



Human Resource Evaluation in Universities Based on the Competency Model

Lichun Xie

Neijiang Normal University, Neijiang, Sichuan, 641100, China.
Lichun641100.xie@126.com

Human resources are the primary kind of university resources. In order to realize sustainable development, universities must put development and management of human resources a priority. However, at present, human resource management of universities hasn't attracted enough attention and is neither scientific. To better enhance the competitiveness of universities, this thesis introduces the competency model to study human resource management of universities according to the evaluation results of main positions, with the vision of accelerating the development of human resources of universities.

1. Introduction

Human resource is the most dynamic, most creative and most valuable factor among all productivity factors. It is the "first resource" for a group to grow and other resource mix cannot function without human resources. It is no exaggerated to say human resource is decisive in the success of a group. But the simple accumulation of human resource alone is not enough. A reasonable and effective distribution of human resource is all but necessary to have a full play. As the market economy is gaining momentum and the proceeding of reform and opening-up, universities turn out to be a talent pool, making human resource management more important than ever. In today's world, universities compete less by hard power and more by soft power, in particular the teaching resource. Market competition has penetrated into universities and teachers are more mobile than ever before. In response to the fast growth of the industry and severe peer competition, this thesis introduces the competency model to study human resource management of universities by evaluating main positions in university. It intends to set light on promoting the development of human resource of universities.

2. Theory on the Competency Model

The competency theory can be dated back to 1970s when Professor McClelland from Harvard University proposed the concept of competency in his book *Testing for competence rather than for intelligence*. The competency model refers to the combination of various competency factors in order to reach a certain performance objective, or to say, it is a competency structure (Gaeta A et al., 2014; Rasmussen E et al., 2014):
 $CM = \{C_i | i = 1, 2, 3, \dots, n\}$

CM is the competency model, C_i is the competency project, C_i is the i-th competency project and n is the number of the competency project.

The first competency model was developed by McClelland and McBer, the consulting company to select foreign information officers in U.S. They divided samples to the performance group and the normal group and confirmed their key behaviors through Behavioral Event Interview. After some complicated analysis, they found out the main competency of each group as the dominant factor of working performance.

The competency model has the following features: ① the industry feature: it reflects the requirement of an industry on the overall quality of employees, including knowledge, skill, outlook, motive and characteristics, etc. This varies from one industry to another. ② The enterprise feature: it reflects the requirement of an enterprise on certain position or staff and the requirement is detailed to one's behaviors. Even two companies in the same industry may have starkly different requirements on employees owing to differences in company culture, business target, and operation strategy. ③ The stage feature: the behavior mode of the competency model is quite related to business operation of an enterprise. So, it is usually phased (McCabe O L et al., 2014).

3. Constructing the Competency Model of Human Resources in Universities

For universities to stay competitive and “match people and position”, it is necessary to understand the core ability of employees by constructing the competency model. Nevertheless, the construction of the model should consider national characteristics and real practice. Based on the analysis of strategy and working content of universities, this thesis combines models proposed home and abroad: it draws merits from mature international competency model (competency dictionary and general competency model) while taking into account working content of universities and finally a competency model that addresses the features of Chinese universities. The constructed model is efficient and fits well the requirement of universities on employees (Dou Y et al., 2014).

3.1 Construction steps

3.1.1 Understand the strategic target and defining the performance standard

The performance standard is based on strategic target of universities. The standards for outstanding employee and ordinary employee are set up according to practical requirement of a position. National universities should tailor the standards to their own scale, target and resources. If the objective performance indicators are not easy to obtain or lacks financing, a simple way of “superior rule” can replace instead, which means the leader in the higher level sets up standards for subordinates. Though it is subjective, it is still efficient and operable for an excellent leader who is full of experience and knowledge (Caligiuri P, 2014; Chang C C, 2014).

3.1.2 Selecting and analysis effective samples

According to the known performance standards, select randomly a certain number of employees from outstanding employees and ordinary employees.

3.1.3 Obtaining data about competency

Behavioral Event Interview, expert panel, questionnaire, all-round evaluation, expert system database and observation method are used in this thesis to collect data about competency. Among these methods available, Behavioral Event Interview, put forward by American psychologist McClelland, is the widest applied (Bigelow L et al., 2014; Morganti K G L et al., 2014).

3.1.4 Constructing the competency model

Firstly, the competency features of a position are figured out through Behavioral Event Interview. Written records are analyzed and the frequency of each feature is counted. Then, the frequency and the relevant degree of a behavior of outstanding employees and ordinary employees are compared with similarity and difference identified. Those features are categorized under different themes and their weight is estimated according to frequency (Dong Y et al., 2014).

3.1.5 Verifying the competency model

The competency model is verified by performance standards of an enterprise. There are usually three methods: selecting the second effective sample, compiling the scale and adopting the evaluation center.

3.2 Constructing the model

In this thesis, a middle-level manager X in charge of student affairs is studied to make adaptive evaluation. The competency model for this manager is shown below: (Klendauer R et al., 2012; Patterson F et al., 2013; Campion M A et al., 2011)

3.3 Competency evaluation based on fuzzy comprehensive evaluation

3.3.1 Comment set of decided indicator

The indicator set $U=\{U_1, U_2, U_3, \dots, U_i\}$, in which U_i ($i=1, 2, \dots, m$) is the competency item in the model, such as influence, achievement-oriented, teamwork, etc.

The model is categorized to four levels, namely “very strong”, “strong”, “mediocre” and “not strong”. So the comment set: $V=\{V_1, V_2, V_3, V_4\}=\{\text{very strong, strong, mediocre and not strong}\}$.

3.3.2 Deciding the weight of indicators through Analytical Hierarchy Process

(1) Deciding the objectives and evaluation indicators

There are P evaluation indicators, $U=\{u_1, u_1, \dots, u_p\}$.

(2) Constructing the judgment matrix

The value of indicators in the judgment matrix reflects their relative importance and it is usually noted as the reciprocal of 1-9. If the indicator can be described by a ratio with practical meanings, such ratio will replace the

reciprocal and indicate importance. There is $S=(U_{ij})_{p \times p}$

(3) Computing the judgment matrix

Mathematica software is used to compute the largest eigenvalue λ_{max} of the judgment matrix S and its corresponding characteristic vector A . This characteristic vector is the ranking of importance of all indicators, or the distribution of weight.

(4) The consistency test

To conduct the consistency test to the judgment matrix, it is necessary to calculate the consistency index

$$CI = \frac{\lambda_{max} - n}{n - 1}$$

and the average random consistency index RI . To be specific, 500 samples are collected randomly to construct the matrix in the way of filling the triangle of the sample matrix by 1-9 or by the reciprocal of 1-9. Values on the leading diagonal are always 1. Values at the transposed position are the reciprocal of the number at corresponding position. All sample matrixes need to be calculated their consistency index. All the

consistency indexes put together are averaged to be random consistency index RI . When there is $CR = \frac{CI}{RI} < 0.10$, it suggests that the ranking of the hierarchical analysis has satisfying consistency, namely, the distribution of weight is reasonable. Otherwise, the values of the judgment matrix need adjusting and the weight needs re-allocating. (Bauer K et al., 2015)

3.3.3 Deciding the evaluation membership matrix

Suppose the comment set $V=\{\text{very strong, strong, mediocre, not strong}\}$ has four layers. There are n judges to evaluate the indicators in each layer of the evaluation subject. The comments are summed up to be membership vector R_{ij} of U_{ij} to the comment set $U_{ij}=\{rij1, rij2, rij3, rij4\}$, in which, $rijk=v_{ijk}/n$, ($k=1, 2, 3, 4$) refers to the four levels of the comment set, n is the number of the judges and v_{ijk} is the number of people whom the judges believe to belong to level V_k in terms of indicator U_{ij} . R_{ijk} is the membership degree, which means the percentage of people whose indicator U_{ij} belongs to level k (Park H S et al., 2011; Park H S et al., 2014).

The final results are shown in Table 2.

3.3.4 Computing the fuzzy comprehensive evaluation vector $B_i(i=1,2-8)$ of subdomain U_i in the second layer.

$$B_1=A_1 \cdot R_1=(0.5, 0.5) \cdot \begin{bmatrix} 0.1 & 0.3 & 0.4 & 0.2 \\ 0.2 & 0.2 & 0.4 & 0.2 \end{bmatrix}=(0.15, 0.25, 0.4, 0.2)$$

Similarly:

$B_2=(0.14, 0.32, 0.36, 0.15)$; $B_3=(0.13, 0.30, 0.33, 0.24)$; $B_4=(0.14, 0.26, 0.42, 0.18)$; $B_5=(0.12, 0.29, 0.31, 0.28)$; $B_6=(0.13, 0.36, 0.39, 0.12)$; $B_7=(0.10, 0.26, 0.33, 0.31)$; $B_8=(0.01, 0.04, 0.05, 0.00)$

3.3.5 Computing the fuzzy comprehensive vector B of the first-layer universal domain U and normalize B_1, B_2, \dots, B_8 to the matrix W . A is the weight vector of U .

$$B=A \cdot W=(0.15, 0.14, 0.10, 0.13, 0.11, 0.07, 0.15, 0.10) \cdot \begin{bmatrix} 0.15 & 0.25 & 0.4 & 0.2 \\ 0.14 & 0.32 & 0.36 & 0.15 \\ 0.13 & 0.30 & 0.33 & 0.24 \\ 0.14 & 0.26 & 0.42 & 0.18 \\ 0.12 & 0.29 & 0.31 & 0.28 \\ 0.13 & 0.36 & 0.39 & 0.12 \\ 0.10 & 0.26 & 0.33 & 0.31 \\ 0.01 & 0.05 & 0.05 & 0 \end{bmatrix}=(0.13, 0.29, 0.36, 0.22)$$

According to the weighted average method, score "100~90" is labeled as "very strong", "89-75" as "strong", "74-60" as "mediocre" and "59-0" as "not strong".

$B \cdot C=(0.13, 0.29, 0.36, 0.22) \cdot (95, 80, 70, 30)=67.35$

Finally, it is calculated that the overall competency of employee X is 67.35, indicating that his competency is at "mediocre" level. From the analysis, we can conclude that employee X is good at teamwork and has good

initiative. But he is mediocre in other aspects, in particular the leadership and expertise. So he is suggested to improve his overall quality.

Table 1: The competency model of a middle-level manager of a university

First-layer indicator	Second-layer indicator
U1influence	U11Pay attention to personal influence, build up individual trust and leave certain impression on others U12 Consider the influence of one's words or behaviors on others
U2 achievement-oriented	U21 Frequently make self-evaluation, teamwork and performance of subordinates, and think of whether the evaluation is appropriate. U22 Look for faster and more efficient ways to do things U23 Set up clear and challenging targets U24 Inspire the potential of subordinates
U3teamwork	U31 Ask for others' opinions and encourage subordinates to engage in things they are involved in U32Make affirmation of the team and appreciate the efforts the team has made. Encourage the team and delegate power properly U33Inspire the moral of the team and advocate cooperation
U4 initiative	U4I Seize the opportunities when it is spotted U42 Wrestle with crisis in a fast and effective way U43Keep persistent in the realization of target
U5 helping other people	U5I Give feedbacks to subordinates U52 Encourage and help subordinates when they are in difficulties U53 Provide training to subordinates through suggestion or other instruction U54 Make special training and classes
U6 understanding other people	U61 Know about other people's attitude, interest, need and opinions U62 Be able to explain other people's non-language behavior and understand other people's emotions and feelings U633 Know how to inspire others U64 Know about other people's strengths and weaknesses U65 Know about other people's reason to behave
U7 leadership	U71 Set up performance objective for the team U72 Stand for the team's interest in a wide range U73 Fight for resources the team needs
U8 expertise	U81 Know about management, computer, foreign languages and master business related knowledge

Table 2: Weight and fuzzy judgment matrix

First-layer indicator	Weight	Second-layer indicator and weight	Membership judgment			
			Very strong	Strong	Mediocre	Not strong
	0.15	0.5	0.1	0.3	0.4	0.2
		0.5	0.2	0.2	0.4	0.2
	0.14	0.2	0.1	0.2	0.4	0.3
		0.3	0.1	0.3	0.5	0.1
		0.4	0.2	0.4	0.3	0.1
		0.1	0.1	0.3	0.4	0.2
	0.10	0.3	0.1	0.2	0.4	0.3
		0.3	0.2	0.4	0.3	0.1
		0.4	0.1	0.3	0.3	0.3
	0.13	0.2	0.1	0.3	0.5	0.1
		0.4	0.2	0.3	0.4	0.1
		0.4	0.1	0.2	0.4	0.3
	0.11	0.2	0.1	0.3	0.3	0.3
		0.2	0.2	0.4	0.2	0.2
		0.3	0.1	0.3	0.3	0.3
		0.3	0.1	0.2	0.4	0.3
	0.07	0.1	0.2	0.3	0.4	0.1
		0.2	0.1	0.4	0.3	0.2
		0.2	0.1	0.4	0.3	0.2
		0.3	0.1	0.3	0.5	0.1
		0.2	0.2	0.4	0.4	0.0
	0.15	0.3	0.1	0.3	0.4	0.2
		0.3	0.1	0.3	0.3	0.3
		0.4	0.1	0.2	0.3	0.4
	0.10	1	0.1	0.4	0.5	0.0

4. Conclusions

Human resource is a main type of university resources. Only by attaching great importance on human resource can a university makes leap-forward progress and can the strategy of powering the nation by science and education. As for how to develop and manage human resources in universities, this thesis suggests to take a comprehensive use of the analysis result and the evaluation result to make the position adaptive. If the competency of an employee evaluated by the competency model cannot meet the need of the position, he should accept some training or shift his position. If the competency of an employee evaluated by the competency model is what the position requires, it means the personnel matches with the job. The leader can point out where the employee could improve and advice on his advancement.

References

- Bauer K, Bai Y, 2015, Innovative Educational Activities Using a Model to Improve Cultural Competency among Graduate Students [J]. *Procedia-Social and Behavioral Sciences*, 174: 705-710. DOI: 10.1016/j.sbspro.2015.01.605.
- Bigelow L, Lundmark L, Parks J M L, Wuebker R, 2014, Skirting the Issues Experimental Evidence of Gender Bias in IPO Prospectus Evaluations [J]. *Journal of Management*, 40(6): 1732-1759. DOI: 10.1177/0149206312441624.

- Caligiuri P, 2014, Many moving parts: Factors influencing the effectiveness of HRM practices designed to improve knowledge transfer within MNCs [J]. *Journal of International Business Studies*, 45(1): 63-72. DOI: 10.1057/jibs.2013.52.
- Campion M A, Fink A A, Ruggeberg B J, Carr L, Phillips G M, Odman R B, 2011, Doing competencies well: Best practices in competency modeling [J]. *Personnel Psychology*, 64(1): 225-262. DOI: 10.1111/j.1744-6570.2010.01207.x.
- Chang C C, 2014, An IPA-embedded model for evaluating creativity curricula [J]. *Innovations in Education and Teaching International*, 2014, 51(1): 59-71. DOI: 10.1080/14703297.2013.856144.
- Dong Y, Seo M G, Bartol K M, 2014, No pain, no gain: An affect-based model of developmental job experience and the buffering effects of emotional intelligence [J]. *Academy of Management Journal*, 2014, 57(4): 1056-1077. DOI: 10.5465/amj.2011.0687.
- Dou Y, Zhu Q, Sarkis J, 2014, Evaluating green supplier development programs with a grey-analytical network process-based methodology [J]. *European Journal of Operational Research*, 233(2): 420-431. DOI: 10.1016/j.ejor.2013.03.004.
- Gaeta A, Gaeta M, Piciocchi P, Ritrovato P, Vollero A, 2014, Evaluation of the human resources relevance in organisations via knowledge technologies and semantic social network analysis [J]. *International Journal of Knowledge and Learning*, 9(3): 219-241. DOI: 10.1504/IJKL.2014.068918.
- Klendauer R, Berkovich M, Gelvin R, Leimeister J M, Kremar H, 2012, Towards a competency model for requirements analysts [J]. *Information Systems Journal*, 22(6): 475-503. DOI: 10.1111/j.1365-2575.2011.00395.x.
- McCabe O L, Everly Jr G S, Brown L M, Wendelboe A M, Hamid N H A, Tallchief V L, Links J M, 2014, Psychological first aid: a consensus-derived, empirically supported, competency-based training model [J]. *American journal of public health*, 104(4): 621-628. DOI: 10.2105/AJPH.2013.301219.
- Morganti K G, Lovejoy S, Beckjord E B, Haviland A M, Haas A C, Farley D O, 2014, A retrospective evaluation of the perfecting patient care university training program for health care organizations [J]. *American Journal of Medical Quality*, 29(1): 30-38. DOI: 10.1177/1062860613483354.
- Park H S, Jung S Y, 2011, Development of the competency model for prevention of adolescent risk behavior [J]. *Journal of Korean Academy of Nursing*, 41(2): 204-213. DOI: 10.4040/jkan.2011.41.2.204.
- Park H S, Jung S Y, 2014, Development of Expert Competency Model for Preventing Adolescent Addictive Behavior and Educational Needs of Psychiatric Mental Health Nurses [J]. *Journal of Korean Academy of Psychiatric and Mental Health Nursing*, 2014, 23(4): 199-207. DOI: 10.12934/jkpmhn.2014.23.4.199.
- Patterson F, Tavabie A, Denney M L, Kerrin M, Ashworth V, Korzwara A, MacLeod S, 2013, A new competency model for general practice: implications for selection, training, and careers [J]. *British Journal of General Practice*, 63(610): e331-e338. DOI: 10.3399/bjgp13X667196.
- Rasmussen E, Mosey S, Wright M, 2014, The influence of university departments on the evolution of entrepreneurial competencies in spin-off ventures [J]. *Research Policy*, 43(1): 92-106. DOI: 10.1016/j.respol.2013.06.007.