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Determinants of Achievement in Scientific Work: Exploring the Relationship of Leadership Style, Adversity Quotient, and Motivation

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Abstract:

Writing scientific work is a requirement for students. However, students still need help writing scientific papers. This study aimed to determine the effect of leadership style, adversity quotient, and motivation on scientific work achievement in Tadris IPA IAIN Ponorogo students. The approach used in this study is a quantitative approach to causal research. The data was collected using a questionnaire and analyzed using regression analysis and SEM PLS. Overall, the study results show that leadership style, adversity quotient, and motivation positively influence scientific work achievement. PLS-SEM analysis shows that the variable that has the highest contribution is the adversity quotient. Then, the indicator with the highest contribution is the ownership indicator, while the indicator that contributes the least is creative innovation, with my statement using failure as a learning tool. This research proves that leadership style, adversity quotient, and motivation influence the scientific work achievement of Tadris IPA IAIN Ponorogo students. Therefore, in improving achievement in the field of scientific work, contributions from leaders, persistence from students, and encouragement to achievement are needed.

Keywords: *Leadership Style, Adversity Quotient, Motivation, Achievement, Scientific Work*

Abstrak:

Menulis karya ilmiah merupakan sebuah tuntutan bagi mahasiswa. Namun demikian, masih banyak permasalahan yang dialami mahasiswa dalam menulis karya ilmiah. Tujuan dari penelitian ini yaitu untuk mengetahui pengaruh gaya kepemimpinan, adversity quotient, dan motivasi terhadap prestasi berkarya ilmiah pada mahasiswa Tadris IPA IAIN Ponorogo. Pendekatan yang digunakan dalam penelitian ini yaitu pendekatan kuantitatif dengan jenis penelitian kausal. Pengumpulan datanya menggunakan kuesioner dan dianalisis menggunakan analisis regresi dan SEM PLS. Secara keseluruhan hasil penelitian menunjukkan gaya kepemimpinan, adversity quotient, dan motivasi memiliki pengaruh positif terhadap prestasi berkarya ilmiah. Analisis SEM PLS menunjukkan bahwa variabel yang memiliki kontribusi paling tinggi yaitu adversity quotient. Kemudian indikator yang memiliki kontribusi tertinggi yaitu indikator ownership, sedangkan indikator yang berkontribusi paling sedikit yaitu pada creative innovative dengan pernyataan saya menggunakan kegagalan sebagai sarana belajar. Melalui penelitian ini terbukti bahwa gaya kepemimpinan, adversity quotient, dan motivasi berpengaruh terhadap prestasi berkarya ilmiah mahasiswa Tadris IPA IAIN Ponorogo. Oleh karena itu dalam meningkatkan prestasi di bidang karya ilmiah

diperlukan kontribusi dari pemimpin, kegigihan dari mahasiswa, serta dorongan untuk berprestasi.
Kata Kunci: *Gaya Kepemimpinan, Adversity Quotient, Motivation, Prestasi, Karya Ilmiah*

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INTRODUCTION

In higher Education, writing is a place for students to channel ideas and experiences through writing. One of the writing activities that students must master is scientific writing. Therefore, writing should have become an essential ability for students (Ali Zaiter, 2020). Writing is a place to channel thoughts and feelings and express one's knowledge and experiences. Scientific work contains the study of problems by a researcher who is guided by scientific rules. Scientific writing is work that discusses problems or phenomena scientifically.

Based on a circular letter, the director general of higher Education requires undergraduate students 1, 2, and 3 to publish their final assignments in scientific journals according to their respective levels. The background to this requirement is based on three reasons: namely, a student must be able to write scientific papers according to the rules for writing scientific papers; secondly, if he is able, there is no longer any reason to find it challenging to write scientific papers, thirdly, that Indonesia can be on par with other countries in terms of writing scientific papers (Bustomi & Afriani, 2020). The country will only be able to progress if its people can read and write because knowledge can be obtained through reading and writing (Majorano et al., 2021).

The existence of demands for scientific publications makes higher Education often hold events such as scientific writing conferences, scientific work competitions, and so on as a forum for students to excel in scientific work. Participating in a scientific work competition is an achievement for a student because many students still need to develop an interest in producing scientific work. Scientific work is one of the academic achievements. Many factors affect student academic achievement (Falah et al., 2023). Higher Education adheres to the 1945 Constitution and the 2003 National Education System Law, namely that Education can be a tool for creating learning processes and climate. Higher Education explores, maximizes, and develops students' abilities (Chernikova et al., 2020). Mehmet stated that knowing the factors determining student academic achievement is essential (Ozcan, 2021). This is important because it serves as a reference for lecturers and higher Education institutions to look for ways to develop student achievement and provide motivation to maximize the achievements achieved. In addition, student achievement can be a factor in students' future success.

Scientific work achievement is essential to study because based on previous research conducted by Barli Bram shows that there are still many problems experienced by students in writing scientific papers, including lack of motivation, lack of ideas for writing, limited opportunities to practice academic writing, and lack of support, recognition, and awards from the authorities. In addition, Indonesia is a country whose academic writing work still needs to catch up to

other countries due to the problems mentioned earlier (Bram & Angelina, 2022).

Achievement indicators for scientific work are described based on competence achievement, which refers to creative thinking abilities. This is because, basically, individuals who think creatively use their minds to create a new set of thoughts that contain various ideas, descriptions, concepts, experiences, and knowledge that are closely related to the process of producing scientific work (Safi'I et al., 2022). The indicators consist of developing, applying, and conveying new ideas; being open and responsive to new and different perspectives; expressing creative ideas conceptually and practically; using concepts or knowledge in new situations; using failure as a means to learn, creating novelty (novelty) based on previous knowledge, and lastly, adapting and contributing to new situations (Safi'i et al., 2022).

Achievement is identified with the effort individuals achieve through a program or activity. Regarding achievement, leadership style is a person's way of leading his subordinates to achieve goals (Karlina & Wijayanti, 2023). In higher education, especially in study programs led by a head of department. The leadership style of a department head in managing his subordinates or teaching staff, such as lecturers, determines students' success in achieving achievements (Hidayati & Zulher, 2022). Based on this statement, of course, leadership style is related to student achievements, along with adversity quotient and motivation. The adversity quotient is the ability to survive in the face of difficulties until finally achieving a goal. Adversity quotient is essential in how hard a person tries to do something (Joglekar, 2021). Of course, this is related to the achievements achieved by a person because how much effort is made is how significant the achievement is. Then motivation is related to achievement, namely the need for achievement; this is a factor that drives a person to work hard in achieving goals (Kothe et al., 2023).

Tadris IPA is one of the undergraduate study programs at IAIN Ponorogo. Preliminary research via the Tadris IPA web shows that in the last five years, namely since 2018, there have been 107 academic achievements and 45 non-academic achievements. One of the academic achievements is producing 30 innovative works and eight scientific works (IPA, n.d.). Even though it is considered a new study program, since 2017, the Tadris IPA study program has been able to compete with study programs that have existed for a long time. This shows that there is good cooperation between the study program community in advancing their majors in terms of the way leaders manage their subordinates. Through these achievements, researchers are interested in knowing whether leadership style, adversity quotient, and motivation influence scientific work achievement in Tadris IPA IAIN Ponorogo students.

The background description shows that adversity quotient and motivation are related to the achievements of individuals and groups because achievement is someone's achievement. Therefore, a deeper study is needed regarding the influence of Leadership Style as a way for leaders or heads of departments to manage their study programs, both lecturers and students. Then, the adversity quotient is a person's ability to solve problems and motivation as encouragement in achieving scientific work achievements in Tadris IPA IAIN Ponorogo students.

RESEARCH METHODS

The approach used in research is quantitative, namely an approach that aims to describe and test the hypotheses made by researchers (Karari et al., 2022). The type of research used is causal research. Causal research has problem characteristics in the form of a causal relationship between 2 or more variables (Casteel & Bridier, 2021). The research aims to uncover facts that have occurred or are called ex post facto. The population in this study were students majoring in Tadris IPA IAIN Ponorogo who excelled in scientific work from 2018-2022. This population was chosen because students who already have achievements can answer the factors that influence the acquisition of these achievements. Because this research uses a saturated sampling technique, 70 students who excel in scientific work are used as respondents. Collecting data in this study using a questionnaire or questionnaire. The questionnaire is a series of questions or written statements to the respondents for the answers (Larsson & Rudberg, 2023).

Table 1. Variable Indicators

Variable	Indicator	Descriptor
Leadership Style	**Transactional** (Purwanto et al., 2020)	
	1. contingent reward	making agreements about what subordinates should do and promising rewards when goals are achieved
	2. management by-exception (active dan passive)	leaders monitor deviations from set standards and take corrective action
	3. Laissez-faire	Freeing his subordinates to develop their potential
	Transformational (Hai, Van, & Thi, 2021)	
	1. Charisma	charismatic
	2. Inspirational	inspire
	3. Intellectual stimulation	encouragement to solve problems
	4. Individulized consideration	pay attention to each individual
Adversity quotient (Jumareng & Setiawan, 2021)	1. Control	1. The level of control over events caused by problems or students' self-control when they experience problems
	2. Origin and Ownership	2. Ownership of the origin of the problem 3. Ownership of the problem
	3. Reach	1. Student ownership of how far the problem can reach other aspects of life
	4. Endurance	2. Students' perception of how long the problem will last
Motivation (Almulla & Alamri, 2021)	1. Achievement needs	The need to have achievement
	2. Power Need	The need to have power
	3. Affiliate needs	The need to belong to a group or organization
Scientific Work Achievement (Safi'i et al., 2022)	Creative Innovative	Develop, implement and convey new ideas
		Be open and responsive to new and different perspectives
		Express creative ideas conceptually and practically

Variable	Indicator	Descriptor
		Using concepts or knowledge in new situations
		Using failure as a means to learn
		Creating novelty based on previous knowledge
		Adapt and contribute to new situations

The assumption test is carried out before the regression analysis. The classic assumption test used is 1) normality test (data usually distributed), 2) linearity test (linear relationship), and 3) multicollinearity test (no multicollinearity symptoms occur). 4) Heteroscedasticity test (no symptoms of heteroscedasticity). 5) Autocorrelation test (no signs of autocorrelation). If the assumption test has been fulfilled, then the hypothesis test can be carried out with 1) Simple Linear Regression analysis to find out whether the independent variables in the model have a real influence on the dependent variable. 2) Multiple Linear Regression Analysis To see the effect of two or more independent variables on the dependent variable. The result is that if a Sig. Value <0.05 is obtained, then there is an influence of the independent variable on the dependent variable. In addition, the study also used PLS-SEM analysis with SMART PLS 4 to see the variables and indicators that had the highest contribution in influencing the dependent variable.

RESULTS AND DISCUSSIONS

Assumption Test

The results of this study discuss how much influence leadership style, adversity quotient, and motivation have on scientific work achievement in students. The hypothesis was tested using simple linear regression analysis techniques and multiple linear regression. Before the regression analysis is carried out, the assumption test is first carried out.

Table 2. Assumption Test Results

Assumption Test	Decision-making	Result	Decision
Normality	– Sig. > 0,05 Normal data distribution (Kwak & Park, 2019)	– Sig. 0.232	– Normal distributed data
Linearity	– Sig. > 0,05 linear variable relationship (Uyanto, 2020)	– Sig. 0,746	– The relationship between variables is linear
Multicollinearity	– tolerance > 0,100 and VIF < 10,00 there are no signs of multicollinearity (Shrestha, 2020)	– X1 = *tolerance* 0,656 VIF 1,524 – X2 = *tolerance* 0,598 VIF 1,671 – X2 = *tolerance* 0,519 VIF 1,926	– There are no symptoms of Multicollinearity
Heteroscedasticity	– Sig. > 0,05 There are no symptoms of heteroscedasticity (White, 1980)	– X1 = Sig. 0,149 – X2 = Sig. 0,991 – X3 = Sig. 0,219	– There are no symptoms of heteroscedasticity
Autocorrelation	– du < Durbin watson < 4-du there are no symptoms of	– 1,7028 < durbin Watson (2,088) < 4-du (2,2972)	– there are no symptoms of autocorrelation

Assumption Test	Decision-making	Result	Decision
	autocorrelation (Uyanto, 2020)		

Source: Processed primary data

The results of the Normality test show that the data is normally distributed, so the data distribution is normal. The normality test is helpful for objectivity and bias in the estimation results later. Then, the linearity test shows that the relationship between variables is linear, or it can be interpreted that if there is a change in the leadership style, adversity quotient, and motivation variables, there will also be a change in the output variable (scientific work achievement). The results of the multicollinearity test show no symptoms of multicollinearity, so it can be interpreted that the independent variables in the regression model are highly uncorrelated. The results of the heteroscedasticity test show that there are no symptoms of heteroscedasticity, so it can be interpreted that there is no similarity of variance in the regression model. The results of the autocorrelation test show no symptoms of autocorrelation, which means that the models in the study are independent or there is no autocorrelation. If all assumptions have been fulfilled, then the hypothesis is tested using regression analysis.

Hypothesis Testing

Simple Linear Regression Analysis

Simple linear regression analysis is used to determine the effect of one independent variable on the dependent variable.

Table 3. Simple Linear Regression Analysis Results

Variable	Constant	Regression coefficient	R Square	t count	Sig.
X1-Y	15.088	0.347	0.204	4.324	0.000
X2-Y	8.110	0.523	0.426	7.107	0.000
X3-Y	11.072	0.660	0.388	6.561	0.000

Source: Processed primary data

Based on the regression analysis results, the regression equation for the variable X1 to Y is obtained, namely Y = 15.088 + 0.347 X1. Scientific work achievement is the value of scientific work achievement plus an increase in the constant value multiplied by each additional leadership style value. If the leadership style is 0, then the achievement of scientific work is 15.088. This relationship indicates a causal relationship between leadership style and scientific work achievement. The regression equation shows that the scientific work achievement will increase by 0.347 for every increase in the leadership style score. This also shows that the direction of the model is positive, as can be seen from the value of the coefficient of the regression direction, which is positive between leadership style and scientific work achievement. Referring to the results of Sig. (0.000) < 0.05 then H0 is rejected. So, the leadership style has a positive effect on the achievement of scientific work. A multiple linear test was carried out with the following results to determine which leadership style influences scientific work achievement.

Table 4. Results of Multiple Linear Regression Analysis of Leadership Style Sub Variables

Variable	Constant	Regression coefficient	t count	Sig.
X1.1 - Y	15.208	0.167	4.324	0.000
X1.2 - Y	15.208	0.475	2.344	0.022

Source: Processed primary data

These results indicate that the value of Sig. Transactional leadership style is 0.543 > Sig. (0.05), the transactional leadership style only significantly affects scientific work achievement. Then, the transformational leadership style has a value of Sig. Equal to 0.022 < (0.05), meaning that the transformational leadership style influences the scientific work achievement of Tadris IPA Department students.

Then, the regression equation of variable X2 to Y is Y = 8.110 + 0.523 X2 or scientific work achievement is the value of scientific work achievement plus an increase in the constant value multiplied by each addition of the adversity quotient value. If the adversity quotient is 0, then scientific work achievement is 8.110. This indicates a causal relationship between the adversity quotient and scientific work achievement. The regression equation shows that scientific work achievement will increase by 0.523 for every increase in the adversity quotient score. This also shows that the direction of the model is positive, as can be seen from the value of the coefficient of the regression direction, which is positive between the adversity quotient and scientific work achievement. Referring to the results of Sig. (0.000) < 0.05 then H0 is rejected. So, the adversity quotient has a positive effect on scientific work achievement.

The regression equation for variable X3 to Y is Y = 11.072 + 0.660 X3, or scientific work achievement is the value of scientific work achievement plus an increase in the constant value multiplied by each additional value of motivation. If motivation is 0, then scientific work achievement is 8.110. This relationship indicates a causal relationship between motivation and scientific work achievement. The regression equation shows that scientific work achievement will increase by 0.523 for everyone to increase their motivation score. This also shows that the direction of the model is positive, as can be seen from the coefficient value of the regression direction, which has a positive value between motivation and scientific work achievement of 0.523. Referring to the results of Sig. (0.000) < 0.05 then H0 is rejected. So, motivation has a positive effect on scientific work achievement.

Multiple Linear Regression Analysis

Multiple linear regression analysis is used to determine the effect of two or more independent variables on the dependent variable.

Table 5. Results of multiple linear regression analysis

Variable	Constant	Regression coefficient	t count	Sig. t test	Sig. F test	R Square
X1	5.779	0.069	0.865	0.390	0.000	0.510 (51%)
X2	5.779	0.333	3.736	0.000		
X3	5.779	0.332	2.619	0.011		

Source: Processed primary data

Based on the results of the regression analysis, the regression equation is Y = 5.779 + 0.069 X1 + 0.333 X2 + 0.332 X3 so that it can be said that if the variables of leadership style, adversity quotient, and motivation are assumed to be 0, then the scientific work achievement variable has a fixed value of 5.779. If the leadership style is 0 and there is an increase of 1 score, the scientific work performance increases by 0.069. If the adversity quotient is 0 and one score increases, then scientific work performance increases by 0.333. If the motivation is 0 and there is an increase of 1 score, the achievement of scientific work increases by 0.332. This equation also shows that the direction of the model is positive, as can be seen from the regression direction coefficient values of the three positive variables.

The table shows that the results of the partial t-test in multiple linear regression indicate that the leadership style (X1) has a Sig. Value 0.390 > 0.05, so this variable does not affect scientific work achievement, and the adversity quotient has a Sig. Value 0.000 <0.05 so that the adversity quotient variable affects scientific work achievement, then motivation has a Sig. The value 0.011 <0.000 indicates that the motivational variable influences scientific work achievement.

The results of the simultaneous F test in multiple linear regression show that the value of Sig. 0.000 <0.05, the variables of leadership style, adversity quotient, and motivation simultaneously influence the variable of scientific work achievement. Then, through a determination test, an R square of 0.510 is obtained, meaning that simultaneously, the variables of leadership style, adversity quotient, and motivation have an effect of 51% on scientific achievement. At the same time, the rest (100% - 51% = 49%) is explained by other variables outside the research.

SEM PLS

In addition to using linear regression analysis, researchers also use the SEM PLS approach. In general, SEM PLS aims to test whether there are relationships and predictive effects between constructs. The structural model in SEM PLS is a path diagram of the relationship between construct and latent variables to analyze the factors that influence scientific work achievement (Hair, Risher, Sarstedt, & Ringle, 2019).

Outer Model Results

The outer loading test has three criteria: 1) outer loading < 0.40, then the indicator may be removed; 2) outer loading > 40 but < 0.70 may be deleted or not deleted; 3) outer loading > 70 (Tajik, Latiff, Siew, Awang, & Asyura Adznam, 2020). The outer loading results show that of the 22 indicators, there are seven indicators with an outer loading value of > 40 but <0.70. Therefore, the researcher eliminated two indicators from the adversity quotient with a low validity value to maintain the results' reliability. The following is the result of outer loading after elimination.

Figure 1. Outer Model

Table 6. Convergent Validity, Reliability, and AVE Test Results at the Output of the PLS Algorithm

No.	Variable	Construct	Convergent Validity (Tajik et al., 2020)			Reliability (Méndez-Suárez, 2021)		
			FL (>0.40-<0.70)	AVE (>0.50)	Ca (>0.60)	rho_A (>0.60)	CR (>0.70)	VIF
1.	Leadership style	X1.1	0.636	0.592	0.884	0.894	0.910	1.579
2.		X1.2	0.790					2.247
3.		X1.3	0.763					2.150
4.		X1.4	0.743					1.900
5.		X1.5	0.774					2.050
6.		X1.6	0.847					2.908
7.		X1.7	0.817					2.290
8.	Adversity	X2.1	0.700	0.576	0.627	0.645	0.801	1.168
9.	quotient	X2.2	0.714					1.329
10.		X2.3	0.853					1.490
11.	Motivation	X3.1	0.832	0.671	0.757	0.767	0.859	1.448
12.		X3.2	0.822					1.557
13.		X3.3	0.802					1.594
14.	Achievement of	Y1.1	0.798	0.521	0.844	0.853	0.883	1.936
15.	scientific work	Y1.2	0.806					2.392
16.		Y1.3	0.728					1.829
17.		Y1.4	0.724					1.840
18.		Y1.5	0.588					1.414
19.		Y1.6	0.663					1.558
20.		Y1.7	0.723					1.618

Based on Table 6, the overall loading factor value for each indicator is >0.40 FL <0.70 (λ = 0.588-Y1.5 to 0.853-X2.3). The AVE value for each variable is> 0.50 (0.521 - scientific work achievement to 0.671 - motivation). So, it can be concluded that each indicator and variable on the instrument has supported the convergent validity requirements. This means that the level of relationship between indicators and variables can be explained by 58.8% to 85.3%.

Based on the value of the loading factor coefficient, the most dominant statement indicator representing the success of scientific work achievement is X2.3, with the statement that I always try to correct errors in the adversity quotient variable of 85.3%. On the other hand, the weakest indicator in measuring scientific work achievement is Y1.5, with your statement using failure as a means to learn about the scientific work achievement variable of 58.8%. Next, the outer model is evaluated by testing the discriminant validity by looking at the cross-loading value.

Table 7. Cross Loading

Variable	Leadership Style	Adversity Quotient	Motivation	Scientific Work Achievement
X1.1	**0.636**	0.315	0.398	0.253
X1.2	**0.790**	0.382	0.454	0.424
X1.3	**0.763**	0.332	0.507	0.312
X1.4	**0.743**	0.254	0.406	0.385
X1.5	**0.774**	0.386	0.427	0.419
X1.6	**0.847**	0.368	0.415	0.369
X1.7	**0.817**	0.419	0.493	0.386
X2.1	0.443	**0.700**	0.475	0.501
X2.2	0.256	**0.714**	0.387	0.435
X2.3	0.338	**0.853**	0.480	0.579
X3.1	0.623	0.477	**0.832**	0.587
X3.2	0.349	0.540	**0.822**	0.522
X3.3	0.410	0.434	**0.802**	0.440
Y1.1	0.432	0.499	0.603	**0.798**
Y1.2	0.410	0.547	0.505	**0.806**
Y1.3	0.348	0.453	0.448	**0.728**
Y1.4	0.359	0.368	0.425	**0.724**
Y1.5	0.176	0.478	0.312	**0.588**
Y1.6	0.405	0.510	0.368	**0.663**
Y1.7	0.275	0.521	0.512	**0.723**

Table 7. shows that the cross-loading of indicators has the highest value on the results of the variables generated by themselves compared to the cross-loading with other variables. So, it can be interpreted that the indicators used have discriminant validity, which means that the indicators for each variable used to measure are not correlated.

Inner Models Result

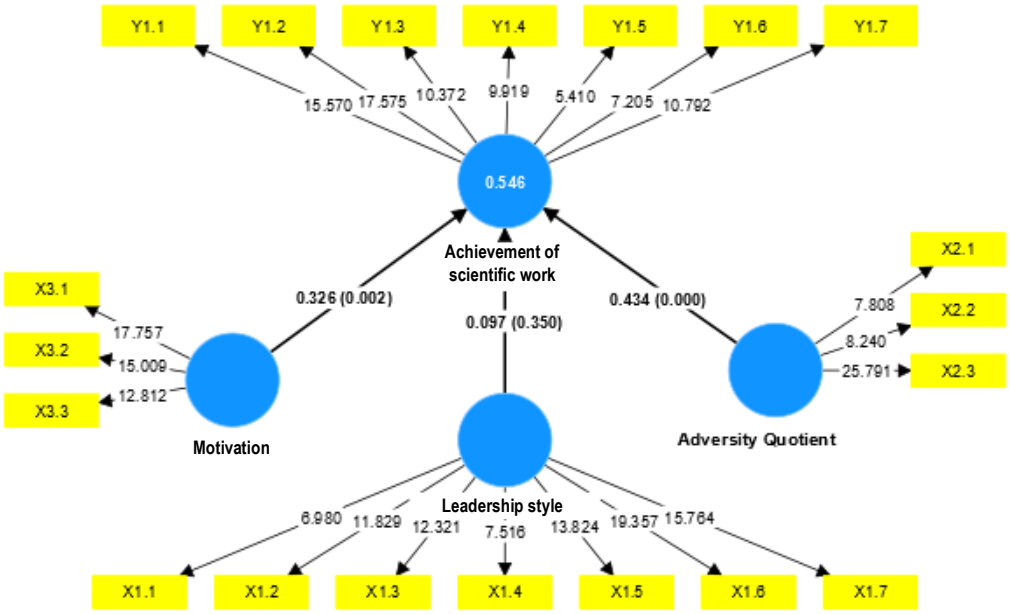

Figure 2. Inner Model

The path coefficients in the inner model show that the overall t-value for each indicator is more than 1.96, so it can be interpreted that each indicator influences the independent variable on the dependent variable. The higher the t value, the stronger the influence of leadership style, adversity quotient, and motivation on scientific work achievement. The results of the inner model can be explained through the R square value obtained by 0.546 or 54.6% in the moderate category so that it informs changes in scientific work achievement, which can be explained through the variables of leadership style, adversity quotient, and motivation.

Table 8. Path Coefficient

Hypothesis	Original sample	Sample mean	STDEV	T statistic	P values
X1-Y	0.097	0.106	0.103	3.988	0.000
X2-Y	0.434	0.437	0.109	0.988	0.000
X3-Y	0.326	0.328	0.105	3.088	0.002

Table 8 shows that all the independent variables positively affect the dependent variable. Based on the original sample value, the highest value was obtained from the influence of the X2-Y variable so that the adversity quotient variable made the most prominent contribution to influencing students' scientific work achievement.

The Influence of Leadership Style on Scientific Work Achievement

This study aims to see the effect of leadership style, adversity quotient, and motivation on the scientific work achievement of Tadris IPA IAIN Ponorogo students. Leadership style is a way for a leader to influence the behavior or thoughts of his subordinates so that they can take responsibility for achieving

goals (Fries et al., 2021). In this context, it is essential to consider the leadership role of school principals in developing appropriate strategies and policies to increase student achievement (Falah et al., 2023). Bernard divides leadership style into two dimensions: Transactional and Transformational (Hai et al., 2021). Transactional leadership is a person's style of leading, which begins with an agreement in the form of the leader's wishes and the expectations of followers, which is then agreed upon to become a shared commitment to achieving goals (Purwanto et al., 2020). The transactional leadership style has the characteristics of contingent reward and exception management. Reward is an appreciation of rewards to someone who can achieve goals or achievements. Meanwhile, exception management is the tendency of a leader to monitor and look for anything that deviates and take corrective steps.

The transformational leadership style is characterized by charisma, inspiration, problem-solving encouragement, and mentoring for each individual (Ahmed et al., 2016). Leaders with a transformational style tend to emphasize good relations with subordinates with the aim of closeness so that subordinates can provide good work results. The results showed that leadership style positively affects the scientific work achievement of Tadris IPA students. The leadership style that has influence is the transformational leadership style. This aligns with Endang and Sari's statement that leaders who can provide motivation or encouragement influence the achievement of goals (Darda et al., 2021). The head of the Tadris IPA department has a transformational leadership style, namely a charismatic, inspiring leader who always tries to encourage his students.

The Effect of Adversity Quotient on Scientific Work Achievement

The adversity quotient is an individual's intelligence in solving problems, namely the extent to which individuals can survive in the face of difficulty and turn a challenge into an opportunity (Rahmawati, 2023). Student success in learning depends on how students overcome and deal with difficulties. Not all students can go through difficulties and challenges in the learning process; of course, this will affect achievement. Learning difficulties in the academic field are tantamount to showing their failure to achieve an achievement according to their abilities. Intelligence is seen as something relative because the intelligence of each student is at a different level. Intelligence related to how students overcome and deal with difficulties in the learning process is called Adversity Quotient. The Adversity Quotient Theory was explained by Paul G. Stolz in 1997 (Zhao & Sang, 2023); the theory aims to mediate between intellectual and emotional intelligence. Stoltz explained that IQ and EQ are not enough to be a benchmark that will predict a person's success; where someone with good IQ and EQ but does not have high fighting power and the ability to respond well to adversity itself, then these two abilities will be useless.

The results of simple regression analysis show a significance of 0.000 < (0.000) so that H0 is rejected, or it can be interpreted that the adversity quotient affects scientific work achievement. The coefficient of the regression direction also shows that the adversity quotient has a positive effect on scientific work achievement. The regression equation states a causal relationship between the

adversity quotient and the achievement of scientific work, as indicated by the value of the regression coefficient. If there is an increase of 1 score, the achievement of scientific work will increase by 0.523. The description of these results is in line with the research conducted by Tesa and Agus Mulyana, namely regarding the effect of adversity quotient on student academic achievement, showing that the ability to overcome difficulties and challenges in the learning process influences student achievement (Huda & Mulyana, 2017).

The adversity quotient has an R2 value of 0.426, meaning that based on simple regression analysis, the adversity quotient variable influences 42.6% of scientific work achievement. This shows that the adversity quotient influences student achievement in scientific work. The adversary quotient plays a role in encouraging students to persist in achieving what they have aspired to, in this case, what is meant by achievement in scientific work.

The aspects in the adversity quotient which are indicators of this research are usually abbreviated as CO2RE, namely Control, Ownership and Origin, Reach and Endurance (Tarmedi et al., 2016). Control is the level of control over events caused by problems or self-control of students when they experience problems. Origin and Ownership are Ownership of the origin of the problem and Ownership of the problem. Reach is student ownership of how far the problem can reach other aspects of life. Endurance is the student's perception of how long a problem will last. The influence of the adversity quotient on scientific work achievement shows that individuals have CO2RE aspects within themselves as a strength in facing challenges.

The Effect of Motivation on Scientific Work Achievement

Motivation is encouragement. Encouragement can be in the form of encouraging students to achieve a goal. Motivation is a way to create enthusiasm to achieve goals, and this situation aims to satisfy some individual needs. Motivation refers to achieving the organization's main goals by satisfying the needs or demands of individual employees (Mohammad et al., 2014). Motivation is an invisible, personal construct in college that manifests itself in observable and measurable behavior.

Motivation has an influence of 38.8% on scientific work achievement. Motivation plays a role in encouraging students to continue trying to increase productivity in doing scientific work by providing opportunities to take part in various scientific work events and competitions. Motivation is indicated in 3 things, namely achievement needs, power needs, and affiliate needs (Cornista & Macasaet, 2013). Achievement needs are a sense of the need to achieve in scientific work. Power need is the need to have power in the form of a sense of belonging, a sense of importance, and a sense of achievement, and participation. Then, a group's affiliates need to be considered (Mohammad et al., 2014). This description shows that motivation affects scientific work achievement, and these three aspects of motivation are found in Tadris IPA students who excel in scientific work.

The Effect of Leadership Style, Adversity Quotient, and Motivation on Scientific Work Achievement

Multiple linear regression analysis on the effect of transactional and transformational leadership styles on scientific work achievement shows that the Head of the Science Tadris department tends to have a transformational leadership style. This style emphasizes giving motivation or encouragement in the form of enthusiasm. Transformational leadership is identified with the behavior of the Head of the department, who is charismatic, inspirational, and able to inspire students. It also includes intellectual stimulation, providing solutions to every problem through stimulation, and individualized consideration, namely, paying attention to each student. Aspects of achievement in scientific work in this study are based on creative thinking abilities because creative individuals can create ideas, knowledge, and experiences closely related to writing scientific papers.

However, multiple linear regression analysis results partially show that leadership style does not affect scientific work achievement, and the other two variables affect scientific work achievement. This study's results align with Ratna's statement that one factor that influences achievement is the adversity quotient (OECD, 2019). Meanwhile, motivation affects achievement because individuals constantly face the need to achieve and compete. Therefore, adversity quotient and motivation have a positive effect on student achievement in the field of scientific work.

Furthermore, it shows that leadership style, adversity quotient, and motivation with values influence the scientific work achievement of Tadris IPA students. Thus, if partially, not all variables affect scientific work achievement in students. Meanwhile, if the three variables simultaneously affect the achievement of scientific work. The coefficient of determination explains that leadership style, adversity quotient, and motivation have an effect of 51% on student achievement in the field of scientific work.

In addition to using regression analysis, this study also uses SEM PLS analysis. SEM PLS was carried out to determine the variables and indicators with the highest contribution to Y. The results and changes in scientific work achievement can be explained through leadership style, adversity quotient, and motivation. Of course, these results are in line with the regression analysis that was carried out. Therefore, in achieving scientific work achievements in students, contributions are needed from leadership management, intelligence in dealing with problems that are owned by individuals, as well as motivation, which is external encouragement in the form of enthusiasm from the Head of the department as a leader and encouragement from outside, namely self-needs in achieving.

Nevertheless, the variable that has the highest contribution to influencing the achievement of scientific work is the adversity quotient. Dina's findings show that achievement requires an adversity quotient. People with high achievement motivation tend to continue working hard to achieve these goals during difficult times. Adversity quotient plays an essential role in determining future orientation to reduce doubt, confusion, and anxiety that arise when students plan and decide on the goals they want to achieve. This is supported by research showing that individuals who overthink about the future continue striving to increase their

knowledge and gain experience to achieve their desired achievements (Rahmawati, 2023). In addition, the t value shows that each indicator also influences Y. In the leadership style, the indicator with the highest influence is intellectual stimulation, with the statement of the Head of the Tadris IPA department. This leader can develop new ideas and creative solutions to problems. In line with Purwanto's research results, leaders with a transformational style can create creative ideas and solutions when dealing with problems (Purwanto et al., 2020). Thus, the Head of the Tadris department is a leader with a transformational style who can generate ideas and creative solutions to problems.

The adversity quotient indicator with the highest contribution is ownership, which shows that self-awareness of a problem is good. If you make a mistake, the individual always tries to improve and can be a motivator for the obstacles he faces himself; in this case, the statement used is that I still feel happy even though no friends care about me. The results of this research align with Karari's research findings, which show that individuals will be able to achieve their goals, correct their mistakes, and be motivated to achieve them. (Karari et al., 2022).

The motivational indicator that has the highest value is achievement need. The need for achievement is related to high fighting power and intelligence in dealing with problems. Individuals who can survive in all circumstances have a high chance of achievement. Research on leadership style, adversity quotient, and motivation for achievement has been carried out, but its relation to scientific work achievement still needs to be discovered. Therefore, in improving achievement in scientific work, contributions from leaders, student persistence, and encouragement to achievement are needed. The results of this research can be used as material for further research related to student achievement because improving student achievement is part of the management of educational institutions in achieving goals, so empowerment needs further attention. This research can also be used as review material regarding the factors that determine student scientific achievement. In practical terms, it can be a consideration for universities in developing learning activities and processes that lead to increased student achievement in creating scientific work.

CONCLUSION

The results of the simple linear regression analysis stated that each variable, namely transformational leadership style, adversity quotient, and motivation, affected achievement. The results of the t-test analysis of multiple linear regression partially show that the leadership style variable does not affect scientific work achievement. However, leadership style, adversity quotient, and motivation simultaneously affect scientific work achievement. PLS-SEM analysis shows that the variable that has the highest contribution is the adversity quotient. Then, the indicator with the highest contribution is the ownership indicator, while the indicator that contributes the least is creative innovation, with my statement using failure as a learning tool.

This research proves that leadership style, adversity quotient, and motivation influence the scientific work achievement of Tadris IPA IAIN Ponorogo students. However, the extent to which this research can be used as a

reference is less effective if it is assumed that each department in tertiary institutions has the same background and objectives so that it is comparable to the findings of this study. Therefore, the researcher hopes that future researchers will find out in advance the characteristics of the subjects to be studied so that they know the organization's background and goals. The research on leadership style, adversity quotient, and motivation can be expanded to settings in universities and schools. Many factors of achievement in scientific work cannot be explained in this study. Therefore, more in-depth research is needed on the factors that influence achievement in scientific work.

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