industrial users has the potential for significant economic growth in a nation, given the quality of generation of knowledge and talent originating from higher education can increase industrial productivity.

To be able to understand the work productivity of lecturers well in an educational institution, it is necessary to understand in detail the various factors in question, including transformational leadership, lecturer academic culture. Lecturer's work productivity lies in efforts to empower the ability of lecturers so that it has an optimal contribution to the creation of academic processes and results. Therefore, to improve quality, higher education institutions need to develop lecturers' work productivity programs. Many factors influence the work productivity of lecturers, including leadership and organizational culture (campus). Realization of increased work productivity related to learning models, namely learning that empowers the potential and development of lecturers' creativity. Several aspects need to be improved by lecturers in the learning process, namely the intensity and optimization of the use of media and learning resources as well as adjustments to course references both in quality and quantity with the development of science and advances in digital technology in the era of the industrial revolution.

Research Methods

Research Approach: The research method used in this study uses quantitative research methods. According to [19], quantitative research is a method for testing specific theories by examining relationships between variables. These variables measured (usually with research instruments) so that data consisting of numbers can be analyzed based on statistical procedures.

Sample and Respondents: Hair [20], describe that the minimum sample size used is based on a complex model, and the essential characteristics of the measurement model are as follows:

- Minimum sample size of 100: the model contains a maximum of 5 constructs, each of which has a minimum of 3 items (observed variables) with a great relationship (standardized loading > 0.6).
- Minimum sample size of 150: the model contains a maximum of 7 extracts with each extract having a moderate relationship (standardized loading > 0.5)
- Minimum sample size of 300: the model includes a maximum of 7 extracts with each extract having a low relationship (standardized loading > 0.45).
- Minimum sample size of 500: the model contains many constructs, each of which has a weak correlation (standardized loading > 0.45), and each of the constructs has a minimum of 3 measured variables (items).

The sampling technique is the discussion of how to organize various procedures in the withdrawal or sampling of study, and to design procedures for sampling so that they become representative samples [21]. The sampling method used is simple random sampling, which is part of Probability sampling because sampling of population members is done randomly regardless of the strata that exist in that population. Then the population in this study were lecturers who explicitly taught at universities. From this explanation, the number of samples and respondents needed in this study was 100 people respondents.

Data Collection: This study uses a closed direct survey form designed to collect data about the situations experienced by respondents. Questionnaire is a data collection procedure that provides a series of written statements or questions to get

information from many people interviewed, so that each respondent chooses alternative answers in the questionnaire and based on conditions.

Data Analysis: Primary data obtained from the questionnaire results were investigated using Confirmatory Factor Analysis or confirmatory factor analysis according to Hair [20], used to test the dimensionality of a construct. In general, before analyzing the structural model, the researcher must first make a measurement model to test the validity and reality of the indicators forming the latent construct by conducting Confirmatory Factor Analysis (CFA). To make it easier to analyze the data, IBM AMOS 21.0 program use. CFA itself began to depart from the existence of a fundamental theory used in a study. The study of theory led researchers to re-recognize old concepts as the basis for building theories and developing more perfect concepts and theories.

Research Model: The model formed from variables Leadership, Work Productivity, and Organizational Culture using confirmatory factor analysis (CFA) in Figure 1. Then indicators of the variables used in this study can be seen in Table 1 below.

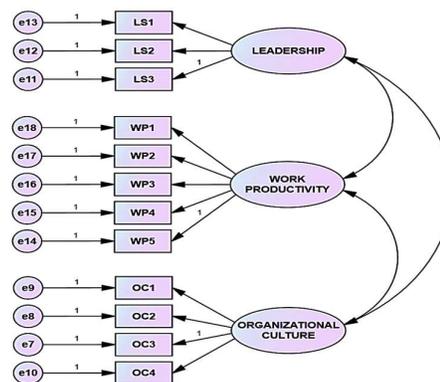| Variables Latent/Construct	Indicators
Work Productivity [22,23]	Work Quantity (WP1)
	Work Quality (WP2)
	Work Effectiveness (WP3)
	Work Efficiency (WP4)
	Working Method (WP5)
Leadership [24,25]	Motivation (LS1)
	Creativity (LS2)
	Innovative (LS3)
Organizational Culture [26]	Professionalism (OC1)
	Distance Management (OC2)
	Trust colleagues (OC3)
	Integration (OC4)

Table 1. Construct and Indicator of Research Model

Figure 1. Research Model

Result and Discussions

Validity and Reliability: A concept and research model cannot be tested in a prediction model of a relational and causal relationship if it has not passed the purification stage in the measurement model. The measurement model itself is used to test validity and reliability. Validity test was conducted to determine the ability of the research instrument to measure what should be measured [27].

Variable Latent/Construct	Construct Reliability (CR)	Average Variance Extract (AVE)
Work Productivity	0.632	0.852
Leadership	0.654	0.726
Organizational Culture	0.884	0.971

Table 2. Results of Construct Validity and Reliability

Construct Reliability (CR): Tests carried out show the extent to which a measuring tool that can provide results that are relatively the same if it is measured again on the same object. If a measuring instrument uses repeatedly and the measurement results obtained are relatively consistent, the measuring instrument is considered reliable [28]. The minimum construct value of the dimensions forming the latent variables that can be received is >0.500. Table 2 shows that the Construct Reliability value obtained is more significant than 0.500, which indicates the CR value of an acceptable variable.

Average Variance Extract (AVE): Indicator that can explain latent variables/constructs if the AVE value obtained from the analysis results > 0.500. [29]. The results obtained in Table 2 show that all the variables are more exceptional than 0.500, which means that the existing indicators can represent the construct.

Criteria Goodness of Fit	Cut-Off Value	Value	Result	Source
Chi-Square (X^2)	> 0.050	0.742	Model Fit	[30]
Normal Chi-Square (CMIN/DF)	< 2.000	0.825	Model Fit	[31]
Goodness of Fit Indices (GFI)	> 0.900	0.943	Model Fit	[32]
Root Mean Square Error of Approximation (RMSEA)	< 0.080	0.002	Model Fit	[33]
Tucker Lewis Index (TLI)	> 0.900	1.025	Model Fit	[34–36]

Criteria Goodness of Fit	Cut-Off Value	Value	Result	Source
Comparative Fit Index (CFI)	> 0.900	1.010	Model Fit	[37–39]
Parsimony Normed Fit Indices (PNFI)	> 0.500	0.623	Model Fit	[40,41]

Table 3. Goodness of Fit Result

Goodness of Fit: In the process of analyzing a research model, various stages are carried out to test the quality of the data and its compatibility with various indicators commonly used before reaching the core stages of the analysis of the research model (Regression) [42]. Evaluation of the criteria for Goodness of Fit (GOF) with its application for Confirmatory Factor Analysis (CFA) using IBM AMOS 21. Tools is an evaluation of the feasibility test of a model with several indexes and cut-off valuation criteria, to determine whether a model can be accepted or the Normality Assumption rejected. The results obtained in Table 3 show that all parameters of the Goodness of Fit look very good. All parameters analyzed met the calculation requirements by CFA analysis. From these results, it can conclude that the CFA analysis carried out could continue for the interpretation of the results of the analysis.

The loading value describes the relationship between the research variables and the indicators. Then the best indicator on a variable is the one with the most massive loading value because it indicates the higher relationship between the indicator and the research variable. In most references, a factor weight of 0.500 or more is considered to have sufficient validation to explain latent constructs [43].

Variables Latent/Construct	Indicators	Estimate
Work Productivity	Work Quantity (WP1)	0.715
	Work Quality (WP2)	0.583
	Work Effectiveness (WP3)	0.783
	Work Efficiency (WP4)	0.668
	Working Method (WP5)	0.474

Table 4. Loading Factor Value from Work Productivity variables

Conceptually, productivity is the relationship between an organization's output or outcome and the input needed. Productivity can be quantified by dividing output by input. Increasing productivity can be done by improving the productivity ratio by producing more output or better output with a certain level of contribution of resources [44]. Work productivity measurements are used to determine the extent of the effectiveness and efficiency of employee work in producing a result. To be able to measure the level of ability of employees in achieving something better results and conditions that apply (work success). As a joint progress in an organization in terms of professional and productive culture, it is essential to note the factors of the organizational environment which must have a full support system for the development of an organization or company that will create a productive and professional organizational culture, regardless of leadership aspects an organization that provides progress for the organization itself. Productivity in the world of education is closely related to the overall process of structuring and using resources to achieve educational goals effectively and efficiently. In the context of scholarly productivity, educational resources combined in different ways. The combination is the same as the effort to produce clothes that use different techniques in combining labor, capital, and knowledge. To master these techniques, a learning process is needed.

Variables Latent/Construct	Indicators	Estimate
Leadership	Motivation (LS1)	0.784
	Creativity (LS2)	0.652
	Innovative (LS3)	0.444

Table 5. Loading Factor Value from Leadership variables

In higher education institutions, lecturers are one of the human resources that have an important role in achieving institutional goals. Many factors influence lecturer productivity, both directly and indirectly. Motivation is one of the factors that influence productivity indirectly, while performance can directly affect productivity. Koontz [45], through the Chain theory the need for satisfaction desires, illustrates that one's motivation in work begins with a requirement that gives rise to desire, whereas desire refers to the drive and effort to achieve a goal and satisfy one's desires. Schiffman and Kanuk [46], argued that motivation generated because of tension due to not fulfilling a need, so that consciously or not someone will reduce pressure with behavior that can meet needs. Motivation is a factor that encourages someone to do an individual activity. Motivation is often interpreted also as a driving factor for a person's behavior; therefore, leaders with different leadership styles play a role in fostering employee motivation to work harder in achieving agency goals. The seriousness of employees in work can be triggered by the motivation given by leaders who can foster confidence in employees in carrying out their respective duties.

Variables Latent/Construct	Indicators	Estimate
Organizational Culture	Professionalism (OC1)	0.677
	Distance Management (OC2)	0.446
	Trust colleagues (OC3)	0.613
	Integration (OC4)	0.538

Table 6. Loading Factor Value from Organizational Culture variables

The formation of academic culture can be achieved through the process of transformation and change as a metamorphosis of academic institutions towards an ideal academic culture. Culture itself enters and forms in the person of a lecturer through adaptation to the environment, habituation of existing arrangements in educational ethics or by bringing a previous value system which then enters and is accepted by the institution which eventually forms an academic culture in an organization. Because individual culture correlated with personality, culture is related to a person's behavior patterns when dealing with a life problem and attitude towards his work. In it, there is an educator's reactive attitude towards changes in government policy in campus autonomy as it did, wherewith the commercialization of the campus it can influence the changes in the academic culture of educators in their daily lives. Judging from the elements of cultural differences also concerns the characteristics that distinguish between one individual and another or those who are involved in one profession with another. The cultural difference between a doctor and a lecturer, then an accountant with a specialist, and a professional with an amateur.

An educator as an organizational actor plays a crucial role in campus imagery much faster because it directly confronts students who act as promoters of imaging in the community while the imaging value of an organization taken through the renewal and direct reduction patterns of similar organizations that are influential in the world of education. A cultural significance which is a system can be an underlying assumption of an organization to move in improving its performance, one of which is the formation of an influential culture that can influence. McKenna and Beech [47], argue that an influential culture underlies the critical aspects of implementing organizational functions in terms of efficiency, innovation, quality and supporting appropriate reactions to familiarize them with events because of the prevailing ethos accommodates resilience.

Conclusions

Increased productivity means excellent performance will be feedback for business or work motivation in the following year. In addition to the relationship between productivity and business and human resource capabilities, productivity also has a relationship with efficiency, effectiveness, and quality. The existence of interrelationships between variables to increase productivity and future research will use other variables that will further support the increase in work productivity, namely satisfaction in work. There have been several previous studies that have provided significant results. Productivity often measured in terms of economic inputs and outputs. However, feedback and production of human and social resources are also essential factors if better organizational behavior will be able to improve job satisfaction so that there is an increase in the results of human resources.

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