

## Research in Pesantren-based Higher Education: Exploring The Factors Improving Lecture's Research Performace

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### ABSTRACT

Integrating two different systems between higher education and pesantren (Islamic boarding schools), Pesantren-based Higher Education (PTBP) is alleged as an ideal Islamic higher education model considering its critical role in the process of integration-interconnection of science and Islamic teaching. Like other Islamic higher educations in Indonesia, PTBP represents poor organizational performance, particularly in research productivity and quality. Since research performance has the most considerable portion in the higher education performance evaluation both nationally and internationally, this study attempted to explore the factors that possibly improve lecturers' research performance at PTBP, categorized into the level of the individual, institutional and resource factors. This study involved 84 lecturers at 7 PTBP in Bogor, Indonesia, selected based on the stratified random sampling and voluntary sampling method. The collected data was analyzed using Structural Equation Modeling-Partial Least Square (SEM-PLS). The results showed that only research competence positively affected research performance at the individual level, but not for work motivation and time management. Research culture and academic leadership insignificantly affected research performance. However, only high-performance work practice (HPWP) at the institutional level positively affected research performance. Meanwhile, collaboration networks at the resource level positively affected research performance, but not for university research funding. The managerial implications are further discussed in this study.

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## 1. INTRODUCTION

Despite the fact that Islamic Higher Educations (PTKI) development in Indonesia statistically increased, precisely of those Islamic Private Higher Education institutions (PTKIS), these developments are not directly proportional to their educational quality (Warits, 2017) and are consequently often viewed as second-class universities (Mashudi, 2020; Muqoyyidin & As'ad, 2020; Wahid et al., 2019). Besides, PTKIS in Indonesia has often been criticized since it adhered to the old paradigm that only represented a teaching-based university (Muqoyyidin & As'ad, 2020; Muqoyyidin, 2016) and was not competent in building research culture seriously (Husni, 2017). Meanwhile, the top world-class universities have long been research-based, so they excelled in leading, producing as well as developing science and technology (Bonaccorsi & Secondi, 2017; Cheng & Huo, 2010). Nationally, most universities consistently on the top tier (such as UGM, UI, IPB, etc.) possessed an excellent research performance (SINTA, 2021). PTKIS institutions' lag in research and knowledge development worsened their position to compete with other excelled universities.

Among the others, research performance has the most considerable portion in the higher education performance evaluation (Javed et al., 2020; Bonaccorsi & Secondi, 2017; Frenken et al., 2017) both nationally (DIKTI Kemendikbud) and internationally (Times Higher Education, Shanghai Ranking, QS World Ranking, Webometrics, etc.). For instance, Times Higher Education (THE) rated research and citation performance as more than 60% of the total assessment (Times Higher Education, 2020). Meanwhile, The Directorate-General for Higher Education (Dikti Kemendikbud) assessed 25% on output indicator (number of indexed scientific publications per lecturer 30% and research performance 40%) and 30% on outcome indicator (innovation performance 25%, number of citations per lecturer 25%, number of patents per lecturer 15%) (Dikti Kemendikbud, 2020). Indeed, the extensive portion of research and scientific publication performance will significantly impact the overall higher education performance.

On the other side, Most PTKIS are managed by pesantren (Mashudi, 2020; Saifuddin, 2013). Indeed, the development of PTKIS cannot be disconnected from Pesantren, regarding that numerous PTKIS were founded by Pesantren (Husni, 2017; Setyawan, 2016). According to the literature, PTKIS institutions managed by pesantren are referred to Pesantren-based Higher Education (Zarkasyi, 2017; Bali, 2017). Pesantren-based Higher Education (PTBP) integrated both higher education and pesantren education systems (Zarkasyi, 2017) to respond to global challenges (Thoyib et al., 2020; Tohet & Eko, 2020; Bali, 2017) and is alleged as an ideal Islamic higher education model considering its critical role in the process of integration-interconnection of science and Islamic teaching (Halil & Anwar, 2016; Tohet & Eko, 2020; Husni, 2017). However, despite the fact that many Muslim scholars claimed PTBP as an ideal Islamic higher education, the fact showed that PTBP institutions' inability (as part of PTKIS) to compete with other higher education is undeniable. Moreover, this integration-interconnection conception is impossibly established without positioning research as an academic basis. Research is essential in producing integrative science (Husni, 2017). Thus, PTBP institutions needed to improve their research performance to improve overall institutional performance and ultimately increase competitiveness (Javed et al., 2020; Artés et al., 2017; Edgar & Geare, 2013).

University research performance is highly reliant on their lecturers as the primary human resource in higher education (Javed et al., 2020; Artés et al., 2017; Edgar & Geare, 2013). Unfortunately, lecturers' research performance at PTBP institutions is deficient (Husni, 2017; al Idrus, 2016). Research by Afandi (2020) concluded that PTBP institutions required a particular managerial strategy to improve lecturers' performance in research and scientific publications. It is critical to identify the factors that possibly influenced research performance in formulating strategy. Unfortunately, to the best of the authors' knowledge, no previous studies specifically explored the factors that improved lecturers' research performance in PTBP institutions. Most previous studies solely investigated this issue through a qualitative-descriptive approach without formulating the alternative strategy to be implemented. Therefore, this study further endeavored to develop a strategy to enhance lecturers' research performance on several PTBP institutions in Bogor, West Java, which is part of the Coordinator of

Islamic higher education (Kopertais II). The number of PTKIS institutions in Bogor is the highest in Kopertais II (22 institutions). Specifically, PTKIS with pesantren-based status (PTBP) spread in Bogor amounted to 7 institutions. Table 1 below displays that the PTBP institutions in Bogor represented poor performance viewed based on accreditation status (Accredited as C). Further, the SINTA ranking (Science and Technology Index) below showed that most of the research and scientific publications performance of PTBP in Bogor is deficient.

**Tabel 1.** The Distribution of Pesantren-based Higher Education (PTBP) in Bogor

Name of PTBP	Name of Pesantren	Acreditation	Institution	Rank of Sinta
Institut Ummul Quro Al-Islami	PM Ummul Quro Al-Islami	Good (C)	IAI	4160
Institut Agama Islam Sahid	PM Sahid	Good (C)	IAI	1259
STAI Nurul Iman	PP Nurul Iman	Good (C)	STAI	2109
STAI Al-Fatah	PP Al Fatah	Good (C)	STAI	4764
STAI Al Aulia	PP Al-Aulia	Good (C)	STAI	4720
STAI Al Mukhlisin	PP Al Mukhlisin	-	STAI	-
STAI Darunnajah	PP Darunnajah	Good (C)	STAI	4771

Due to these issues, it is essential to analyze the factors that affected lecturers' research performance at PTBP in Bogor. Based on the literature, numerous studies investigated the factors that affected lecturers' research performance in higher education through diverse perspectives and analysis levels. However, most previous studies only explored these factors partially and unstructured, making it difficult to identify and analyze managerial implication. For instance, the comparative research by Valdivieso et al., (2021) conducted in several Latin American countries only reviewed individual and environmental characteristics on research performance. In the individual-level framework, Valdivieso et al., (2021) dismissed several vital variables such as competence and work motivation. In contrast, Zhao et al., (2021) only examined institutional and environmental factors but missed individual variables, which are critically important to be reviewed simultaneously.

Numerous other studies also explored individual attributes related to research performance. For instance, several of them were found to specifically review attitudes and personality (Pouratashi & Zamani, 2017; Gunawan, 2020; Fukuzawa, 2014), academic age and level (Abramo, D'Angelo, & Murgia, 2016), motivational attributes (Tan et al., 2020; Ringelhan et al., 2013; Zhang, 2014), academic achievement (Ramesh et al., 2017), academic preferences (Zhao, 2017), and individual competence (Devi & Tjahjadi, 2020; Roman, 2021). In addition, several other studies attempted to investigate the resource factor in particular. Some of them included collaboration (Paraskevopoulos et al., 2021; Aldieri et al., 2020; Rahimi et al., 2020; Inayati, 2019; Sabah et al., 2019; Wang et al., 2017; Kim et al., 2014) and research funding (Álvarez-Bornstein & Bordons, 2021; Möller, 2019; Doh et al., 2018). These studies, both specifically reviewing individual and resource factors, were conducted in-depth yet partial, so they fail to provide a more comprehensive understanding in explaining research performance in higher education.

These limitations were confirmed by Heng et al., (2020) and Aydin (2017). Through a systematic literature study, Heng et al., (2020) and Aydin (2017) proposed a more comprehensive and systematic model to review various factors affecting higher education research performance. Heng et al., (2020) compiled these into three levels: individual, institutional, and national factors. Meanwhile, Aydin (2017) divided these factors into individual factors, including demographic variables and personal attributes, and external factors, including institutional-structure variables and resources provided by institutions. However, those two conceptual frameworks are required to be tested simultaneously. Therefore, this study attempts to examine the conceptual framework simultaneously using structural equation modeling (SEM) analysis to fully understand the factors that can affect research performance in a higher education setting.

Further, these factors are divided into three levels: individual, institutional, and resource. Several variables examined related to individual factors are research competence, work motivation, and time management. Research competence is positively assumed as the most decisive factor in improving individual research performance (Wasfi, Mulyati, & Purwono, 2020). Wasfi et al., (2020) reviewed competencies based on knowledge, skills, work attitude related to research tasks. Other studies found that work motivation positively correlated to academics' research performance in higher education (Esponilla, 2015; Ringelhan et al., 2013; Karna & Ko, 2013). Esponilla (2015) explored the two most studied dimensions of work motivation, intrinsic and extrinsic motivation, and found that each of them effectively improved lecturers' research performance in the Philippines university (Esponilla, 2015). Et last, Tauhed et al., (2019) found that time management skills are the main factor determining a lecturer's success in accomplishing research tasks. Academics with a high level of research performance have better time management skills than those with low ones (White, James, Burke, & Allen, 2012).

Meanwhile, at the institutional level, this study attempted to examine research culture, academic leadership, and high-performance work practice (HPWP). Previous studies revealed that institutions with a culture that supported research activities tended to possess research excellence (X. Zhao et al., 2021) (Ramezani, Mehni, & Azizi, 2018) (Bai, Millwater, & Hudson, 2013). The research environment at higher education played an essential role in encouraging research productivity in addition to individual and behavioral factors (Dhillon, Ibrahim, & Selamat, 2015). Yulianto & Juwono (2021) and Ramezani et al., (2018) found that a weak research culture led to the lecturers' low research performance at universities. Furthermore, previous studies proved that leadership is a factor that significantly influenced research performance (Ryu, Hwang, & Choi, 2016). Based on numerous literature, one of the leadership models often studied related to research performance is academic leadership (Gerashchenko, 2021; Evans, 2014). Finally, several studies also found that human resource management significantly affected university research performance (Abe & Mugobo, 2021; Kim, 2016; Beerkens, 2013). Specifically, high-performance work practice (HPWP) is widely implemented in the higher educational context due to its effectiveness in encouraging numerous positive work outcomes (Boxall, 2018). Some studies, such as Perdomo-ortiz et al., (2020) and Alshaikhmubarak et al., (2020), found that HPWP effectively increased research productivity and performance and further determined academic career success.

Ultimately, several factors examined at the resource level covered collaboration networks and university research funding. Numerous researchers discovered the critical role of collaboration networks in higher education, mainly related to research performance (Badar et al., 2016; Badar et al., 2013). Collaboration and co-authorship have been essential in developing academic research policies (Aldieri et al., 2020). The studies conducted by Paraskevopoulos et al., (2021) Feng (2020), Inayati (2019), and Sabah et al., (2019) revealed that researchers who possessed more collaboration networks and co-authorships are found to possess a higher number of publications and broader impact factors. In addition, several studies showed that funding effectively improved research performance, mainly related to quality, excellence and impact (Álvarez-Bornstein & Bordons, 2021; Doh et al., 2018; Yang, 2017; Mali et al., 2017). Most funded scientific publications were found in the top reputable journals (Álvarez-Bornstein & Bordons, 2021).

To the best of the authors' knowledge in exploring the literature, no study has systematically explored these factors for their influence on lecturer research performance, specifically those conducted in pesantren-based higher education (PTBP). This study further attempted to analyze the factors that could improve lecturers' research performance at PTBP, categorized based on individual, institutional and resource levels. Hence, this research is essential to enhance lecturers' research performance at PTBP institutions.

## 2. METHODS

The research method should be included in the Introduction. The method contains an explanation of the research approach, subjects of the study, the conduct of the research procedure, the use of materials and instruments, data collection, and analysis techniques.

This study used a cross-sectional survey design, conducted at 7 PTBP in Bogor (signed under the Coordinator of Islamic Private Higher Education Region II West Java-KOPERTAIS II). Ninety-seven (84) lecturers from 5 PTBP were involved and selected based on stratified random sampling and voluntary sampling methods. The stratum of PTBP was divided based on institution classification: IAI and STAI. The two (2) selected IAI was Institute Agama Islam Sahid (INAIS) and Institute Ummul Quro Al-Islami (IUQI). Meanwhile, the three (3) selected STAI were STAI Nurul Iman, STAI Darunnajah, and STAI Al-Aulia. Additionally, the questionnaire was distributed using a google-form link to the lecturers from each selected PTBP. At last, 84 Lectures voluntarily completed the questionnaire. The voluntary sampling method is a non-probability sampling design. In this method, the sample frame consisted of selected volunteers that qualified and voluntarily participated in the research (Murairwa, 2015). However, to minimize the bias of respondent variants, this study only involved the lecturers with a minimum of 3 years of employment. The following table shows the distribution of selected institutions and samples for each stratum.

**Table 2.** The Distribution of Selected Institutions and Samples

Name of PTBP	Population (N)	Sample Target (N)	Sample Acquisition (N)	Proportional Percentage (%)	
				Sample Target	Sample Acquisition
Institut Ummul Quro Al-Islami	41	25	35	31%	44%
Institut Agama Islam Sahid	38	23	17	29%	21%
STAI Nurul Iman	35	21	16	26%	20%
STAI Al Aulia	7	4	5	5%	6%
STAI Darunnajah	12	7	11	9%	13%
Total	133	80	84	100%	100%

This study used nine measurement scales: research competence, work motivation, time management, research culture, academic leadership, HPWP management practices, collaboration networks, research funding, and performance. Research competence was measured using the scale developed by Wasfi et al., (2020), including knowledge, skill, and work attitudes. Work motivation consisted of intrinsic and extrinsic developed by Esponilla (2015). Time management measured the degree of an individual's ability to complete more work and organize time. Meanwhile, the research culture scale was adapted from Jayachandran & Chandrasenan (2021), which contained work conditions, collaboration and sharing, research infrastructure, research policies and agendas, as well as research monitoring and mentoring. Academic leadership included teaching, research, and administrative leadership developed by Perdomo-ortiz et al., (2020). HPWP scala adopted from Perdomo-ortiz et al., (2020) consisted of training and education, compensation and incentives, performance management, selection, and teamwork.

The collaboration network scale was developed from the study conducted by Paraskevopoulos et al., (2021), Slavova et al., (2016) and Kim et al., (2014), covering internal, local/national, and international collaboration. University research funding is adapted from Doh et al., (2018). Finally, research performance used the scale developed by Retnowati et al., (2018), including research level, publication level, research team role level, and authorship level. Research competence, work motivation, time management, research culture, academic leadership, and management practices of HPWP were measured using the Likert scale. In contrast, collaboration networks, university research funding, and research performance were measured using the ratio scale.

Collected data was then analyzed using structural equation modeling through partial least squares (SEM-PLS) with the help of Smart-PLS to examine the causality relationship between latent variables. Ghozali & Latan (2019) stated that SEM-PLS analysis is a simultaneous equation focused on

predictions to describe latent variables based on indicators. SEM-PLS was used since this research was early exploratory research with a weak theoretical basis (Ghozali & Latan, 2019) and a relatively small sample (84 respondents) (Jaya & Sumertajaya, 2008).

### 3. FINDINGS AND DISCUSSION

#### 2.1. Respondent Characteristics

The characteristics of the respondents in this study were reviewed based on the institution, gender, educational level, academic level, age, and work tenure. The respondents from Institute Ummul Quro Al-Islami are the largest (41.7%). Based on gender, male respondents (72.6%) dominated compared to females (27.4%). In terms of educational level, the number of respondents with master's degrees (S2) also dominated (98.3%) compared to respondents with doctoral degrees (S3) (10.7%). Based on the academic level, assistant professors (asisten ahli) are the most (46%), followed by assistant professors (lektor) (31.4%) and lecturers without an academic level (22.6%)—none of the respondents with the academic level of associate professor or full professor. Furthermore, respondents aged 25-35 (63.1%) and a working tenure around 1-5 years (73.8%) are the largest.

**Table 3.** Respondent Characteristics

Characteristic		N (128)	Percentage (100%)
Institution	Institut Ummul Quro Al-Islami	35	41.7 %
	Institut Agama Islam Sahid	17	20.2 %
	STAI Nurul Iman	16	19 %
	STAI Darunnajah	11	13.1 %
	STAI Al-Aulia	5	6 %
Gender	Male	61	72.6 %
	Female	23	27.4 %
Educational Background	Master (S2)	75	89.3 %
Academic Level	Doctor (S3)	9	10.7 %
	Lecturer	19	22.6 %
	Assistant Professor ( <i>Asisten Ahli</i> )	39	46 %
	Assistant Professor ( <i>Lektor</i> )	26	31.4 %
Age	Associate Professor	-	-
	Full Professor	-	-
	25-35 Year	53	63.1 %
	36-45 Year	21	25 %
	46-55 Year	10	11.9 %
Work Tenure	1-5 Year	62	73.8 %
	6-10 Year	22	26.2 %

#### 2.2. Measurement Model Evaluation (Outer Model)

Measurement model evaluation aimed to evaluate the validity and reliability of each indicator in the constructs. The measurement model evaluation was differentiated based on reflective and formative indicators (Hair, Sarstedt, Hopkins, & Kuppelwieser, 2014). Latent variables with reflective indicators consisted of research competence, work motivation, time management, research culture, academic leadership, HPWP, and university research funding. Meanwhile, latent variables with formative indicators covered collaboration networks and research performance.

##### 2.2.1. Measurement Model Evaluation of Reflective Indicators

Measurement model of reflective indicator evaluated through convergent validity based on the loading score of each indicator ( $n > 0.70$ ) and discriminant validity based on the Average Variance Extracted (AVE) score ( $n > 0.50$ ). Meanwhile, the construct reliability was reviewed through

Composite reliability score ( $n > 0.60$ ) and Chronbach alpha score ( $n > 0.70$ ) (Hair et al., 2014). The following table showed that the whole indicators possessed a good loading score ( $> 0.70$ ).

**Table 4.** Indicator-Loading

Indicator	Symbol	Loading Score	Conclusion
Research Competence	KOM		
Knowledge	KOM1	0.978	Valid
Skill	KOM2	0.971	Valid
Work Attitude	KOM3	0.965	Valid
Work Motivation	MOT		
Intrinsic Motivation	MOT1	0.885	Valid
Extrinsic Motivation	MOT2	0.948	Valid
Time Management	MW		
Degree of an individual's ability to complete more work	MW1	0.901	Valid
Degree of an individual's ability to organize time	MW2	0.907	Valid
Research Culture	BP		
Work Condition	BP1	0.918	Valid
Collaboration & Research Sharing	BP2	0.918	Valid
Research Infrastructure	BP3	0.883	Valid
Policy and Research Agenda	BP4	0.937	Valid
Research Monitoring & Mentoring	BP5	0.911	Valid
Academic Leadership	KA		
Research Leadership	KA1	0.942	Valid
Teaching Leadership	KA2	0.947	Valid
Administrative Leadership	KA3	0.954	Valid
High-Performance Work Practice (HPWP)	HPWP		
Training and Education	HPWP1	0.923	Valid
Compensation & Incentive	HPWP2	0.757	Valid
Performance Management	HPWP3	0.950	Valid
Selection	HPWP4	0.866	Valid
Team work	HPWP5	0.920	Valid
University Research Funding	DANA	0.973	Valid

Table 5 showed The AVE, Chronbach alpha, and Composite reliability scores. The overall results of the reflective indicator measurement model evaluation above showed that the instrument used to measure each variable and indicator in this study possesses a good validity and reliability.

**Table 5.** The AVE, Cronbach's Alpha, and Composite Reliability Score

Variable	Cronbach's Alpha	Composite Reliability	AVE
Research Competence	0.970	0.980	0.943
Work Motivation	0.818	0.914	0.841
Time Management	0.776	0.899	0.817
Research Culture	0.953	0.962	0.835
Academic Leadership	0.944	0.964	0.898
HPWP	0.932	0.948	0.785
University Research Funding	1.000	1.000	1.000

### 2.2.2. Measurement Model Evaluation of Formative Indicators

Measurement model evaluation of indicator formative consisted of two stages: analyzed the multicollinearity and the significance value of the outer weight (Hair et al., 2014). The value of

multicollinearity can be observed through the variance inflation factor (VIF) score. VIF score represented the correlation between the indicators and was expected to be low as possible ( $VIF < 5$ ). In table 5 below, the VIF score of each indicator is below 6.

**Table 6.** VIF Score

Indicator	Symbol	VIF Score	Conclusion
Collaboration Network	KOL		
Internal Collaboration	KOL1	1.054	Low multicollinearity
National Collaboration	KOL2	1.802	Low multicollinearity
International Collaboration	KOL3	1.769	Low multicollinearity
Research Performance	KP		
Level of Research	KP1	1.508	Low multicollinearity
Level of Scientific Publication	KP2	1.395	Low multicollinearity
Level of Research Tim Role	KP3	2.281	Low multicollinearity
Level of Authorship	KP4	2.157	Low multicollinearity

Further, the significance value of outer weight was assessed through t-statistic values ( $t\text{-statistic} > 1.96$ ) and p-value ( $p > 0.05$ ). Based on table 7, indicator KOL3 on collaboration network construct as well as KP2, KP3, and KP4 on research performance construct are found to be insignificant.

**Table 7.** Outer Weight Score

Indicator → Variable	Path Coeff.	t-statistic	p-value	Conclusion
KOL1 → Collaboration Network	0.756	3.644	0.000	Significant
KOL2 → Collaboration Network	0.435	3.123	0.002	Significant
KOL3 → Collaboration Network	0.116	0.496	0.620	Insignificant
KP1 → Research Performance	0.361	2.746	0.006	Significant
KP2 → Research Performance	0.273	1.205	0.228	Insignificant
KP3 → Research Performance	0.157	0.963	0.336	Insignificant
KP4 → Research Performance	0.489	1.899	0.058	Insignificant

According to Hair et al., (2014), formative indicators with insignificant outer weight values must be eliminated. However, in certain circumstances in which the outer weight score is insignificant, researchers are suggested to re-check these indicators' bivariate score (outer loading) (Hair et al. 2014). Based on table 8 below, indicators KOL3, KP2, KP3, and KP4 showed significant loading values. Therefore, these indicators are maintained to be included in the model.

**Table 8.** Bivariate Score (*Outer Loading*)

Indicator → Variable	Path Coeff.	t-statistic	p-value	Conclusion
KOL3 → Collaboration Network	0.575	2.133	0.033	Significant
KP2 → Research Performance	0.696	4.024	0.000	Significant
KP3 → Research Performance	0.784	5.370	0.000	Significant
KP4 → Research Performance	0.869	4.728	0.000	Significant

### 2.3. Structural Model Evaluation (Inner Model)

In the beginning, we evaluated the structural model through the R-Square score of the endogenous variable. The R-Square showed a predictive degree of certain exogenous variables toward endogenous variables. Based on the rule of thumb, the R-Square score below 0.25, 0.50, and 0.75 is categorized as a weak, moderate, and strong model (Ghozali & Latan, 2019). Based on Table 9, the R-Square score for research performance is 0.800, indicating that research competence, work motivation, time management, research culture, academic leadership, HPWP, collaboration network, and university research funding explained 80 percent of the variance on research performance.

**Table 9.** Coefficient of Determination (R-Square)

Variable	R-Square	R Square Adjusted	Category
Research Performance	0.800	0.779	Strong

The structural model is further evaluated based on coefficient  $\beta$  and  $t$ -value (T-Statistic) through the bootstrapping procedure. Critical ratio scores greater than 1.96 showed the path coefficient is statistically significant at a level  $p < 0.05$  (Ghozali & Latan, 2019). Based on Table 10, research competence positively affected research performance ( $\beta = 0.412$  and  $t$ -statistic = 3.004). In contrast, work motivation has negative effect but less significant on research performance ( $\beta = -0.027$  and  $t$ -statistic = 0.252) as well as time management on research performance ( $\beta = -0.016$  and  $t$ -statistic = 0.240), research culture on research performance ( $\beta = -0.258$  and  $t$ -statistic = 1.750), and academic leadership on research performance ( $\beta = -0.207$  and  $t$ -statistic = 1.215). Meanwhile, HPWP positively and significantly affected research performance ( $\beta = 0.248$  and  $t$ -statistic = 1.987) as well as collaboration network on research performance ( $\beta = 0.653$  and  $t$ -statistic = 4.685). Finally, university research funding positively but less significant in affecting research performance ( $\beta = 0.076$  and  $t$ -statistic = 0.685). In conclusion, only hypotheses H1a, H2c and H3a are accepted in this study.

**Table 10.** Path Coefficient and T-statistic Value (Hypothesis Testing)

Hypothesis		Original Sample (O)	T Statistics ( O/STDEV )	Con.
Research competence -> Research performance	H1a	0.412	3.004	Accepted
Work Motivation -> Research performance	H1b	-0.027	0.252	Rejected
Time Management -> Research performance	H1c	-0.016	0.240	Rejected
Research Culture -> Research performance	H2a	-0.258	1.750	Rejected
Academic Leadership -> Research performance	H2b	-0.207	1.215	Rejected
HPWP -> Research performance	H2c	0.248	1.987	Accepted
Collaboration Network-> Research performance	H3a	0.653	4.759	Accepted
Univ. research funding -> Research performance	H3b	0.076	0.685	Rejected

## Discussion

The purpose of this study endeavored to explore the factors that possibly improved lecturers' research performance at PTBP, divided into individual, institutional and resource factors. All those hypotheses are assumed to be positively and significantly affected research performance. However, some unexpected results exhibited differently.

The result found that only research competence positively affected research performance at the individual level factor. It's indicated that the research competence of each lecturer at PTBP institutions dramatically determined the extent of their performance in accomplishing research-related tasks. In contrast, work motivation and time management were less significant in improving lecturers' research performance at PTBP in Bogor and tended to exhibit a negative relationship. Hence, instead of concerning those two variables, PTBP suggested focusing on their research competencies as the most paramount factor in individual-level significantly would improve lecturers' research performance.

In response to those findings above, numerous studies found that research competence was indeed one of the most critical factors that determined research performance (Wasfi et al., 2020; Roman, 2021; Yulianto & Juwono, 2021; Devi & Tjahjadi, 2020; Xu & Ye, 2015). The research competencies measured include the degree of lecturers' knowledge, skills, and work attitudes in accomplishing research-related tasks developed by Wasfi et al., (2020) in measuring researchers' level of research competence at LIPI, Indonesia. Despite being contextually different, knowledge and skill in completing research duties are both found to be the two most essential facets that must be

improved due to their highest coefficient values. Yet, work attitudes remained consistently cultivated to boost lecturers' productivity in accomplishing research.

Of the three hypotheses proposed on the institutional level, only HPWP positively affected lecturers' research performance at PTBP. It's indicated that the better the level of lecturers' perception toward HPWP implemented by PTBP institution, the better the level of lecturers' research performance, and vice versa. Contrary, research culture and academic leadership were less effective in enhancing lecturers' research performance and instead showed a negative effect. Their perception of research culture and academic leadership implementation in their respective institutions negatively led to low research performance. The effectiveness of HPWP in boosting research performance is in accordance with previous studies (Perdomo-ortiz et al., 2020; Alshaikhmubarak et al., 2020), stated that HPWP implementation effectively increased lecturers' research productivity and performance at higher education and ultimately determined their academic career success. Boxall (2018) considered HPWP as a strategy that possibly integrated HRM practices with organizational vision. HPWP implementation covered the selection system, training and education, performance management, compensation and incentive, and teamwork culture (Perdomo-ortiz et al., 2020). All management processes above are integrated with the pursued organizational goals and automatically encourage organizational members to maximize their performance (Boxall, 2018).

The collaboration network as the resource factor positively affected lecturers' research performance, but not for university research funding. It demonstrated that the lecturer with a higher level of collaboration network tended to be more productive and exhibited better research performance. In fact, among the others, the collaboration network was the most influential factor in improving research performance. This finding is not surprising, regarding that numerous researchers commenced acknowledging the critical role of collaboration networks in higher education, particularly in enhancing research performance (Paraskevopoulos et al., 2021; Aldieri et al., 2020; Rahimi et al., 2020; Inayati, 2019; Sabah et al., 2019; Wang et al., 2017; Kim et al., 2014) and research funding (Álvarez-Bornstein & Bordons, 2021; Möller, 2019; Doh et al., 2018).

In examining the effect of collaboration networks on research performance in the higher educational context, numerous studies explored various levels, including internal collaboration (Slavova et al., 2016; Aldieri et al., 2017; Hopp et al., 2010), local/national collaboration (Sabah et al., 2019), and international collaboration (Paraskevopoulos et al., 2021; Inayati, 2019; Sabah et al., 2019). In this study, the entire collaboration network above, which consisted of internal, local, and international collaborations, were examined to acquire a more comprehensive understanding. Contradicting with Sabah et al., (2019), this study found that internal collaboration within university scales (between departments, faculties, etc.) exhibited a more prominent role than national and international collaboration due to its higher coefficient score. In contrast, international collaboration showed the smallest role in improving lecturers' research performance at PTBP.

#### 4. CONCLUSION

The results found that various factors affected lecturers' low research performance at PTBP Bogor. Individually, their low performance was extremely influenced by the extent of their competence in accomplishing research tasks. Thus, it is critical for PTBP institutions to further focus on developing lecturers' knowledge, skills, and work attitudes, primarily related to research duty. Meanwhile, this study also found work motivation and time management insignificantly influenced research performance. Several reasons caused it, one of which was the lecturers' deviation of paradigm that considered research only as a secondary task in higher education. Given that the measurement of work motivation was un-specifically contextualized to research schemes and most lecturers possessed multiple jobs, it indicated that their low work motivation did not cause the real problem of lecturers' low research performance, but rather to kind of work is important, and they prioritized. Therefore, institutions must build an ecosystem that could encourage lecturers' paradigm changes and ultimately engage them in their academic work, primarily those related to research tasks.

Institutionally, the poor implementation of HPWP in PTBP institutions led their lecturers to poor research performance. Institutions must seriously correct their performance management to be more objective, transparency, measurable and fair; encourage lecturers to continually develop their capacities by participating in conferences, seminars, and scientific projects; encourage them to initiate research groups and build teamwork and knowledge sharing culture; evaluate the selection system of upcoming lecturers; and adjust remuneration system based on the academic level, education, as well as performance. However, PTBP institutions must also build and evaluate the research culture in the next few years and discover the leadership model most effective in improving research performance. As the most critical factor, the collaboration network is urgently needed to boost their lecturers' research performance. PTBP institutions are recommended to build collaboration networks, starting from the internal level, such as collaboration between departments and faculties, then gradually continuing to the local/national and international level. Besides, since research funding provided by PTBP institutions are relatively undersized, PTBP institutions are suggested to raise them to encourage lecturers in accomplishing research tasks.

Every research has limitations, including this study. One is related to the online data collection method with a cross-sectional design approach. Future researchers are expected to collect data directly to increase data validation and accuracy, also possibly observe respondents' behavior. In addition, further study is recommended to use a longitudinal study design to understand better causality between variables. This study only explored models with a direct path. Further research is expected to provide a more complex causal relationship by constructing a mediation-moderation model. In addition, this study also involved a small sample. Future research is expected to involve more proportional respondents.

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