The Linear Structural Equation Model of the Competency of Deans in Educational Colleges in Western China

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Abstract

The objectives of this research were: (1) To study the constituted characteristic competencies of Deans in educational colleges in Western China; (2) Create and develop a linear structural equation model of the competency of Deans in Educational Colleges in Western China; (3) To a linear structural equation model to examine the competency of Deans in Educational Colleges in Western China. The sample was 460 individuals selected using a multi-stage random sampling method. Research tools include questionnaires, semi-structured interviews, SPSS statistics, etc. Likert 5-level scales are used to measure and evaluate each competency characteristic, and factor analysis methods are used to analyze the internal structure of the competency characteristics. The research results are as follows: (1) The competency of deans of education in western China is composed of five important components: personal charisma, educational philosophy, administration skills, interpersonal relations, and development awareness.; (2) Linear structural equation model composed of the competencies of deans of colleges of education Included are the following statistical values: $x^2/_{df} = 2.954$, $\chi 2 = 316.52$, df = 160, P = 0.047, RMSEA = 0.043, GFI = 0.950, NFI = 0.955.

Keywords: Dean of educational colleges; Competency composition; Linear structural equation model

Introduction

Since McClelland introduced the concept of competencies in the 1970s, it has experienced rapid development and gained widespread acceptance in Western nations, particularly across Europe and the United States. This evolution has elevated competencies theory and its application to the forefront of research in management and psychology. Nowadays, the creation of competency models remains a central focus in talent assessment. Colleges, as a fundamental component of organizational structure, play a crucial role in achieving educational objectives, contributing significantly to a university's operational efficiency and long-term viability, as emphasized in Knox W.G.'s "Power of Pawn" (1977: 309-318). The dean, serving as the administrative leader of a college, is not only a guiding force in academic studies but also a pivotal figure in managing and allocating resources, including human, financial, and material assets, as discussed by Wang Jinghong (2016: 118-124).

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This study concentrated on deans in educational colleges in Western China, seeking to investigate the key components that constitute the characteristic competencies of these deans. The investigation aimed to understand how these competencies impact the efficiency of deans, intending to establish benchmarks and standards for the selection, training, and evaluation of university personnel.

Research Objectives

1. Study the key components that constituted characteristic competencies of Deans in educational colleges in Western China.

2.Create and develop a linear structural equation model of the competency of Deans in Educational Colleges in Western China.

3. A linear structural equation model to examine the competency of Deans in Educational Colleges in Western China.

Research Methodology

1. Research Methodology

1.1 Behavioral incident interview method

In this research, an interview was devised to assess the competencies of Deans in educational colleges. To implement this guide, a structured interview form was formulated, and interviews were conducted with 10 experts, comprising 2 educational administrators, 6 deans, and 2 professors from educational colleges.

1.2 Survey method questionnaire

Open-ended questionnaires were employed in this study to capture significant events, shaping distinct behavioral "domains." These events were systematically classified to guide the development of a comprehensive questionnaire. An initial pilot test of the questionnaire was conducted to gather feedback and suggestions from participants, influencing subsequent revisions to the measurement items. Following these adjustments, the final version of the questionnaire was distributed, and data were collected through its dissemination and subsequent retrieval.

2.Research sample group

2.1 overall

The dean of the School of Education has a management team and teachers of 5,895 people divided by province, including: Inner Mongolia Autonomous Region, Guangxi Zhuang Autonomous Region, Chongqing City, Sichuan Province, Guizhou Province, Yunnan Province, Shaanxi Tibet Autonomous Region, Gansu Province, Qinghai Province, Ningxia Hui Autonomous Region and Xinjiang Uygur Autonomous Region.

2.2 sample

The researchers used a sample of 460 people through multi-stage random sampling (Mulit-stage Random Sampling) to test the consistency of the linear structural equation.

3. Research tools

Research tools include questionnaires, semi-structured interviews, SPSS statistics, etc. Likert 5-level scales are used to measure and evaluate each competency characteristic, and factor analysis methods are used to analyze the internal structure of the competency characteristics.

4. Data collection

The researcher first conducted a literature study to study the components of competency characteristics of education deans in western China by analyzing textbooks, relevant research articles and comprehensive theoretical concepts. Secondly, the researcher created a questionnaire, which included two steps: drafting the questionnaire and checking the quality of the questionnaire. After the questionnaire was drafted, it was sent to 5 experts to conduct content validity testing by finding the index of consistency (IOC). Third, the researcher used the questionnaire to verify the results with 30 deans, staff, and teachers from the non-sample group. Finally, the researcher distributed the questionnaire to schools as sample groups, and filled in and collected the survey results online through Questionnaire Star.

5. Data analysis

This study takes the deans of colleges of education in western China as the research object, and analyzes the mean, standard deviation, skew, bulge, Pearson product-moment correlation coefficient, squared multiple correlation, and goodness-of-fit index (GFI) of the data, normal fit index (NFI), CN (critical N), RMSEA, etc., to create and develop a linear structural equation model of the competency of education deans in western China and test it

Research Conceptual framework

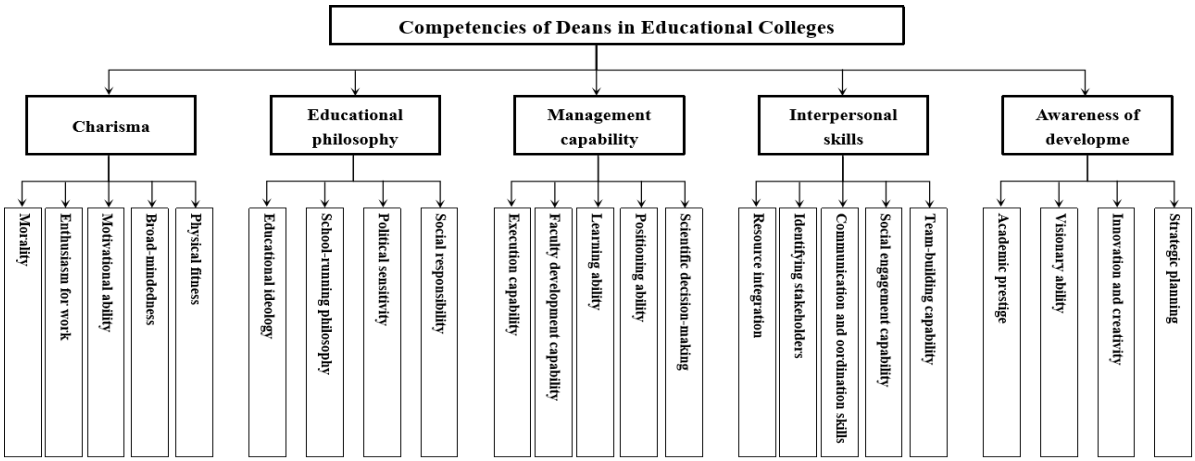


Figure 1 Research Conceptual framework
Source: Constructed by the author

Research Results

1. Approach to examine and identify key components constituting the competency of deans in educational colleges in Western China

To comprehensively grasp the characteristic competencies of deans in educational colleges in Western China and collect diverse attributes related to deans' competence, such as motivation, personality, self-image, values, social roles, attitudes, knowledge, and skills, a thorough literature review was initially conducted. This involved analyzing textbooks, relevant academic articles, and comprehensive theoretical concepts to study the competency components of these educational leaders.

Subsequently, a structured questionnaire was developed through two main steps: drafting and quality assessment. After the drafting phase, the questionnaire underwent content validity testing by five experts, utilizing the Index of Consistency (IOC) method. In the third step, the questionnaire was applied in a preliminary study involving 30 deans, staff, and teachers from a non-sample group to verify its effectiveness. The final stage included distributing the questionnaire to selected schools within the sample group, with responses collected online using the wjx.cn platform. Each characteristic competency was measured and evaluated using a five-point Likert scale.Through investigation and research, a five-point Likert scale was used to measure and evaluate each competency characteristic, and it was determined that there are 23 observable variables that are closely related to the competency characteristics of the dean of Western China College of Education.

2. Descriptive Statistics

On the basis of the previous analysis, descriptive statistics were performed on the data in the "Questionnaire Survey on the Competency of Deans in Educational Colleges in Western China ", and the maximum value, average value, standard deviation, and peak value of each element variable were calculated. degree and skewness. The importance of the competency of Deans in Educational Colleges in Western China is measured by the average value of each factor variable. The greater the average value, the higher the importance. The results are sorted from high to low based on the average value of the 23 observable variables. As follows Table 1.

Table 1 Descriptive statistics of the observable variables of competency of Deans in Educational Colleges in Western China

Observable variables	MIN	MAX	M	SD	KU	ZKU	SK	ZSK
Faculty development capability	1.0	5.0	3.83	1.01	-1.01	0.11	0.91	0.21
Team-building capability	2.0	5.0	3.81	0.82	-0.34	0.11	-0.42	0.21
School-running philosophy	1.0	5.0	3.74	0.95	-0.46	0.11	-0.58	0.21
Social responsibility	1.0	5.0	3.73	0.97	-0.48	0.11	-0.51	0.21
Educational ideology	1.0	5.0	3.71	0.97	-0.46	0.11	-0.66	0.21
Execution capability	1.0	5.0	3.71	1.06	-0.83	0.11	0.29	0.21
Visionary ability	2.0	5.0	3.66	1.08	-0.17	0.11	-1.29	0.21
Political sensitivity	1.0	5.0	3.64	1.02	-0.45	0.11	-0.52	0.21
Scientific decision-making ability	1.0	5.0	3.63	0.95	-0.81	0.11	0.64	0.21
Identifying stakeholders	1.0	5.0	3.62	0.93	-0.56	0.11	0.18	0.21
Positioning ability	1.0	5.0	3.62	1.03	-0.92	0.11	0.63	0.21
Social engagement capability	1.0	5.0	3.57	0.96	-0.42	0.11	-0.23	0.21
Resource integration capability	1.0	5.0	3.55	0.95	-0.31	0.11	-0.40	0.21
Learning ability	1.0	5.0	3.47	1.02	-0.51	0.11	0.01	0.21

Communication and coordination skills	1.0	5.0	3.40	1.01	-0.37	0.11	-0.21	0.21
Academic prestige	1.0	5.0	3.37	1.15	-0.09	0.11	-1.06	0.21
Innovation and creativity	1.0	5.0	3.35	1.22	-0.07	0.11	-1.23	0.21
Strategic planning	1.0	5.0	3.33	1.19	-0.08	0.11	-1.09	0.21
Morality	1.0	5.0	2.89	1.08	0.25	0.11	-0.57	0.21
Physical fitness	1.0	5.0	2.86	1.10	0.34	0.11	-0.54	0.21
Broad-mindedness	1.0	5.0	2.80	1.07	0.28	0.11	-0.50	0.21
Motivational ability	1.0	5.0	2.75	0.99	0.12	0.11	-0.50	0.21
Enthusiasm for work	1.0	5.0	2.74	0.93	0.01	0.11	-0.45	0.21

As outlined in Table 1, the 23 observable variables of deans in educational colleges in Western China are ranked in descending order according to their significance. The prioritized competencies are as follows: faculty development capability, team-building capability, school-running philosophy, social responsibility, educational ideology, execution capability, visionary ability, political sensitivity, scientific decision-making ability, identification of stakeholders, positioning ability, social engagement capability, resource integration capability, learning ability, communication and coordination skills, academic prestige, innovation and creativity, strategic planning, morality, physical fitness, broad-mindedness, motivational ability, and enthusiasm for work.

In addition, the standard deviation of each variable is small, the absolute value of skewness is less than 3, and the absolute value of kurtosis is less than 10. It can be considered that each variable obeys the normal distribution, and the changes of skewness and kurtosis of each variable are relatively stable and within the standard Within the range, it shows that the sample data has the characteristics of concentration and small fluctuation, and has high reference and application value.

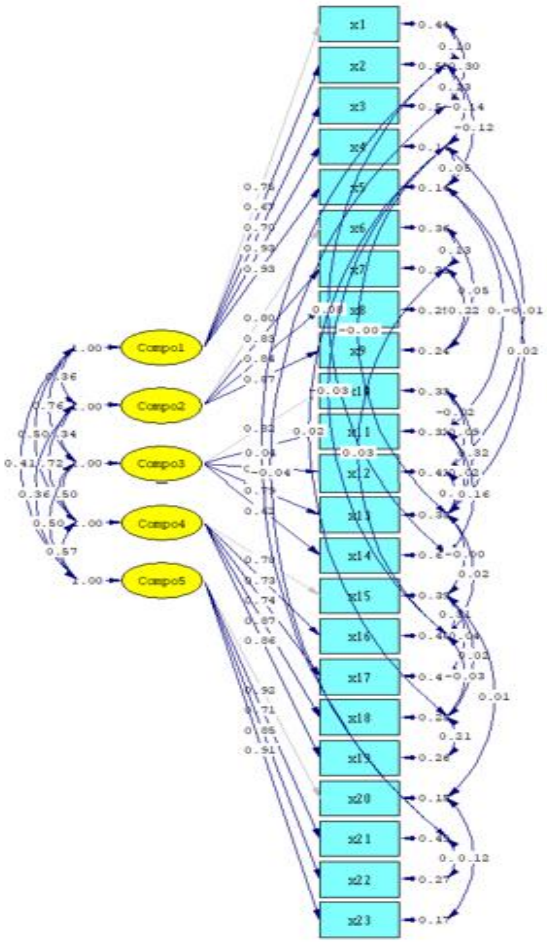
3. Model evaluation

The competency model is based on the work characteristics of a certain group and can distinguish between excellent performers and mediocre performers. The selection and determination of competencies is the key to model construction, and whether these elements accurately reflect the work characteristics of the research object has become the focus of model testing. The linear structural equation model of the competency of Deans in Educational Colleges in Western China obtained through exploratory analysis needs further verification. In order to further verify the theoretical framework of the linear structural equation model of the competency of Deans in Educational Colleges in Western China, this paper uses individual sample data to conduct confirmatory factor analysis using the linear structural equation model of the competency of Deans in Educational Colleges in Western China.

When evaluating a newly constructed or revised model, researchers need to test: whether the solution to the structural equation is appropriate, including whether the iterative estimation converges, and whether the estimated values of each parameter are within a reasonable range; they also need to test the relationship between the parameters and the preset model Is it reasonable? Finally, test multiple different types of overall fit indices, such as NFI, CFI, RMSEA and $\chi 2$, etc., to measure the degree of fit of the model. In this paper, six fit indices $\chi 2$, df, RMSEA, NFI and CFI are reported. It is generally believed that if RMSEA0.08 is below (the smaller, the better), and NNFI and CFI are above 0.9 (the bigger, the better), the fitted model is a good model (Hou, 2004).

3.1 First-order model verification

The results of the first confirmatory factor analysis of the five latent variables present the results of the factor analysis of the competencies of the Dean of Education. in the western area of the People's Republic of China Details are shown in Figure 2.



Chi-Square = 306.60 df = 185 P-value = 0.049 RMSEA =0.036

Figure 2 Results of first order confirmatory factor analysis

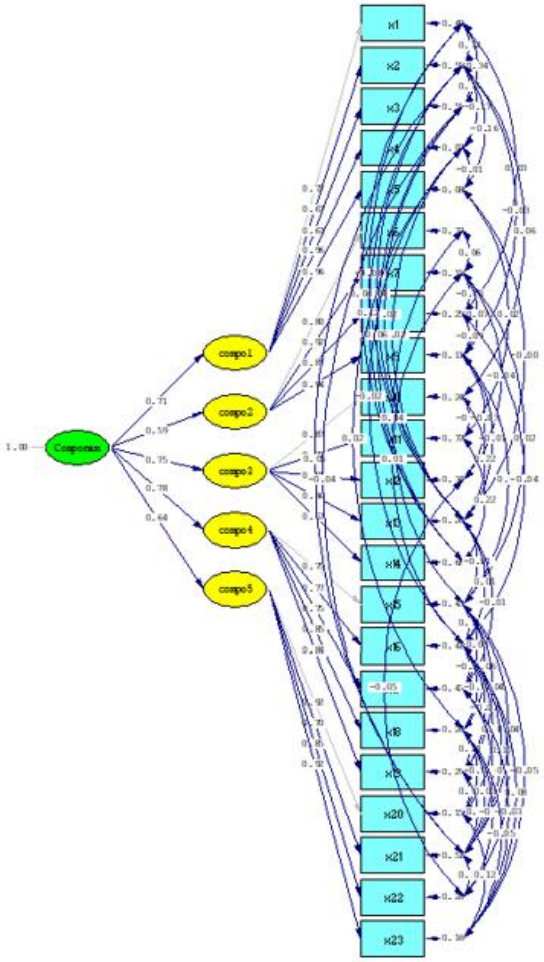
Source: Constructed by the author

From Figure 1 The results of the first confirmatory factor analysis of the results of the analysis of the competency components of the Deans in Educational Colleges in Western China, it was found that when adjusting the model's consistency, the model was consistent with the empirical data. Considering the chi-square value equal to 306.60, not statistically significant (p-value = 0.049), df value equal to 185, RMSEA value equal to 0.036, chi-square correlation value ($x^2/_{df}$) equal to 1.65, which meets the criteria. is less than 2.00.

The weight values of the indicators ranged from 0.90 – 0.74, which indicates that overall the indicators have shared variance in explaining all 23 indicator components.

3.2 Second-order model verification

The results of the second confirmatory factor analysis present the results of the component analysis of the competencies of the Dean of Education. in the western area of the People's Republic of China Details are shown in Figure 3.



Chi-Square = 316.52 df = 160 P-value = 0.047 RMSEA =0.043

Figure 3 Results of second-order confirmatory factor analysis.
Source: Constructed by the author

Estimation of variable parameters in the measurement model, component analysis of competency components of the Dean of Education. in the western area of the People's Republic of China Analysis results as shown in Table 2.

Table 2 Results of estimating variable parameters in the measurement model of the dean of education competency component analysis measurement model. in the western area of the People's Republic of China.

External latent variables	Element weight	Internal latent variables	Element weight	Indicator	Tolerance e	R^2	R^2
	0.712	Compo1	0.717	X1	0.486	0.514	
			0.670	X2	0.551	0.449	
			0.672	X3	0.549	0.451	0.507
			0.962	X4	0.074	0.926	
			0.957	X5	0.085	0.915	
	0.593	Compo2	0.796	X6	0.367	0.633	
			0.921	X7	0.153	0.847	0.351
			0.868	X8	0.247	0.753	
			0.942	X9	0.113	0.887	
	0.753	Compo3	0.870	X10	0.243	0.757	
Compo			0.793	X11	0.371	0.629	
			0.810	X12	0.345	0.655	0.566
			0.860	X13	0.260	0.740	
			0.567	X14	0.679	0.321	
	0.776	Compo4	0.753	X15	0.433	0.567	
			0.766	X16	0.413	0.587	
			0.753	X17	0.432	0.568	0.602
			0.849	X18	0.279	0.721	
			0.840	X19	0.294	0.706	
	0.638	Compo5	0.921	X20	0.151	0.849	
			0.702	X21	0.507	0.493	0.407
			0.849	X22	0.279	0.721	
			0.817	X23	0.159	0.841	
Chi-Square = 316.52 df = 160 P-value = 0.047 RMSEA =0.043							
GFI = 0.950 AGFI=0.913 CFI = 0.994							

From Table 2, the results of estimating the variable parameters in the model reveal that the model is consistent with the empirical data. Considering that the index for measuring the level of harmony is within the specified criteria, every value is $\chi 2$=316.52, df= 160, $x^2/_{df}$= 1.97, P-value = 0.047, RMSEA =0.043, CFI = 0.994, by the latent variable Compo1, Compo2, Compo3, Compo4, Compo5 can explain the covariance in Compo variables were approximately 50.70, 35.10, 56.60, 60.20, and 40.70 percent, respectively.

The consideration of the weight values of observed variables indicates that the weight values of observed variables are positive, and there is a significant statistical difference from zero at this level. All values indicate that the observed variables of all hidden variables are different in the combined model. The observation variable X14 with the maximum element weight ranging from 0.074 to 0.679 has an element weight of 0. 679. The observation variable with the minimum element weight. The weight of X4 element is. 0.074.

Considering the composition weight of the second passive variable, the composition weight of the second passive variable is positive. And there is a significant statistical difference with zero at the 0.01 level, all values indicate that the second latent variable of the combined total model is different. Its element weight range is. 0.593-0.776. The potential variable for the maximum element weight is Compo4. The element weight is equal to the passive variable with

the minimum weight of 0.776, namely Compo2 passive variable, has a composition weight of 0.593.

3.3 Evaluation results of the structural model section

In terms of structural form, the researchers considered the relationship matrix between the performance composition of the dean and the joint coefficient. The square polynomial relationship is shown in the table 3.

The relative coefficient between the performance components and coefficients of the dean Secondary multilateral relations.

Table 3 Relationship between variables and SMC

Serial number	variable	1	2	3	4	5	SMC
1	development awareness	1.000					0.452
2	interpersonal relations	0.423	1.000				0.395
3	administration skills	0.491	0.399	1.000			0.533
4	educational philosophy	0.361	0.337	0.613	1.000		0.287
5	personal charisma	0.359	0.663	0.389	0.355	1.000	0.284

There is a positive relationship between each variable.

Discussion

The central focus of this study aligns significantly with the perspectives of Xu Yue and other scholars concerning the competencies exhibited by college deans. Xu Yue proposes that a college dean's competency comprises 19 indicators, encompassing attributes such as self-confidence, self-control, flexibility, critical thinking, developing others, achievement orientation, innovation, goal setting, execution, conceptual thinking, analytical thinking, influencing, judgment, information gathering, self-improvement, interpersonal skills, organizational dedication, vision, and teamwork. Xu Yue further classifies these 19 characteristics into five groups: personality traits, interpersonal characteristics, achievement characteristics, management characteristics, and career development characteristics (Xu, 2018: 11-18). Similarly, Wang Yang's research, grounded in leadership theory and the organizational management aspects of colleges, suggests that the leadership model of college deans includes components like educational philosophy, basic qualities (characterized by professional and management knowledge), academic ethics, work passion, management wisdom, strategic management, relationship management, decision-making management, and standardized management (Wang, 2013: 24-30).

The results of this study closely align with Bray et al.’s research on managerial competency characteristics. Bray et al. identify 25 factors crucial to a manager's success, including political sensitivity, organization, planning ability, interpersonal communication ability, innovation, and decision-making ability, among others (Bray, 1999). Similarly, Hellriegel et al., in the context of economic globalization, have emphasized the fundamental attributes of high-performance managers: management ethics, the capacity for self-control, communication, diversity management, cross-cultural management, team management, and change management (Hellriegel, Slocum & Richard, 2000).

Recommendations

To effectively pursue optimized goals, it is crucial to concentrate on two primary areas aimed at improving the management capabilities of deans in educational colleges across Western China.

1. Universities should focus on cultivating the Charisma of the dean of the school of education and improving morality, work enthusiasm, motivational ability, broad-mindedness, and physical fitness of the dean of the school of education.

2. Establish competency characteristics standards for the dean of the School of Education, clearly define the competency characteristics required for the dean of the School of Education, and select the dean of the School of Education based on these standards.

3. Use research findings to broaden the development of competencies that other administrators in higher education should have.

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