Determining Criteria of Human Resource Information System that Affect Human Resource Performance in Companies Using DEMATEL-Based ANP Method

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Abstract. Decision making in HR activities is delayed because of insufficient information. Human Resources (HR) and information system are the important roles in helping company HR works. Objective of this study is to identify criteria of Human Resource Information System (HRIS) that affect human resources in companies by using DEMATEL-based ANP (DANP) method. HRIS criteria are collected from several studies to be validated by experts in HR of manufacturing companies. The survey was conducted with 5 experts and their judgments are calculated in limit supermatrix. The limit supermatrix of DANP showed that 18 criteria in HRIS. This study obtained five most important criteria of HRIS in HR performance are high quality data presentation, quick and precise, accessible, information need in time, and fulfill needs of HR.

1 Introduction

Human Resource (HR) affect the development of an organization/company. HR problems that are often encountered such as the retention of human resources, the lack of human resources development, poor employee relations, traditional administrative system, manual payroll system, and lack of integrated system. Information system (IS) is a combination of information technology that use technology to support operational and management activity [1]. There are two important sources in the organization, human resources and information systems (IS). HR and IS require significant management to affect the overall performance of the business. In some developed countries, HRIS were managed independently rather than using outsourcing services. The purpose of this study is to identify the criteria of HRIS (Human Resource Information System) that affect the performance of human resources in companies using DANP method in manufacture companies. A research conducted in UK showed modules of HRIS in the UK have been used to help facilitating the performance of human resources in the company [2].

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2 Literature Review

Human Resource Information System (HRIS) was defined as information system, within the traditional functional areas of the organization, and designed to support planning, administration, decision-making and Human Resource Management (HRM) control activities [3]. In the other hand, Kavanagh [4] defined HRIS as a system that used to acquire, manipulate, store, retrieve and distribute related information about the organization's human resources. There are many advantages of using HRIS such as faster process information, greater information accuracy, better program planning and development, improved employee communication, reduced cost of data storage in HR, more transparency in the system, more meaningful career planning and counseling at all levels, and better ability to respond to environmental changes [5].

Company performance is the company capacity indicator to achieve its goal and performance which include financial and non-financial action [6]. Financial size includes economic factor and non-financial include an indicator of achievement, as market share, quality, satisfaction and market effectiveness. In the other hand, the most important thing to develop and achieve organization's goal is employee's contribution. A potential and skilled employee could help to achieve competitive advantage over their competitors [7].

The DEMATEL-Based ANP (DANP) method combines other hybrid techniques. Analytic Network Process (ANP) has interactions and feedback within (inner dependence) and between clusters (outer dependence) [8]. The DANP method are used to obtain form of a comprehensive unweighted supermatrix by constructing a direct effect matrix. This pairwise comparisons are not only done in groups, but also to the whole system. The total intergroup relationship matrix is used to measure the appropriate portion of unweighted supermatrix to obtain weighted supermatrix. This following steps are the process of DANP method [9]. There are seven steps in DANP process: 1. Calculate the direct effect, 2. Normalize the direct-effect matrix, 3. Build up Total-Influence Matrix T, 4. Analyze the results, 5. Build up an unweighted matrix, 6. Create a weighted matrix, 7. Limit supermatrix.

3 Methodology

The questioner in this study was reviewed by 5 expert judgments. All experts are HR manager with more than 10 years of experience in their area. Geometric mean value of criteria obtained from expert judgments that has more than 3.75 are accepted. There are 4 dimension and 18 criteria selected by experts, as follow: System quality dimension (D1) consists of four criteria: accessible (C1), quick and precise (C2), easy to use (C3), and multipurpose (C4). Information quality dimension (D2) consists of five criteria: output in useful format report (C5), comprehensive information (C6), up-to-date information (C7), information need in time (C8) and accurate information (C9). User satisfaction dimension (D3) consists of three criteria: high quality data presentation (C10), fulfill needs of HR (C11), and satisfaction (C12). Information system success dimension (D4) consist of six criteria: enhance human resource planning (C13), online system (C14), career improvement (C15), salary advice (C16), improve the assessment and training needs (C17) and enhance performance management (C18). The second questionnaire of this research were distributed to 10 HR experts in different manufacturing companies and used Likert scale from 1 to 5.

The result of the respondents were generated to be an averaged matrix (A) as shown in Table 1.

Table 1.Averaged Matrix (A)

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	Total
C1	0.00	1.50	2.20	1.70	1.50	2.40	2.90	3.20	3.00	3.20	1.50	1.10	1.00	1.40	0.40	0.60	0.50	0.50	32.70
C2	2.90	0.00	3.40	3.30	3.40	3.40	3.20	3.20	3.10	3.20	3.10	0.70	1.00	3.60	1.10	0.60	0.80	0.80	40.80
C3	3.40	1.90	0.00	1.90	0.50	0.50	0.50	0.60	0.50	0.40	1.10	0.40	0.40	3.10	0.40	0.30	0.30	0.30	16.50
C4	3.40	3.40	1.30	0.00	2.10	3.40	2.80	3.10	2.90	2.90	3.20	0.30	1.50	2.90	0.30	0.30	0.20	0.20	34.20
C5	2.20	3.30	2.70	3.00	0.00	3.30	3.20	3.40	3.40	3.50	3.30	1.00	0.50	3.20	0.50	0.70	0.90	0.70	38.80
C6	3.40	2.90	0.50	0.50	1.00	0.00	3.30	3.40	3.50	1.10	0.70	0.60	0.60	3.30	0.50	0.50	0.50	0.50	26.60
C7	2.10	3.00	3.00	2.60	2.30	3.50	0.00	3.40	3.40	3.50	3.40	3.40	0.90	3.50	0.50	0.40	0.60	0.60	40.60
C8	3.20	3.30	3.00	2.30	3.00	2.60	3.40	0.00	2.70	3.20	0.50	0.60	0.50	3.00	0.60	0.60	1.00	1.10	34.60
C9	2.80	3.30	1.10	1.10	3.40	3.40	3.30	3.40	0.00	3.40	0.40	0.30	0.80	2.50	0.50	0.50	0.50	0.50	31.20
C10	2.20	3.40	2.90	3.20	3.40	3.40	3.50	3.50	3.40	0.00	0.80	0.40	0.30	2.70	0.20	0.30	0.40	1.10	35.10
C11	2.90	3.20	3.40	2.90	2.90	3.00	3.30	3.50	3.20	3.30	0.00	1.40	1.10	3.40	0.30	0.40	0.30	0.50	39.80
C12	3.50	3.60	3.20	3.30	3.30	3.50	3.40	3.50	3.40	3.40	3.40	0.00	3.10	3.70	3.10	3.30	3.60	3.70	58.90
C13	3.20	1.80	0.60	0.70	0.50	0.50	3.50	3.60	3.60	1.00	1.90	1.00	0.00	3.50	3.20	3.50	3.30	3.60	44.00
C14	3.60	3.60	3.30	3.50	2.70	2.90	3.00	3.20	3.00	3.10	1.00	0.80	0.70	0.00	0.70	0.60	0.50	0.70	36.90
C15	3.20	3.00	0.50	2.90	0.60	3.50	3.20	3.50	3.40	3.20	2.90	0.80	3.10	3.40	0.00	3.10	3.20	3.00	46.50
C16	3.40	3.50	0.80	0.80	3.40	3.60	3.40	3.60	3.40	3.40	0.70	1.30	1.00	3.60	1.00	0.00	2.00	3.10	42.00
C17	3.20	3.40	0.70	0.30	0.30	2.60	2.70	3.20	2.70	2.90	0.70	3.00	2.00	2.60	1.40	3.20	0.00	3.20	39.10
C18	3.30	3.50	3.10	3.40	3.20	3.50	3.40	3.50	3.40	3.20	3.20	3.70	3.10	3.60	3.10	3.60	3.30	0.00	57.10
Total	51.90	53.60	35.70	37.40	38.20	52.00	52.00	54.90	52.00	49.90	31.80	20.80	22.60	55.60	17.80	23.00	21.90	24.10	

The averaged matrix (A) are processed to limit supermatrix to obtain global weight. This following steps show the process:

Fig 1. DANP Process

After generating average matrix (A), we form Matrix (X) which is the result of an overall matrix of direct-indirect influence. Then, we would like to find the Total Influence Matrix (T)from the multiplication of Matrix X. Furthermore, we form unweighted supermatrix (W_D and W_C) to generate local weight and weighted supermatrix (W^a). The last step is to form a limit supermatrix to obtain a stable supermatrix and generate a global weight for the criteria.

4 Result and Discussion

The result of DANP method is the limit supermatrix and the global weight for the criteria. Limit supermatrix process needs normalization to make sure that the unweighted supermatrix (W_D and W_C) have same unit. Table 2 summarizes all the weight by DANP method. Information quality (D2) has the greatest local weight dimension (0.3268) while information system success (D4) has the smallest local weight (0.1570). Moreover, high quality data presentation (C10) also has the greatest global weight while career improvement (C15) has the smallest global weight (0.0152). The greater weight of local dimension and global weight means a higher level of importance than the other dimension in the framework for making decisions in the HR field based on the information system.

According to the result of DANP method, information quality dimension helps HR to improve their performance, such as an up-to-date information will make all activities in HR like selection of new employee, promotion of employee, general affair activities, transportation and lodging expenses, and payroll system becomes easier. Information quality generates accurate data presentation that helps HR to have a valid data, so the human errors

in HR activities will be minimized.Quick decision making in HR activities would improve corporate’s performance.

Table 2.Weight by DANP

Dimension	Local Weight Dimension	Criteria	Local Weight Criteria	Global Weight
D1	0.2990	C1	0.2855	0.0834
		C2	0.2982	0.0884
		C3	0.2063	0.0646
		C4	0.2100	0.0645
D2	0.3268	C5	0.1612	0.0547
		C6	0.2049	0.0664
		C7	0.2087	0.0680
		C8	0.2183	0.0708
		C9	0.2069	0.0672
D3	0.2173	C10	0.4957	0.1089
		C11	0.3098	0.0691
		C12	0.1945	0.0410
D4	0.1570	C13	0.1339	0.0202
		C14	0.3936	0.0638
		C15	0.1017	0.0152
		C16	0.1184	0.0168
		C17	0.1185	0.0172
		C18	0.1338	0.0196

5 Conclusions

As a conclusion, there were four dimensions at this research, that were system quality dimension with 4 criteria, information quality dimension with 5 criteria, user satisfaction with 3 criteria, and information system success with 6 criteria. The most important dimension was quality information (0.3268). The five biggest global weight from 18 criteria were high quality data presentation (0.1089), quick and precise (0.0884), accessible (0.0834), information need in time (0.0708), and meet your needs (0.0691).

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