

Quantitative Methods in Human Resource Management

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This study searches for possibility of quantitative models in human resources management (HRM). Quantitative methods turn thinking into model structure. Coefficients and symbols represent variables of HRM. Markov Analysis, linear functions, logaritma, and Pisagor Models are explored in this study as a quantitative method. Thus, HR managers use these models to solve HR-related issues. Aim is fastness and effectiveness in management of HR. The study concludes that quantitative methods exist in HRM.

Keywords: HR, quantitative methods, Markov, Pisagor, Limit Theorems

Introduction

Strategic human resource management (SHRM) is related with strategy and performance. Strategy dimension is Michigan Model by Devanna et al. (1981; 1984). Accordingly, HR managers are involved with top-level firm strategies, and HR strategies contribute to firm-level strategies. Further, HRM is related to performance by Wright (1992). HRM improves firm performance. Moderator between HRM and firm performance might be individual performance. Individuals in organizations work for departments and departments' performance has impact on organizational performance. For example, in Australia, strategic HRM is applied. SHRM is not applied globally yet. But it exists in Australia. Therefore, for application in firms globally, Australian SHRM Model can be adopted. Australia applied SHRM by performance variable. In addition, there exists industrial relation in Australian HRM (Bayat et al., 2015); however, it has decentralization in industrial relations. Therefore, it is a little bit difference than European-based HRM.

Bayat et al. (2015) mentioned for HRM models: Harvard Model, Michigan Model, Guest Model, Brewster Model, Warwick Model, Huselid Model, and others. Michigan Model is called as hard HRM that is based on strategy. Harvard Model is soft HRM that is based on HR systems and human relations (Elton Mayo). Guest discusses organizational behaviours' impact on employee performance. Warwick Model tends to contextual framework on HRM. Brewster Model discusses European-style HRM. According to him, American HRM is culturally not appropriate to European context. Therefore, European specific HRM must be developed. European HRM specifically intends to industrial relations.

This study argues quantitative methods in HRM. Markov Analysis, Simplex Method, Pisagor Link, and Limit Theorem are considered as quantitative methods. It is assumed that, for example, Pisagor Link is related to American HRM style.

Examples of Quantitative Methods

Logaritma is found by Scottish scholar of J. Napier in 17th century. It is related with numerics. Firm sets

many career plans for employees in career planning. Which one is applied in organization for promotion? Which personnel is to promote in career ladders? Answer might be found with logarithm. In this case, star employees are base or logarithm. Firm organizes career plan for everyone but star employees are promote.

$$a^Y = x$$

$$Y = \log_a x$$

Where a = career plans; Y = employees who experiences career plan; x = career ladders; and limit = talent management.

In this problem, limit (talents or stars) becomes logarithmic base of solutions or firms actually apply career plans for talents or star employees.

$$Y = \log_2 16$$

For these relations in logarithmic functions with limit, firm applies career plans for two employees. Other 16 gets, for example, performance management for later promotion.

Markov Analysis

Markov Analysis is related to business forecasting. There are matrix, vector, and determinant in Markov Analysis. Firstly, matrix is established in problem, then, vector is determined, and vector pulls matrix variables into business results. For HRM, matrix is established from HRM practices, star employees, HR governance, and others. Vector is HR managers. Because HR managers affect results, and it leads HRM practices. Objective of HRM is to achieve individual and firm performance. So, matrix:

$$\begin{pmatrix} X1 & Y1 \\ X2 & Y2 \\ X3 & Y3 \end{pmatrix} \times V = \text{Performance}$$

In Markov, firms apply HRM practices, and it tries to guess results, performance. Vector in organizations for HRM is HR managers. $X1$, $Y1$, $X2$, $Y2$, $X3$, and $Y3$ symbolize HRM practices, star employees, intellectual capital, etc.

Simplex Method

First of all, goal function is established in simplex methodology.

$$Z = 3X1 + 4Y1$$

Where, Z = performance

$$X1 = \text{talent management}$$

$$Y1 = \text{staffing}$$

Aim of goal function is to maximize performance. It is assumption that talent management and staffing have an impact on performance. Talents possess expected individual performance, and have impact on firm performance. Staffing recruits talents and best candidates for company objectives. Therefore, goal function is established by staffing and talent management. Therefore, coefficient of $X1$ is 3. It is higher. It shows talent management has big impact on performance. Coefficient of $Y1$ (staffing) is 4, higher. It means staffing is root of HRM practices. It hires talent; training, performance evaluations, career planning, and wage are applied for talent.

Aim of simplex is to calculate value of $X1$ and $Y1$ to see Z .

Limit Theorem

Limits of application of HRM in organizations are both budget limit and talents limit. For career management, training, compensation, performance management, and other practices, HRM department needs budget allocation. If there is more budget limit, HRM applies more training, compensation, career, etc. So, limit function is:

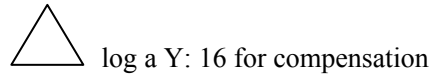


Figure 1. Lim ► budget.

In this function, the limit of compensation in organization is budget limit, and it is measured with logarithm.

Pisagor Link and American HRM

In Pisagor Link, goal function is goodness of firm:

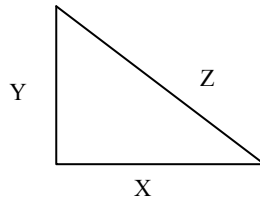


Figure 2. Pisagor triangle.

In this triangle, Y = performance line; X = HR; and Z = Firm

Pisagor calculates hipotenus (Z = firm goodness). Z line is hipotenus in Pisagor Link. There is 90° triangle in Pisagor. X is HR dimension. Firm management realizes that HR function is good for firm’s objectives. USA is HRM country. The country obtains many scholars as immigrants. USA government knows that HRM is good for country. This is X line in Pisagor and Z is goodness of country. Thus, HRM (X) increases performance of country (Y), and with 90° triangle, this connection is good for country social structure.

Discussion: Four Perspectives of Strategic HRM

There are four perspectives in HRM in addition hard and soft models: universalistic, contingency, contextual, and configurational. Configurational (Huselid Model) and universalistic perspectives are specific to American HRM. In addition, European HRM heads to universalistic approach in addition to contextual perspective.

There are linear relations in universalistic perspective between HRM and firm performance. It does not consider moderator between HR and performance. This is linear relations. How does HR directly affect firm performance in American HRM? Innovation. HR (= intellectual capitals) makes innovations and it affects firm performance, such as Bill Gates and Microsoft, and Steve Jobs and Apple.

In addition, American HRM applies congrigurationl perspective, which is based on Harvard Model. For European HRM, it possesses contextual perspective, but it is adopting universalistic perspective as well.

Conclusion

For science, re-Renaissance is needed (Uysal, 2017). Europe investigated Roneissance and science

through 15th century. Later, scientific theories appeared in 17th century in physics, mathematics, chemicals, biology, and medicine. Roneissance move resulted with scientific developments in 17-19th century. European scholars developed new theories in physics, biology, medicine, and physics through 17th century after Roneissance in 15th century. For example, French scholars are very active between 16th and 19th century. Industrial revolution comes up with 19th century after scientific revolution. So chronology might be:

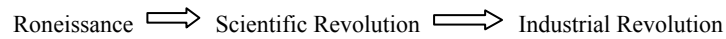


Figure 3. Chronology of industrial revolution.

Furthermore, 1990s witnessed blackbox discussion. Blackbox Notion argues moderators between HRM and firm performance. Organizational behaviours must be moderator between HRM and firm performance. Because OB positively affects individual performance of employees and it has impact on firm performance through department performance. Therefore, new model of SHRM might be:

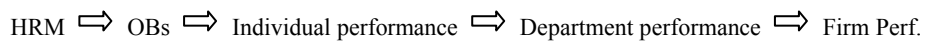


Figure 4. New model of SHRM.

Organizational behaviours are trust, commitment, justice, citizenship, motivation, satisfaction, support, etc. That has impact on individual performance of employees. It is that HRM practices results with OBs that increases individual performance.

References

- Bayat, B. & Bayat, İ., and Baykal, B. (2015). International human resources management, Alter Publishing, Ankara.
- Fombrun, C. J & Tichy, N. M., and Devanna, M. A. (1984). Strategic human resource management, Wiley Publishing, New York.
- Uysal, G. (2014). HRM and quantitatives: decision tree and vector analysis in HRM. *Chinese Business Review*, 13(6), 382-387.
- Uysal, G. (2017). HRM, organizational psychology and personnel psychology: Linear and simplex analysis of HR. *Management Studies*, 5(2), 149-152.
- Wright, P. M. & McMahan, G. C. (1992). Theoretical perspectives for strategic human resource management. *Journal of Management*, 18(2). 295-320.