



Path analysis of factors influencing identity in graduates from the Faculty of Forestry, Kasetsart University

Piyawat Diloksumpun^a, Thanasak Chanthasin^{b,*}, Manasanan Hatthasak^c, Sathidaporn Khomsod^d, Wiraporn Chanthasin^e

^a Department of Forest Engineering, Faculty of Forestry, Kasetsart University, Bangkok 10900, Thailand

^b Psychological and Guidance Service Unit, Kasetsart University Laboratory School Multilingual Program Center for Educational Research and Development, Faculty of Education, Kasetsart University, Bangkok 10900, Thailand

^c Department of Educational Psychology and Guidance, Faculty of Education, Kasetsart University, Bangkok 10900, Thailand

^d Department of Vocational Education, Faculty of Education, Kasetsart University, Bangkok 10900, Thailand

^e Independent Researcher, Chatuchak, Bangkok 10900, Thailand

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Abstract

This study investigates the factors influencing identity development among 710 graduates from Kasetsart University's Faculty of Forestry. Using path analysis, the research identifies integrity, commitment, knowledge application, and adaptability as significant predictors of graduate identity. The findings suggest that teamwork and fighting spirit are dependent variables, predicted at 60 percent and 48 percent, respectively. These results have practical implications for curriculum development and skill enhancement initiatives aimed at maintaining graduate identity and meeting societal expectations.

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Introduction

Faculty of Forestry at Kasetsart University is regarded as the only higher education institution in Thailand that offers teaching and learning in the forestry field at all levels, and is considered the leading educational institution that prepares graduates to work in forestry and national parks, producing wildlife and plant species. Therefore, the Faculty of Forestry has an intensive teaching and learning management model, especially with regard to field work. In addition, complementary activities are organized to develop important career skills, aiming to provide students with a number of competencies related to

the demands of the job. According to the research findings on the identity of forestry graduates (Diloksumpun et al., 2023), forestry graduates have nine prominent identity characteristics, including teamwork, motivation, and knowledge practice. They adhere to morality towards themselves and others and try to adapt to the environment, are polite and humble, proactively help and share. They do not appear condescending or combative. However, it is still necessary to consider how the various identities that have emerged among forestry graduates directly and indirectly affect each other. How can the guidelines of education management development for human development be utilized to produce graduates with the expected identities?

* Corresponding author.

E-mail address: thanasak.cha@ku.th (Chanthasin, T.).

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Path analysis is a widely utilized statistical method for exploring direct and indirect variable relationships to ascertain causal connections among independent variables. Cuadra-Martinez et al. (2019) conducted a path analysis on predictors of professional identity in psychology students. Strate et al. (2023) examined university students' occupational identity through pathways influenced by attachment, gender, age, and socioeconomic status, primarily occurring in peer interactions. The significance of peer support in identity formation is highlighted by Wingwon (2015), who found that self-perception directly affects identity, with social support shaping this perception. Family and institutional support also directly influence the perception of one's abilities. The study by Ditphokinsakul and Langka (2018) revealed that teachers' professional identity is positively affected by their self-efficacy and teaching spirit, with social transmission playing an indirect role. Together, these causal factors account for 76 percent of the variance in teachers' professional identity, indicating a need for enhanced identity education in forestry and agriculture professions.

This study aims to investigate the direct and indirect impact of identity on forestry graduates, who are considered professionals who require a unique identity, especially as fighters and team workers, by applying path analysis. Preliminary results show that there are still few students studying path analysis in the forestry field. In contrast to current educational management, the emphasis is on presenting results as preliminary values. The results of this study are expected to serve as basic information for the design and development of learning management processes in class activities and extracurricular activities, including the creation of an environment that promotes learning. Not only does it show the sequential steps of identity development, but it also highlights the points that need to be considered during the development, which can not only help forestry departments to develop graduates who can maintain their identity, but also be applied to the design and development of learning management models in other courses and performance characteristics in the future as well.

Literature Review

The identity of graduates from the Faculty of Forestry, Kasetsart University is shaped by various factors that affect educational experience and professional development to help solve problems in an era of increasing environmental concerns. The forestry sector therefore

becomes increasingly important and emphasizes the need to have a strong educational foundation in the field of forestry and related fields. (Blake, 2024; Wilson, 2023) These programs aim to equip learners with the skills necessary for effective management and conservation of forest resources. When graduates embark on their career paths, these educational foundations, coupled with expert learning, can increase their ability to enter the labor market and increase their performance in their career field (Blake, 2024).

Factors that affect identity: The development of professional identity of graduates from the Faculty of Forestry, Kasetsart University is influenced by a number of factors, which, based on the results of previous research, have proposed a comprehensive conceptual framework that divides these influences into different groups, which allows for a more integrated understanding of how different elements contribute to professional identity in the context of higher education (Sills, 2009). Types of influencing factors: Social experience, Educational Context, Perception of occupational conformity, Demographic characteristics, Professional image Work Experience, Self-development and self-participation.

There is still a lack of research on the identity of graduates of the Faculty of Forestry, as far as the research team has discovered, especially the graduate development model. With Research and Development of Teaching Curriculum, the development of graduates is in line with the needs of the labor market and the needs of society. The identity of the graduates of the Faculty of Forestry is important; there are 9 variables: (1) Teamwork (F1), (2) Commitment (F2), (3) Application knowledge (F3), (4) Integrity (F4), (5) Adaptability (F5), (6) Humility (F6), (7) Willingness to help (F7), (8) Not-indifferent (F8), and (9) Fighting spirit (F9) (Diloksumpun et al., 2023). But previous findings still need to be studied at the level of relationships, the magnitude of influence and the causality of identity variables This study helps to expand the knowledge to understand the cause and effect of these variables even more.

Methodology

Research objectives: To study the Path Analysis of Factors Influencing Identity in Graduates from the Faculty of Forestry, Kasetsart University

Research hypothesis: The paths of identity factors of graduates from the Faculty of Forestry, Kasetsart University, are consistent with the empirical data.

Conceptual framework: The authors conducted this study based on reviews of previous literature. The predicting equations were found for the identity of graduates from the Faculty of Forestry (Diloksumpun et al., 2023). These findings were used by the authors to create a hypothesis and empirical data in the form of overidentified model of the identity factors of the graduates from the Faculty of Forestry, Kasetsart University (Diloksumpun et al., 2023), as shown in [Figure 1](#).

Results of the measure of model fit: The results were derived from parameter estimation of the model, estimation of various coefficients, and path analysis of an overidentified model of independent variables and dependent variables (latent variables) that the authors have created based on previous research studies. This overidentified model consists of paths connecting variables in various directions that can be linked to dependent variables that are internal variables or latent variables in every structural equation. The statistics shows the relationship between variables through standard regression weights, *t*-Value (critical ratio: C.R.), *p*-Value, and standard error (S.E.). The analysis results are shown in [Figure 2](#).

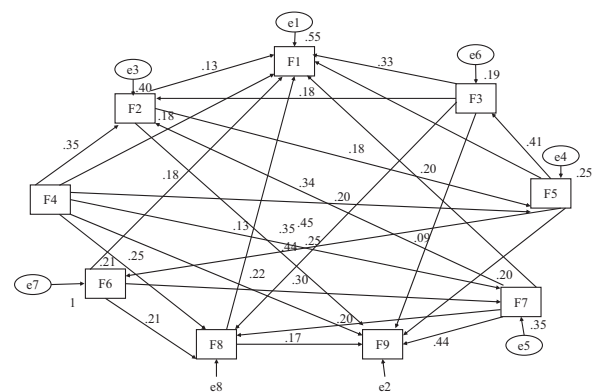


Figure 2 The results of estimation of coefficients of the path analysis model

The model needs to be checked for fitness or consistency of the correlation between variables. If consistent, it can be used for the analysis; if not, the structural equation model needs to be adjusted until it is complete, acceptable and reliable according to the research principles before it can be used. Developing a model that is consistent with empirical data is commonly called “Model Fit.” For this study, it was found that the empirical model and theoretical model (prototype model) were not consistent under the evaluation criteria as follows, (1) Chi-square Probability Level: CMIN-p of .000, (2) Relative Chi-square: CMIN/df of 19.582, (3) Goodness of Fit Index: GFI of .932, and (4) Root Mean Square Error of Approximation: RMSEA of .162

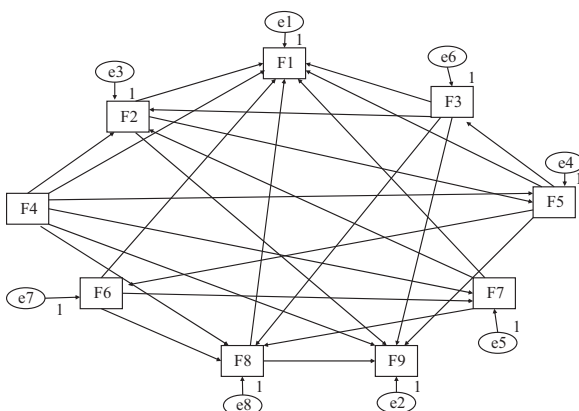


Figure 1 A hypothesis of overidentified model

The examination of theoretical model (prototype model) fit against the empirical data was found to be inconsistent. The figure shows the estimation of the model parameters or various coefficients indicating the relationship between variables through standard regression weights), standard error (S.E.), *t*-Value (critical ratio: C.R.) and *p*-Value (Luekveerawattana, 2024)

From the path analysis shown in Figure 2 and Table 1, which display standardized regression weights, variables, and indication of statistical significance, it reveals significant correlation of 24 pairs of variables at the 0.001 level ($p < .001$), significant correlation of 1 pair of variables at the .01 level ($-p < .01$), and insignificant correlation of 1 pair of variables at the .05 level.

Since there was one pair of variables with insignificant correlation - fighting spirit being influenced by Adaptability ($F9 < --- FS$), the researcher had to eliminate this path from the analytical model. Although the model found 24 pairs of variables with significant correlation at the 0.001 level ($*** p < .001$), it was still not consistent with the empirical data. Therefore, the model needed to be adjusted for consistency with the empirical data.

Model Adjustment

From the analysis of the overidentified model of path analysis to find the Factors Influencing Identity in Graduates from the Faculty of Forestry, Kasetsart University, it was found that the correlation between the variables used in the analysis were not appropriate as the model was found inconsistent with the empirical data. Therefore, the model needed to be adjusted based on the value of (1) Chi-square Probability Level: CMIN-*p*, (2) Relative Chi-square: CMIN/df, (3) Goodness of Fit Index: GFI, and (4) Root Mean Square Error of Approximation: RMSEA to obtain a model with best correlation by adding or discarding statistically significant paths in the overidentified model

Thus, the path coefficients of each structural equation could be used to draw the path of the parsimonious model to ensure the best correlation. The findings are as follows:

Direct effect

1. Integrity had direct effect on teamwork, willingness to help, humility, Integrity, Application knowledge, Adaptability, Commitment, Not-indifferent, and fighting spirit.
2. Willingness to help had direct effect on teamwork, Commitment, Application knowledge, and Not-indifferent.
3. Humility had direct effect on willingness to help, teamwork, Commitment, Application knowledge, and Not-indifferent.

4. Adaptability had direct effect on willingness to help, humility, Application knowledge, and teamwork.

5. Application knowledge had direct effect on Commitment, Not-indifferent, and teamwork.

6. Commitment had direct effect on Adaptability, Not-indifferent, fighting spirit, and teamwork.

7. Not-indifferent had direct effect on fighting spirit and teamwork.

Indirect Effect

1. Integrity had indirect effect on fighting spirit through willingness to help, humility, Adaptability, Application knowledge, Commitment, and Not-indifferent.

2. Integrity had indirect effect on teamwork through willingness to help, humility, Adaptability, Application knowledge, Commitment, and Not-indifferent.

3. Willingness to help had an indirect effect on fighting spirit through humility, Adaptability, Application knowledge, Commitment, and Not-indifferent.

4. Willingness to help had an indirect effect on teamwork through humility, Adaptability, Application knowledge, Commitment, and Not-indifferent.

5. Humility had indirect effect on fighting spirit through willingness to help, Adaptability, Application knowledge, Commitment, and Not-indifferent.

6. Humility had indirect effect on teamwork through willingness to help, Adaptability, Application knowledge, Commitment, and Not-indifferent.

7. Adaptability had indirect effect on fighting spirit through willingness to help, humility, Application knowledge, Commitment, and Not-indifferent.

8. Adaptability had indirect effect on teamwork through willingness to help, humility, Application knowledge, Commitment, and Not-indifferent.

9. Application knowledge had indirect effect on fighting spirit through willingness to help, humility, Adaptability, Commitment, and Not-indifferent.

10. Application knowledge had indirect effect on teamwork through willingness to help, humility, Adaptability, Commitment, and Not-indifferent.

11. Commitment had indirect effect on fighting spirit through willingness to help, humility, Adaptability, Application knowledge, and Not-indifferent.

12. Commitment had indirect effect on teamwork through willingness to help, humility, adaptability, application knowledge, and Not-indifferent. The direct and indirect effect of the graduate identity of the Faculty of Forestry, Kasetsart University appear as shown in the figure below.

Measures of the model fit are used to examine the consistency of correlation between variables. The research results reveal that the empirical model and theoretical model (prototype model) were consistent with empirical data as follows, (1) Chi-square Probability Level: CMIN-p of .348, (2) Relative Chi-square: CMIN/df of 1.118, (3) Goodness of Fit Index: GFI of .998, and (4) Root Mean Square Error of Approximation: RMSEA of .013.

Model path coefficients: From calculation of the direct effect, indirect effect, and the total effect of the adjusted model, it was found that the correlation between the variables was at the highest level. Therefore, the model was used to find direct effect (DE), indirect effect (IE), and total effect (TE).

From Figure 3, regarding total effect, it was found that there were 6 independent variables with a total effect on Willingness to help, namely, Integrity at .565, Willingness to help at .009, humility at .258, Adaptability at .219, Application knowledge at .006, and Commitment at .035.

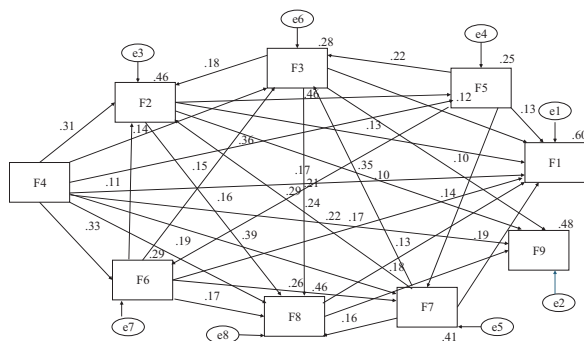


Figure 3 Results of estimating coefficients after model adjustment

There were 6 independent variables with a total effect on humility, namely, Integrity at .462, Willingness to help at .012, humility at .009, Adaptability at .292, Application knowledge at .008, and Commitment at .046.

There were 6 independent variables with a total effect on Adaptability, namely, Integrity at .445, Willingness to help at .044, humility at .033, Adaptability at .022, Application knowledge at .029, and Commitment at .161.

There were 6 independent variables with a total effect on Application knowledge, namely, Integrity at .393, Willingness to help at .164, humility at .201, Adaptability at .302, Application knowledge at .008, and Commitment at .048.

There were 6 independent variables with a total effect on Commitment, namely, Integrity at .568, Willingness

to help at .276, humility at .208, Adaptability at .139, Application knowledge at .182, and Commitment at .022.

There were 6 independent variables with a total effect on Not-indifferent, namely, Integrity at .532, Willingness to help at .237, humility at .291, Adaptability at .170, and Application knowledge at .240, and Commitment at .185.

There were 7 independent variables with a total effect on fighting spirit, namely, Integrity at .553, Willingness to help at .157, humility at .146, Adaptability at .110, and Application knowledge at .207, Commitment at .401, and Not-indifferent at .180.

There were 7 independent variables with a total effect on teamwork, namely, Integrity at .604, Willingness to help at .286, humility at .315, Adaptability at .300, Application knowledge at .184, Commitment at .197, and Not-indifferent at .125.

Regarding direct effect, it was found that there were 3 variables with a direct effect on Willingness to help, namely, Integrity at .256, humility at .205, and Adaptability at .126.

There were 2 independent variables with a direct effect on humility, namely, Integrity, at .272 and Adaptability at .310.

There were 2 independent variables with a direct effect on Adaptability, namely, Integrity at .266 and Commitment at .137.

There were 4 independent variables with a direct effect on Application knowledge, namely, Integrity at .139, Willingness to help at .152, humility at .153, Adaptability, at .220.

There were 4 independent variables with a direct effect on Commitment, namely, Integrity at .311, Willingness to help at .243, humility at .109, and Application knowledge at .178.

There were 5 independent variables with a direct effect on Not-indifferent, namely, Integrity at .193, Willingness to help at .156, humility at .175, Application knowledge at .207, and Commitment at .159.

There were 4 independent variables with a direct effect on fighting spirit, namely Integrity at .216, Application knowledge at .099, Commitment at .355, and Not-indifferent at .180.

There were 7 independent variables with a direct effect on teamwork, namely, Integrity at .171, Willingness to help at .191, humility at .172, Adaptability at .129, Application knowledge at .123, Commitment at .130, and Not-indifferent at .125.

Regarding indirect effect, it was found that there were 6 independent variables with an indirect effect on Willingness to help, namely, Integrity at .179,

Willingness to help at .009, humility at .007, Adaptability at .076, Application knowledge at .006, and Commitment at .035.

There were 6 independent variables with an indirect effect on humility, namely, Integrity at .127, Willingness to help at .012, humility at .009, Adaptability at .006, Application knowledge at .008 and Commitment at .046.

There were 6 independent variables with an indirect effect on Adaptability, namely, Integrity at .090, Willingness to help at .044, humility at .033, Adaptability at .022, Application knowledge at .029., and Commitment at .003.

There were 6 independent variables with an indirect effect on Application knowledge, namely, Integrity at .254, Willingness to help at .013, humility at .048, Adaptability at .083, Application knowledge at .008, and Commitment at .048.

There were 6 independent variables with an indirect effect on Commitment, namely, Integrity at .257, Willingness to help at .033, humility at .099, Adaptability at .139 Application knowledge at .004, and Commitment at .022.

There were 6 independent variables with an indirect effect on Not-indifferent, namely, Integrity at .340, Willingness to help at .081, humility at .116, Adaptability at .170, Application knowledge at .033, and Commitment at .027.

There were 6 independent variables with an indirect effect on fighting spirit, namely, Integrity at .336, Willingness to help at .157, humility at .146, Adaptability at .110, Application knowledge at .109, and Commitment at .046.

There were 6 independent variables with an indirect effect on teamwork, namely Integrity at .433, Willingness to help at .095, humility at .143, Adaptability at .171, Application knowledge at .061, and Commitment at .067.

Discussion

The above research results show that the identity of graduates of the Faculty of Forestry, Kasetsart University is caused by a causal relationship consisting of 7 paths, which helps to predict and explain the formation of graduate identity more effectively by integrating psychological theories, educational theory and social science theory to develop hypothetical models and examine them with advanced statistics in the analysis of causal relationship pathways. Path Analysis is used to study the influence of various variables that affect the formation of the identity of the graduates of the Faculty of Forestry.

The emergence of identity of the graduates of the Faculty of Forestry found direct and indirect influence paths that transmit the influence of the primary variable to the following variable, which helps to predict the emergence of identity more accurately. The most influential primary variable is the “adherence to virtue towards oneself and others” variable, which is important for building trust and maintaining relationships with others. It affects the well-being of society. It points out the need to inculcate morality and ethics in students from the beginning of their studies in the faculty, which is in line with the theory of Kohlberg and Hersh (1977), who proposed the theory of ethical development. Learning through reflection on ethical thinking, especially at the higher education level, develops learning and realizing the role of morality in living and participating in society. Cultivating morality and ethics from the beginning of education is in line with the concept of learning that helps to develop students to be more ethical according to the process of ethical thinking. The 6 variables are “Committed to Accomplishing the Task”, “Ready to Put Knowledge into Action”, “Ready to Adapt to the Environment”, “Polite and Humble”, “Help and Share”, and “Don’t Look Down”. These variables act to be influenced by the primary variable and influence the “Teamwork” and “Fighter”, which are important variables in building the identity of graduates. In line with the study of Banjerdkit et al. (2013) it was found that the identity of graduates of Nakhon Sawan Rajabhat University is “graduates who work in a team, are technologically proficient, honest, and have a public spirit towards the community and the locality”. Organize activities that affect the fulfillment of identity in all aspects and affect teamwork as much as possible to enable students to express desirable attributes according to the defined identity.

Creating the identity of the graduates of the Faculty of Forestry is not only about promoting one factor. Rather, it is a combination and reinforcement of several factors that work together. Developing graduates to have an appropriate identity needs to focus on promoting morality. All of these will help graduates be job-ready and able to adapt to a rapidly changing environment. This is in line with Charoenphon (2022), who found Strengthening identity with those involved, changing the concept of identity shaping from the concept of participation to the concept of cooperation. All sectors must participate in the development of learning activities, activities outside the classroom to build identity

The model developed in this research is consistent with empirical data and can be used as a guide for the development of curriculum and learning activities for students of the Faculty of Forestry to strengthen their appropriate identity and meet the needs of the labor market in the future. It emphasizes the promotion of highly influential factors and links to concrete development.

Conclusion and Recommendation

Based on a research hypothesis to prove the influence pathway model of graduate identities, Faculty of Forestry, Kasetsart University, which was developed to be accurate with empirical data, the results show that by evaluating the data-model fit, the statistical value used to check the consistency of the empirical model with the theoretical model is the use of p -value, which must be statistically significant. Significant (Sig.) with a value of $p > .05$ is considered to be consistent with the empirical data because when the value of $p > .05$, the result is not Sig., which means that there is no difference or consistency. The value calculated from the results is that $p = .348$.

Therefore, it can be concluded that the cause of the emergence of the identity of the graduates of the Faculty of Forestry, Kasetsart University is not only one cause, but relies on the stimulation and promotion of various causes that occur together by the graduates of the Faculty of Forestry, Kasetsart University. 41 percent are polite, humble, ready to adapt to the environment, ready to apply knowledge to practice, committed to accomplish the task, making predictions together, and helping to share. 29 percent predicted and adapted to the environment, 25 percent predicted and put knowledge into practice, 28 percent predicted and committed to accomplish the task, 46 percent predicted together, did not look down, and 46 percent predicted together. Fighters got 48 percent and “teamwork got 60 percent.

Recommendations

1. The Faculty of Forestry should formulate a policy for the development of graduate identity systematically. The Graduate Identity Path Model developed as a framework for planning by integrating the development of Graduate Identity into the Faculty’s strategic plan with clear goals, indicators, and strategies, and adequate budget and resources should be allocated to support graduate identity development activities both inside and outside the program.

2. The Faculty of Forestry can use the Graduate Identity Path Model as a guide to design learner development activities both inside and outside the classroom and integrate graduate identity development into the teaching and learning process of all subjects. It focuses on activities that promote model-based attributes.

3. The Faculty of Forestry should take the extra-curricular activities provided by the faculty to students in all grades by considering the results of the activities and linking them to the identity of the graduates and then arrange or group the activities to be used as graduate development activities of the Faculty of Forestry according to the results of the analysis of the identity development path from research.

4. Suggestions for the next research: Expand the scope of education to current students in all grades to compare the identity path model between grades. Conduct semi-experimental research to study the effectiveness of graduate identity development methods and the persistence of identity generation. Create a tool to measure the identity of graduates of the Faculty of Forestry as a standard tool.

Conflict of Interest

The authors declare that there is no conflict of interest.

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