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Artificial Intelligence Based E-Recruitments System

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***Abstract*— In order to maintain well-rounded competences in today's global businesses, organisations seek efficient methods to attract the best qualifications and candidates to maintain a high-level, qualified workforce. Currently, organisations in Saudi Arabia receive a tremendous number of job applications which, require manual selection and identification of the best candidates. This is considered to be a time-consuming process that requires personnel and resources. In this paper, we develop a new e-recruitment support system for organisations that can assess the experience, qualifications and suitability of a candidate applying for a specific job in a company or governmental organisation. In the proposed work, a "codeigniter" framework is used which is the main interface platform for the graphical user interface dashboard to filter the input data of all candidates. The proposed system is built experimentally using mySQL and PHP servers. For the quantitative survey, the Cronbach method is implemented to assess the reliability and validity of the survey. The quality achieved is 94%. The system should analyze job requirements and match the skills of potential employees, selecting the best person for short-listing. Hence, the human factor in the selection process can be eliminated.**

Keywords: E-recruitment, Saudi universities, candidates' assessment, short listing.

I. Introduction

This paper's aim is to present the varied viewpoints of different scholars and authors with respect to the E-recruitment process. E-recruitment is not limited to advertising jobs on websites and other social media platforms: rather, it is a complex phenomenon. Thus, analysing the different views of scholars and authors will be beneficial in gaining a better knowledge and awareness about the scope of E-recruitment process. The process in question is to select the right candidates for the right kinds of position. This paper reviewed the literature by framing two major themes to gain an overview of types of E-recruitment process and the quality of selection.

II. Literature Review

Using efficient recruitment strategies would help the organization in recruiting employees and workers with high potential and would even help in executing talent management strategies in an enhanced manner [1]. Fundamental changes in recruitment practices have been observed since the 1990s. Recruitment through online procedures has increased enormously due to growth in the global economy, which has raised the demand for talented potential employees and workers in an organisation [2]. This research paper discusses the contribution of online recruitment for a specific job in a company or Saudi Arabian governmental organization on the basis of the varied perceptions of different HR professionals.

III. Types of Recrutiment Process

The recruitment process in an organisation refers to the overall process of attracting, short-listing, and appointing suitable candidates for vacant job positions [3]. The recruitment process in an organisation can be primarily classified into two categories; internal promotion or recruitment and external recruitment. Internal recruitment or promotion is the process in which an organisation uses its internal sources to fill vacant positions with the help of its existing employees: for example, rewarding junior employees by promoting them to senior positions. On the other hand, external recruitment is the process of hiring new candidates or employees from outside the organisation. An external recruitment process is conducted by the human resources department of the organisation, with the help of traditional and modern recruiting techniques such as e-recruitment, and newspaper advertisements [3].

Internal recruitment or promotion is much easier in comparison to external recruitment, as it requires less time and money. The organisation and senior managers are well aware of the skills, knowledge and capabilities of their junior employees; hence, it is more efficient than external recruitment. The promotion of junior employees can encourage and motivate them to perform better. On the other hand, external recruitment is helpful in bringing new talent and ideas into the organisation. External recruitment procedures also provide an opportunity for the organisation to select from a large pool of candidates, who possesses a diverse set of skills and knowledge. External recruitment also prevents employees from becoming complacent. However, external recruitment is a time consuming, cumbersome and expensive process for organisations [4]. Thus, internal recruitment or promotion motivates and encourages existing employees to perform better, whereas external recruitment helps in bringing new and talented employees into the organisation who can help in improving overall organisational performance [5].

In the view of Swider, Zimmerman and Barrick [6], the E-recruitment process involves 15 steps which lead to the selection of the right kind of candidate for the right job. The identification of hiring needs and planning are considered as two important steps in the process of E-recruitment [7]. These steps are followed by the creation of a job description, and posting as well as promoting the job opening. The process continues with screening and interviews of the candidates, to make the final decision with respect to the selection of the right kind of candidate for the required job position [7]. It has been observed that the steps in the E-recruitment process need to be followed by human resource managers to ensure the selection of suitable candidates for the required job posting [7].

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A. Finding the Job Folder

Searching for suitable candidates is considered an important step in the process of E-recruitment which affects all future activities in the process of the selection of the right candidate. According to Holm [8], finding the job folder is concerned with the identification of applicants based on the hiring requests of the clients. It is concerned with the identification of the required qualifications and candidate profiles. These requirements and candidate profiles form the basis for the development of the job specifications and description [8].

Holm [8] reports that the identification of an appropriate pool of candidates for a vacant job position is a crucial step in the E-recruitment process. It is concerned with the identification of the segment of the labour market which will be targeted for searching for potential candidates for the required position [8]. In addition to this, the E-recruitment process is based on the searching process of the organisations with respect to suitable candidates for vacant job positions. Thus, it helps in generating a large pool of candidates for the selection of appropriate candidates for the job position [9].

B. Assess Candidates

Assessing the applicants is a major component of the selection of appropriate candidates for a vacant job position. According to Faliagka, Tsakalidis and Tzimas[10], the assessment process involves accessing the documents presented by potential applicants. These documents may include an application form, CV and other supporting documents. The applicant's documents are assessed on the basis of the information contained in them [8]. The assessment of the selected applicants is completed by reviewing all available details and information with respect to their skills and qualifications. Candidates with skills and qualifications in accordance with the requirements of the job position are selected for the vacant job position [10].

In addition to the viewpoint given by Faliagka, Tsakalidis and Tzimas [10], Barber [11] states that candidate assessment forms a significant part of the process of E-recruitment, which enables the selection of the right kind of job applicants, and those who match the skills and requirements of the vacant job positions [11]. In addition to this, the assessment process of candidates for a job is based on assessment scores achieved through software which helps in the selection of suitable candidates for the vacant job position[9]. These assessment scores also form an important part of the recruitment of candidates in the online process, as they help in searching for candidates with the proficiencies and skills required for the position [11].

According to Laumer von Stetten and Eckhardt [12], assessment is a major part of the recruitment process and helps the organisation in selecting the candidates within the stipulated period. The assessment process in E-recruitment is focused on candidate selection, which is based on the scores secured by the candidates, as well as on their qualifications and skills. It has been observed that the organisation has the flexibility to modify information on the basis of the demands of the job [12]. The expectations of the management of the organisation strongly impact the selection of the candidates on the basis of the required skills and qualifications [12].

C. Short-listing Candidates for Interview

The short-listing process is a part of the E-recruitment process which is based on the selection of the best candidates out of the pool of applicants with respect to a position. In the perspective of Chapman and Webster[13], candidates who have applied for the required job position are short-listed by the human resources department of an organisation for the purpose of selecting the best suitable candidates for the vacant position [13]. In addition to this, the literature reflects that the candidates are short-listed for interview with the involvement of recruitment team managers. The role of recruiting managers is considered significant in the short-listing of candidates for the required job position [13].

According to Kinnunen and Parviainen [14], the recruiting managers at this stage of the E-recruitment process are engaged in decisions with respect to the next stage of the selection of the candidates. The recruitment team is involved in decisions which might lead to rejection of a candidate for the required job [14]. Kinnunen and Parviainen [14] further add that the recruitment team is presented with three major decisions with respect to the selection of candidates for the required job. These decisions relate to; short-listing the candidates for interview, reserving candidates, and holding recruitment of the candidates [14].

According to Checchi, De Poli and Rettor [15], the decision to shortlist candidates is taken by the recruitment team on the basis of the documents and skills of the candidates and how these match the requirements of the job position. This decision by the recruitment team means that the selected candidates will be invited to participate in the interview process for the job [15]. In addition to this, the decision of recruitment managers with respect to reserving candidates means that candidates will be listed in a reserved list for interview in order to replace existing candidates who drop out of the interview process [16]. Further, the decision of the recruiting managers with respect to holding the candidates means that recruiting managers will have the option to progress the candidates [16].

D. Final Decision

The final decision of the managers is the basis for the selection of the suitable candidate for the required position. In this context, Faliagka, Ramantas and Sirmakessis [17] state that the final decision of the recruiting mangers is based on different factors such as the scores which the candidates achieve during the assessment process, and short-listing decisions with respect to the candidates [17]. The final decision on the candidates is not based on the single factor of the score in the assessment process conducted in E-recruitment [17]. However, the recruiting managers in certain circumstances might direct the selection of certain candidates based on their scores in the assessment process [17].

According to Faliagka, Tsakalidis and Tzimas [10], the selection of candidatets is based on the final decision of the recruiting managers. he recruiting managers consider

the skills, scores and qualifications of the candidates, along with their backgrounds, for the purpose of deciding about the recruitment of potential candidates. The skills and qualifications of candidates are considered in making effective decisions with respect to the recruitment of eligible and proficient candidates. It has been observed that the recruiting managers might take biased decisions in certain cases when referrals have been provided by the existing employees of the organisation [10]. The consideration of referrals might hamper work productivity in the later stages of job tenure due to the weaknesses attached to the process of E-recruitment. Thus, there is a need for recruiting managers to pay attention to the recruitment process and carefully select suitable candidates for the job position.

IV. Methodology

The methodology followed in this study is descriptive survey using a questionnaire. Study Sample: The study sample consisted of 509 male and female lecturers at Saudi universities, who were randomly chosen.

Study Tool: The questionnaire was constructed following two focus groups with human resource experts, and consisted of questions on participants' use of social networks to find a job. The researcher prepared the questionnaire as a tool by making use of the tools in previous studies and by reviewing the related literature. The tool consisted of 20 paragraphs spread over two domains: the need for E-recruitment (10 paragraphs); and quality (10 paragraphs).

Validity of the Tool: The tool was presented to 7 experienced arbitrators in the domain of human resources for university lecturers in Saudi Arabia. They were asked to define the appropriateness of the paragraphs in the tool and suggest any amendments. These amendments were made. The tool, after arbitration, consisted of 20 paragraphs in two domains.

Reliability of the Tool: Primary information was collected using an online survey that was available online for 40 days. All the information collected was anonymous and confidential. companies were selected randomly through the Saudi Arabian Chamber of Commerce, Industry Listing and human resource.

For Saudi Arabia, with organisations of all sizes and from all market sectors. Five hundred and nine usable questionnaires were collected, and descriptive analysis was carried out. The reliability of the tool was verified by using the Cronbach's alpha formula for internal consistency.

In order to analyse internal consistency for the items mentioned in the questionnaire, Cronbach's alpha was applied through SPSS. According to Hair *et al.*[18], internal consistency of an item is achieved if Cronbach's Alpha is greater than 0.7. hence, the 0.7 threshold is considered as an acceptable cut off point among the social sciences researchers.

Measurements that reflect low reliability are not further investigated, as the items do not reach the standard of convergent validity. In reference to Table I, all scores are within the standard of convergent validity, and are greater than 0.70, exhibiting high reliabilities, which means that the above construct satisfies the requirement of convergent validity.

TABLE I CRONBACH'S ALPHA TEST FOR RELIABILITY DATA

Variable	*Cronbach's Alpha*	*No. of Items*
E-recruitment	0.88	10
Quality	0.94	9

Table II indicates the participants' responses to the 10 elements of the E-recruitment process. It has been confirmed that the mean response value corresponding to each element included in the survey is greater than 3.4; thus, the direction of decisions regarding each element is either agree or strongly agree. Further, the mean value corresponding to EREC1 is greater among all items, which demonstrates a higher agreement level among participants regarding the statement that E-recruitment helps HR managers in reaching people located in varied locations. Moreover, the results in Table II also shows that the E-recruitment process helps employers to reach a large group of prospective candidates 24 hours a day and 7 days a week.

Table III describes the response of participants regarding the quality aspects of E-recruitment process. It is found that the mean response of the majority of the respondents lies in the agree category; however, only one response lies in the strongly agree category. The maximum average response value is attained corresponding to quality 9, which shows that E-recruitment helps the employers to attract candidates who are otherwise inaccessible.

V. Conclusion

It can be summarised from the review of relevant literature that the E-recruitment process involves the use of technology for the purpose of attracting and selecting suitable candidates for a job. It has been observed that the E-recruitment process involves stages such as searching the job folder, assessing the candidates, short-listing candidates and the final decisions made by the recruiting managers. Further, the process faces certain challenges, such as an increased number of unsuitable job applicants, discrimination and diversity issues, and alignment issues.

Although adequate literature sources are available on the benefits and challenges of the E-recruitment process, there is lack of literature on the clear process of E-recruitment and correct procedures, which presents scope for further research in this domain. In this work, we have developed an integrated company or governmental organisation-oriented E-recruitment system that automates the candidate evaluation and pre-screening process. Its objective is to calculate the applicants' relevance scores, which reflect how well their profile fits the position's specifications. In the next stage of this work, an Artificial Intelligence System will be implemented to intelligently enhance the selection process for candidates within our proposed framework.

TABLE II PART A: E-RECRUITMENT

Question Number	*Strongly disagree*	*Disagree*	*Neither agree nor disagree*	*Agree*	*Strongly agree*	*Mean*	*Direction*
EREC1	6 (1.2)	7 (1.4)	16 (3.2)	223 (44.1)	254 (50.2)	4.407	Strongly Agree
EREC2	12 (2.4)	51 (10.1)	87 (17.2)	246 (48.6)	110 (21.7)	3.773	Agree
EREC3	6 (1.2)	12 (2.4)	26 (5.1)	271 (53.6)	191 (37.7)	4.243	Strongly Agree
EREC4	4 (0.8)	24 (4.7)	38 (7.5)	247 (48.8)	193 (38.1)	4.188	Agree
EREC5	19 (3.8)	71 (14)	67 (13.2)	225 (44.5)	124 (24.5)	3.719	Agree
EREC6	6 (1.2)	16 (3.2)	42 (8.3)	248 (49)	194 (38.3)	4.202	Strongly Agree
EREC7	3 (0.6)	30 (5.9)	63 (12.5)	257 (50.8)	153 (30.2)	4.042	Agree
EREC8	3 (0.6)	11 (2.2)	31 (6.1)	238 (47)	223 (44.1)	4.318	Strongly Agree
EREC9	2 (0.4)	28 (5.5)	31 (6.1)	266 (52.6)	179 (35.4)	4.17	Agree
EREC10	4 (0.8)	24 (4.7)	48 (9.5)	266 (52.6)	164 (32.4)	4.111	Agree

TABLE III PART B: Quality

Question Number	*Strongly disagree*	*Disagree*	*Neither agree nor disagree*	*Agree*	*Strongly agree*	*Mean*	*Direction*
QUALITY1	8 (1.6)	15 (3)	61 (12.1)	258 (51)	164 (32.4)	4.097	Agree
QUALITY 2	8 (1.6)	11 (2.2)	59 (11.7)	258 (51)	170 (33.6)	4.128	Agree
QUALITY 3	9 (1.8)	20 (4)	72 (14.2)	239 (47.2)	166 (32.8)	4.053	Agree
QUALITY 4	6 (1.2)	9 (1.8)	58 (11.5)	271 (53.6)	162 (32)	4.134	Agree
QUALITY 5	17 (3.4)	29 (5.7)	69 (13.6)	234 (46.2)	157 (31)	3.958	Agree
QUALITY 6	12 (2.4)	33 (6.5)	83 (16.4)	232 (45.8)	146 (28.9)	3.923	Agree
QUALITY 7	10 (2)	6 (1.2)	40 (7.9)	256 (50.6)	194 (38.3)	4.221	Strongly Agree
QUALITY 8	16 (3.2)	49 (9.7)	97 (19.2)	207 (40.9)	137 (27.1)	3.791	Agree
QUALITY 9	7 (1.4)	11 (2.2)	53 (10.5)	276 (54.5)	159 (31.4)	4.125	Agree

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