



The Development of an Online Job Marketing Information System: A Case Study of Accounting Graduates

Yoseph Leonardo Gunawan^{a*}, Debby Ratna Daniel^{b*}, ^{a,b}Faculty of Economy and Business, Universitas Airlangga, Surabaya, Email: ^{b*}debby-r-d@feb.unair.ac.id

ASEAN Economy Community (AEC) 2015 has given a new challenge for the Indonesian nation to prepare university graduates for the workforce. According to the statistical data of the Central Statistical Bureau, the visible average university unemployment reaches 8% per annum. The high level of university graduate unemployment is due to a mismatch between the job market and university. This mismatch occurs due to the university's unspecific graduate profiles caused by limited job market information. This study aims to develop the system of <http://infokerja-jatim.com> website database. It also adopts exploratory qualitative methods to design an integrated system with human resource information system concepts. The proposed system takes the Candidate management system and cloud computing-based database management system that integrates information on job vacancies, workforce on-demand, job market standard requirements conforming to the Indonesian Accountant Association (IAI) standard. The Candidate management system can provide information on the competency needed in the market and the candidates' suitability within the work standard requirement.

Keywords: *Candidate management system, cloud computing, database management system, e-recruitment, human resource information system.*

JEL Classification: O15, O31, M15

Introduction

ASEAN Economic Community (AEC) has become a new challenge for university graduates because it facilitates the entry of both a skilled and professional workforce from overseas/ASEAN into Indonesia, as well as from Indonesia to overseas. The Central



Statistical Bureau (BPS) states that university graduate unemployment in February 2013 had reached 360.000 or 5.04% of the total unemployment figure of 7.17 million (Wahyuni, 2014).

One specific area of expertise specifically attended in AEC is the accounting sector. Sunaryo, Head of Institut Akuntan Publik Indonesia or IAPI (Indonesia Public Accounting Institute) expresses his anxiety regarding the high number of young graduates who are unaware of the tight competition with competency in English proficiency, and mental preparation to compete with accountants from overseas (BBC, 2014). The unfulfillment of these young graduates for the working world effects the unfulfillment and recruitment requirement criteria adopted by the companies. These young graduates' incapability of meeting the demand of the working world shows a discrepancy between the educational world (supply side) and the working world (demand side) which eventually leads to problems of unemployment and the inability of graduates to take strategic positions in a company.

For the higher education to meet the demand of the company, there is a need for the availability of information on the job market to fulfil employment demand and to determine the university graduate profiles. The graduate profile is a hope of the universities on the expected roles of their graduates when entering the working world. Besides, as stated by Susilo, a respondent from university and professional institution, the graduate profile also plays a role to direct university students towards the competency needed for the job market.

To bridge the availability of job market information, the Government of East Java Province has developed an online job market website, named www.infokerja-jatim.com. However, the job market information available on the site has been limited to the number of job placement, vacancies, active workers, yet still not optimally used. Besides, the website is to date considered as ineffective and inefficient in providing information regarding the job market. A company respondent named Adi states that the procedure, customs and regulation related to the system is weak in achieving the goal because the process is too complicated, lengthy and inefficient. A similar view is stated by Susilo, a respondent from university and professional institution who expects that the active role of the Employment Department is to provide information on the job market needed by the supply side and to map out professional competence.

Based on the problems, the writer proposes that the database system development of www.infokerja-jatim.com integrates with the human resource information system (HRIS) concept. The proposed system adopts two methods: (a) candidate management system that provides information on the competence needed by the market, candidate suitability with the standard requirement of job types and (b) cloud computing-based database management system that integrates information on job vacancies, the number of workers on demand, and the standard requirement of accounting graduate profile which is demanded by the job



market. The proposed system is visualized in Data Flow Diagram (DFD), Flowchart, and Entity Relationship Diagram (ERD) that results in an integrated e-recruitment system. This integrated system is expected to handle fictitious data, provide automatic reports, and enable related parties to provide and recruit an excellent workforce and to select job vacancies according to needs, and eventually be able to answer the challenge of necessary job market information availability for workforce candidates, workforce suppliers and job vacancy providers, and to map out professional competence.

The result of the study is expected to provide input for the government on the existing online job market/offer website system; for universities, to provide information on the job market to enable them to create graduates that meet the market demand; and for companies, to help get the workforce that meets the established criteria.

This report is organized into four sections: the introduction section provides the background from which the study is conducted in relation to the development of the online job market information system of Infokerja-Jatim.com website: a case study of accounting graduates. The other sections consist of literature reviews, research method, discussion, and the final section discuss the implication and limitation of the study. This study aims to develop the system of <http://infokerja-jatim.com> website database.

Literature Review

Human Resources Information System (HRIS)

Human resources information system provides information on the workforce to help managers in making decisions and strategic steps in human resources (McLeod, Jr, R., & Schell, 2008). There are three elements that always build an information system: an input subsystem that describes the *transaction processing system*, databases that describes *cloud computing* and output subsystem that describes *workforce planning subsystem*.

Cloud Computing

Cloud computing is an internet-based information technology that provides application service and data to external consumers. Previous application and data are only available internally in the company on a personal basis to be transferred by the cloud system that is accessible to several users. Cloud computing can be described as a transition from a previous information technology application installed in the company desktops.

The superiority of cloud computing includes *the provision of scalable resources on demand; virtualization; and maintenance and management free* (Truong, H.L, & Dustdar, 2015). The



service used in cloud computing is divided into three kinds, including *Software-as-a-service* (SaaS); *Platform-as-a-Service* (PaaS); and *Infrastructure-as-a-Service* (IaaS)(Ahmad, A & Setiawan, 2011). there are some aspects of cloud computing that demand attention, including: risk management and loyalty, access management and identity; service integrity; and client integrity.

Job Analysis

Job analysis is used to determine the role of the job and to determine the criteria of skills and competency needed for the job itself. Job analysis is a common method to determine the type and quality of worker needed for each job. Job analysis can provide the necessary information to create job descriptions, recruitment, training and development, management performance, and job evaluation.

Job Description

One result of job analysis is the dissemination of the information to create a job description. A job description is the major key (main target) to achieve by the employee (role holder) in performing the job. In the job description, it is necessary to put the competency and capability needed by the person taking the role of the job.

Competency Analysis

Competency analysis is needed to determine the suitability of a person for the job in making a decision using techniques one has acquired according to their job roles. Competence analysis has six approaches, as proposed by Amstrong (2006: p. 193), to include *Expert opinion*, *Structured Interview*, *Workshops*, *Critical Incident Techniques*, *Repertory Grid Analysis*, and *Job Competency Assessment*.

Research Method

This study adopts the qualitative method of an exploratory case study that it is limited by problems and database system development of the www.infokerja-jatim.com website to integrate with university databases in East Java. It is a case study of university graduates in accounting departments. The study will be conducted in Surabaya city, the capital of East Java Province, that is more or less a representative picture of other cities in East Java.

The data source includes primary data obtained directly by interviewing some resource persons or informants from the accounting graduate alumni, accounting graduate users, accounting graduate producers and the board of accounting profession association, direct



observation and online searches. The secondary data is obtained from the third party from various literature on human resources information system. This data is taken from references, the internet, as well as knowledge directly gained from academicians and practitioners, which is then used for the theoretical foundation of the present study.

Some components of the research design include research questions; research proposition; analysis unit; logics to relate data and proposition; and criteria to interpret the findings. The data analysis technique adopts McLeod's theory on *human resource information system* (McLeod, Jr, R., & Schell, 2008). Cloud computing and e-recruitment are supporting theories. The data validity test adopts the triangulation method by showing the research result to informants for their approval.

Results and Discussion

The proposed system design involves the *human resource information system (HRIS)* concept. The first step is to analyze the weaknesses of the existing job offer system. Based on the results of direct observation, online search, an interview with alumni, HRD and government officers, the questionnaire results of the alumni and HRD, the following points need to be developed and improved both on the technical and procedural aspects of the job-offering websites, including ID login activation procedure, worker selection procedure, job market information that is still limited to the number of placement, vacancies, and the number of active workers.

After evaluating the weaknesses, a proposed system is achieved, and then there is a need for improvement in the activity processes of the *infokerja-jatim.com* system. The proposed system includes the aspects of *input*, *output* and the report present in three formats: *Data Flow Diagram (DFD)*, *Flowchart*, and *Entity Relationship Diagram (ERD)*.

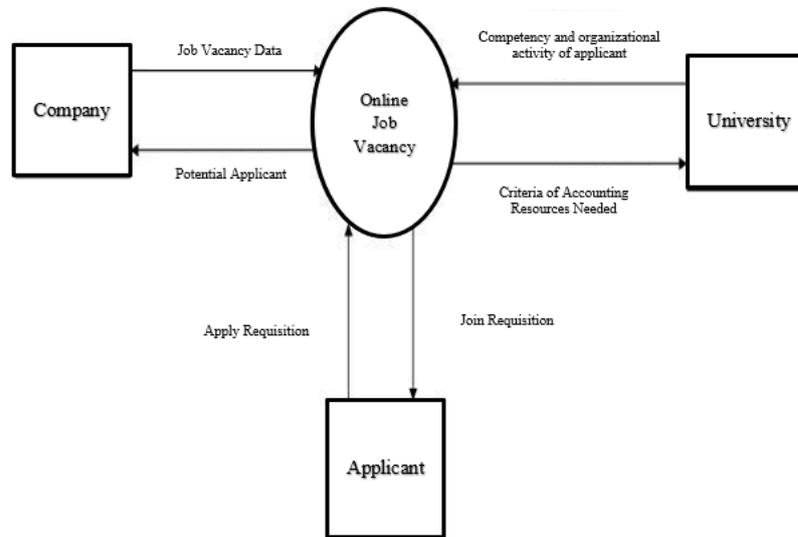


Figure 1. DFD Context

Figure 1 presents the DFD context representing all information of the proposed system. The arrows in the DFD Context are the object movement lines to link the entering entities into the Infokerja-jatim.com System, including Companies, Universities and Applicant.

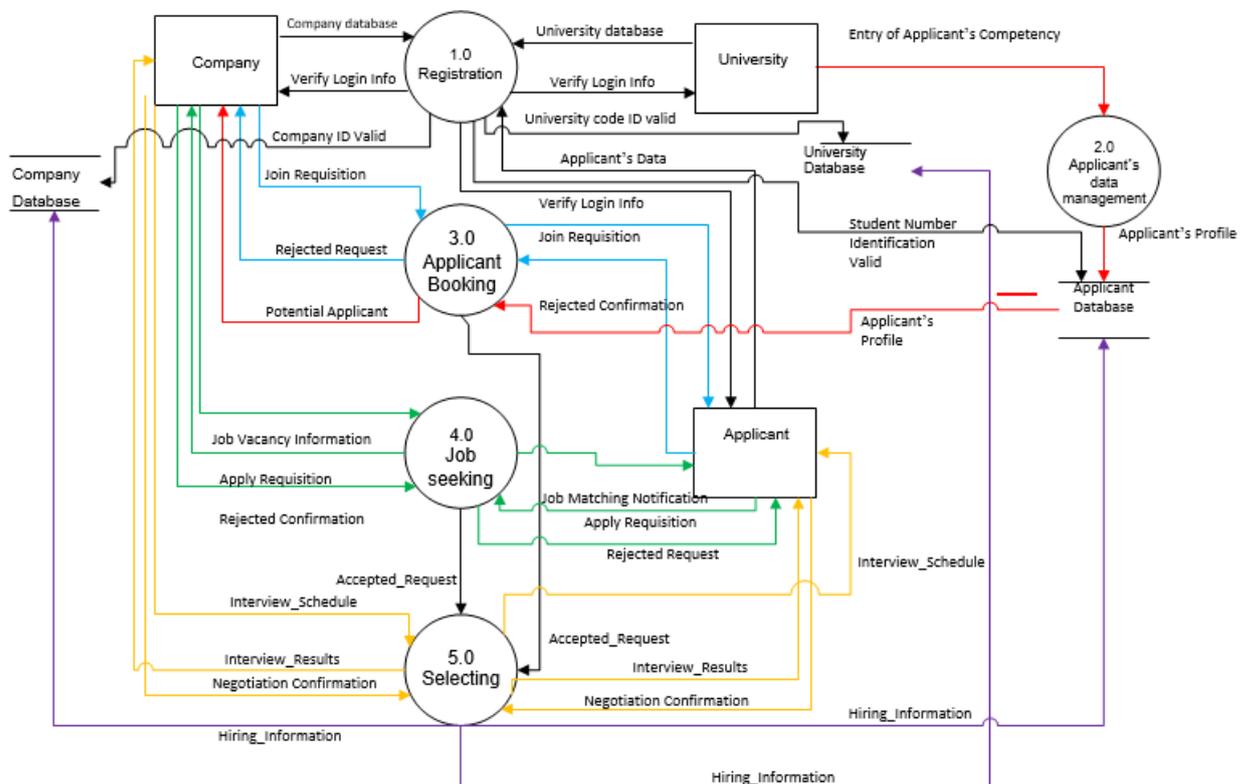


Figure 2. DFD Level 0-Process 1.0 to 5.0

Figure 2 contains information about DFD Level 0 from Process 1.0 to 5.0 which will be later explained in the following discussions.

Input
Transaction Processing System

In ERD the input process, including Transaction Processing Subsystem (ERD as shown in Figure 3). Before further processing, a master file is needed to create data integration. The master database is divided into two master databases: reference master file whose record is relatively static and rarely changed. The file in this system consists of Subject Master, including demand master, JP Master, city master, job master, business category master, and business area master.

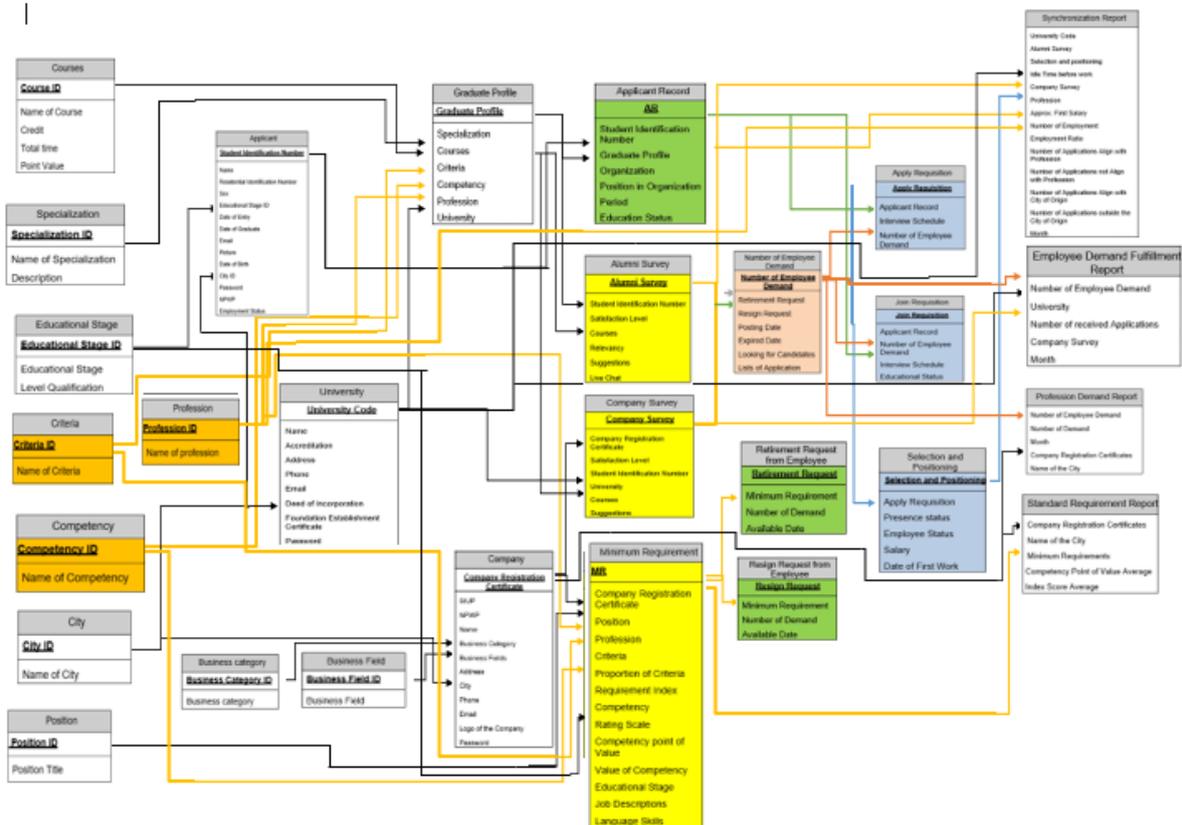


Figure 3. Entity Relationship Diagram

Besides the reference master file, the next master file is a dynamic. This master file contains changing record values or is often updated as a result of a transaction. The dynamic master file in this system consists of applicant master, university master, profile master, and company master.

Transaction processing system begins with the applicant, university and company conducting the registration process using the ID received by the applicant, universities and company. The company ID uses the company registration card obtained in the Department of Industry and Trade, and the company should also enter the company business license (SIUP) and tax file number (NPWP) as the validation process and internal control mechanism process to show that the company is not fictitious. The university ID uses the institution code obtained on the founding of the institution, and the university should also input the Foundation Certificate (SKPY) or certificate from the Department of Higher Education (SK DIKTI) as validation of evidence that the institution is under a corporate legal body.

The university inputs the applicant data through a file export (as shown in Table 1.). After the file export is done, the applicant begins the registration process by entering the university ID code to call for the student number in the university. Then the applicant enters the student ID number obtained when first enrolling in the university, and this can only be activated in a specified semester. The next step is that the applicant should also input the residential identification card (KTP) as a validation form of Indonesian citizenship.

Table 1. Applicant Profile Data Export Form (pre-Export)

Applicant Profile Data Export Form										
Specialization ID					Profession ID					
Name of Specialization					Name of Profession					
Student Number ID	Date of Birth	Residential Identification Number	Sex	Educational Stage ID	Educational Stage	Email	City of Origin	Name of Applicant	Date of Entry	Date of Graduate

The applicant data management processing is conducted by the university, beginning with course adjustment regarding the interests of the professional competence criteria established by the government. After the course adjustment, the university conducts student data update to include both the applicant's study result and organizational experience during study. Figure 8 presents the DFD Level 1 of process 2.0 (as shown in Figure 4) on the applicant data management. The next necessary step from the university is an information update on the applicant achievement history during the study at the university.

A further detailed process of the applicant data management process the transaction entity of applicant data management is the applicant record entity which consists of the student number ID attribute to draw the applicant data, University ID Code to draw the applicant university affiliation, Graduate Profile ID. The graduate profile master entity contains the interest, courses related to interest, interest profession group, professional standard criteria, and standard professional competence.

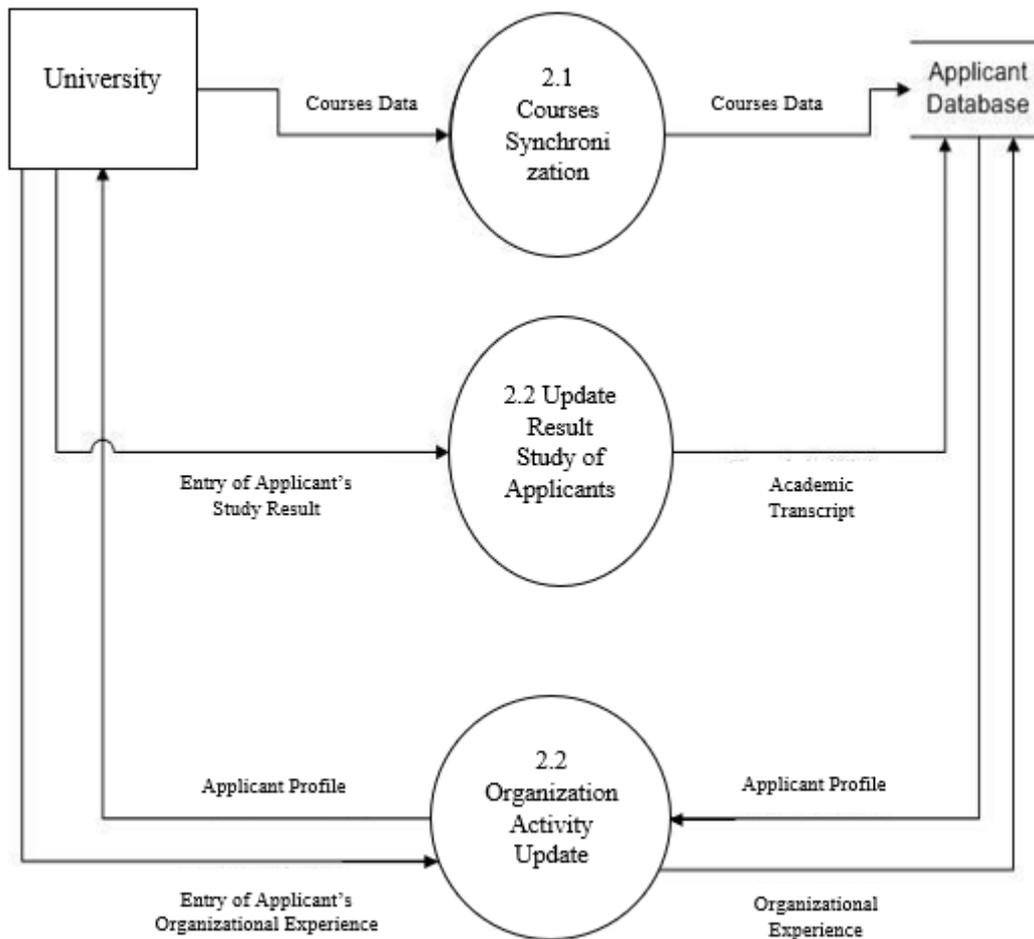


Figure 4. DFD Level 1-Process 2.0

Human Resources Research Subsystem

The human resources research subsystem provides information on the minimum job requirement that the minimum requirement is the standard to fulfil by the applicant before applying for a job and also a standard for the university to create graduates to suit the need of companies. Basically, each job type has a minimum requirement that is established by each company. Besides the minimum requirement, the other human resources research subsystem is obtained from company data survey and alumni survey (the already employed applicants).

The Minimum Requirement includes the company, positions in the company, the professional type of the position, the criteria of the profession, the created competence result of the criteria and the job description of the position. The other minimum requirement attributes include a rating scale of the competence of the position, and the competence value, job description,



minimum educational level of the position, and language competence. The competence rating scale in each professional criterion is necessary to see the job's prominent competence emphasis.

Survey entity is divided into two parts: company and alumni. Company survey entity becomes the basis for creating a report on the new competency needed by the company for each of the professional criteria of the existing job. While the alumni survey entity becomes the basis for creating a report on the new competency needed by the new graduate candidate to help prepare them for entering the employment world.

Human Resource Intelligence Subsystem

The human resources intelligence subsystem provides external knowledge. This study uses one type of human resources intelligence, that is government intelligence. Government intelligence contains information on the professional standard established by the Ministry of Finance through professional institutions to anticipate the ASEAN Economic Community (AEC). This study adopts *Chartered Accountant (CA)* professional competence established by the Indonesian Accountant Association (IAI). Based on the Ministry of Finance regulation No. 25 the year 2014 on the State Registered Accountant, the regulation becomes the foundation of restructuring of professional accountants in Indonesia. By obtaining the CA title, graduates of accounting schools are capable of competing with professional accountants from ASEAN countries in MEA implementation. Based on the regulation of the Ministry of Finance No. 25 the year 2014 articles 18 and 19, the Indonesian Accounting Association is established as the professional accountant association that is responsible for developing accountant professionalism in Indonesia.

The list of competency and minimum requirements adopted into the course subjects, include Corporate Reporting, Strategic Management and Leadership, Professional Ethics and Corporate Governance, Advanced Management Accounting, Advanced Finance Management, Taxation Management, Information System and Internal Control. The government intelligence entity consists of three entities, including professional master entity, criteria master entity and competence entity (Armstrong, 2006). The professional master entity contains the accountant profession, the criteria master entity contains criteria from the profession, and the competence entity contains the resulting competence of the criteria.



Output

Workforce Planning Subsystem

The Output Workforce Planning Subsystem is in the form of the prediction of workforce demands from units or organizations. This workforce demand triggers the subsystem recruitment processes. This workforce planning subsystem refers to the Labor Regulation no 13 the year 2003. The Labor Regulation no 13 the year 2003 that becomes the reference basis is in particular Articles 154 c and 162 subsection 3a. Article 154 c which describes the retirement age as stated in accordance with the work contract, company regulation, join work agreement, or government regulation, commonly referring to the Labor Social Security Law article 14 subsection 1 of Law no 3 the year 1992 which states that old-age/pension security is paid to the workforce reaching the age of 55 years.

The entity resulting from the processes of the workforce planning subsystem is the workforce demand entity. This entity consists of the workforce request for resigning and workforce request for retirement. Also, the workforce demand process begins from each unit that sends requests to the HRD department to recruit substitutes for future vacant positions. The HRD will input to the system. In searching the candidates, HRD can adopt two ways: advertise to the job offer that links with the apply requisition process, or directly recruit candidates linked to the join requisition process.

Recruitment Subsystem

Output Recruitment Subsystem is in the form the of Candidate Management System or the Applicant Tracking System, a system for selecting and sorting candidates automatically based on the needed requirements that enable the users to select the suitable candidates on demand. Recruitment Subsystem helps users to provide information on the workforce market, interview scheduling, recruitment and recruitment analysis.

In this study, there are three databases from the Candidate Management System: join-requisition, apply requisition and interview and selecting databases.

Join Requisitions

Data on join requisitions are the output results of DFD level 1-process 3.0 (Figure 5). The resulting output from join requisition is on the compatibility between the applicant candidate demand and the user's minimum job requirement (company). The information line begins with the user (company) in order to gain information from the result of the output workforce planning subsystem, that is, the demand for a new workforce for the periodic job vacancies.

The join requisition process occurs when the company presses the button search candidate on the workforce demand form.

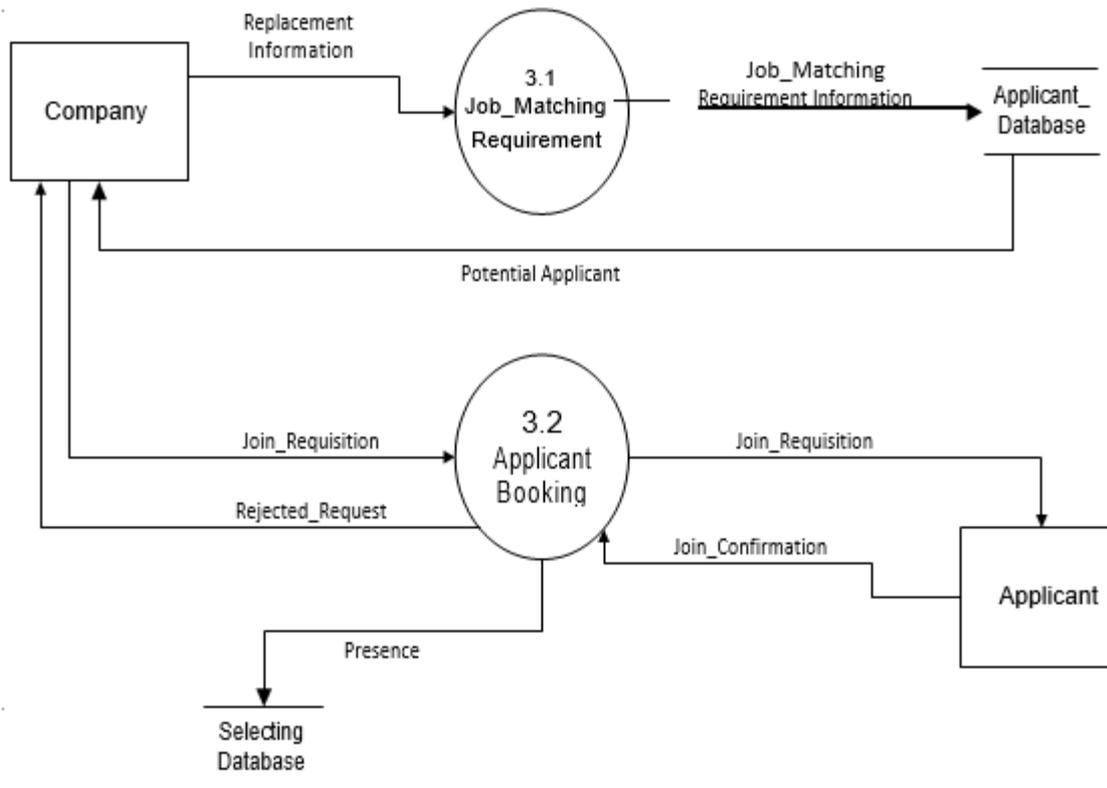


Figure 5. DFD Level 1-Process 3.0

The system automatically conducts research on candidates according to the company needs, the professional need and the minimum educational level necessary for the position. Besides applying DFD-Level 1, a more detailed process of the applicant booking system resulting in the join requisition output can be viewed in Figures 14 and 15 on the Applicant Booking Flowchart.

The trigger of join requisition is the workforce demand entity. Besides the workforce demand entity, another entity supporting join requisition comes from the applicant record entity. Applicant record is the input information of the transaction processing system that provides information of the update data development while the applicant is still studying or the final data after the applicant has graduated. Data in the applicant records includes the applicant’s whole data and organizational experience while studying.

The result of the entity link to the join requisition will issue reports to the users, both applicants and companies, on Candidate List Forms, based on Professions on Demand – (Corporate Interface), Comparison of Company Minimum Requirement with the Applicant

Grade History, Detailed Information on Applicant Graphic - (Corporate Interface), Detailed Information on Applicant – (Corporate Interface), List of Companies offering Join Requisition – (Applicant Interface), and Details of Companies offering Join Requisition – (Applicant Interface).

Apply Requisition

Data on apply requisition is the output result of DFD level 1-process 4.0 (Figure 6). Based on the information line, as stated in DFD level 1-process, the resulting output of apply requisition is the need for new employment to fill the vacant positions. The information line begins with the user (company) to gain information through *output workforce planning subsystem result, that is, the need of workforce to fill the vacant position due to employee resignation or retirement.*

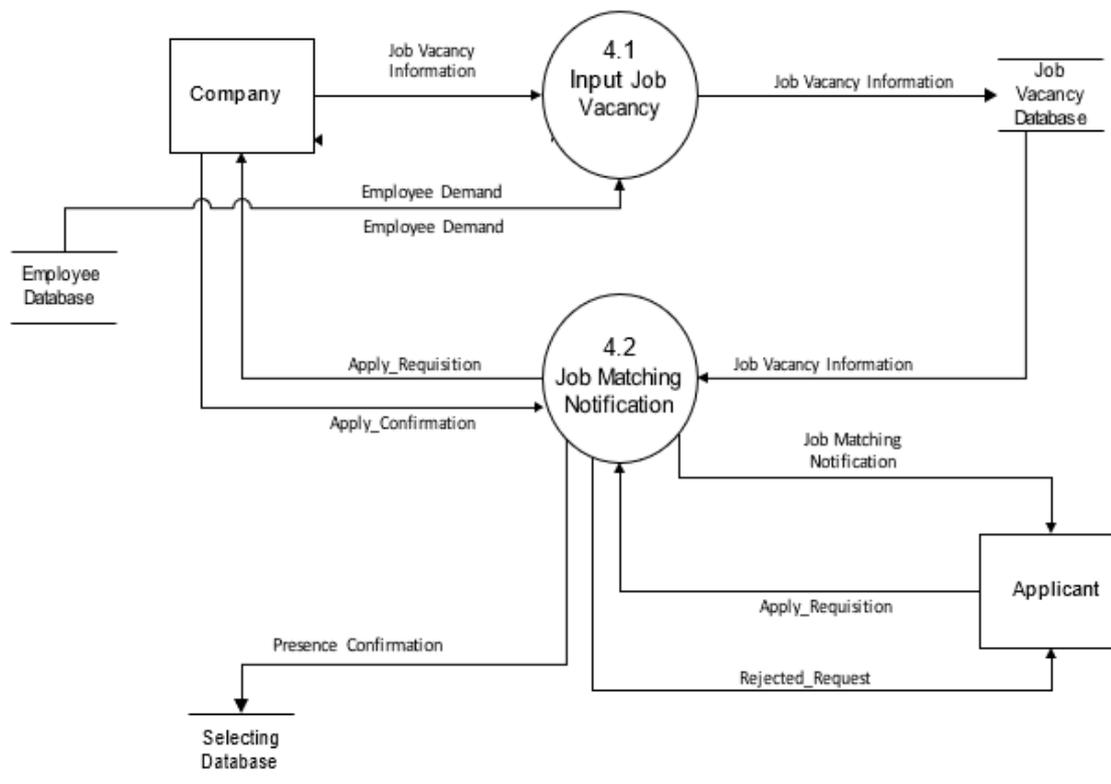


Figure 6. DFD Level 1-Process 4.0

The system automatically searches job vacancies suitable for the applicants. The system also displays the necessary minimum requirements of the job according to the professional criteria established by the government through the profession. Besides using the DFD-Level 1, apply requisition can be triggered by the workforce demand entity. Besides the workforce demand entity, another supporting entity for apply requisition comes from the *transaction processing system entity, that is the applicant record.* Applicant record is information input from the



transaction processing system that provides information on the latest data while the applicant is still studying and the latest data after graduation. Data on applicant records consists of all data on applicants, including the study interest, relevant course subjects, applicant's achievement and organizational experience while studying.

The resulting entity link to this apply requisition will produce reports to the users, both applicant and company on the Company Job Vacancy List-(Applicant Interface), Companies' Job Vacancy Details - (Applicant Interface), Minimum Job Requirement Details – (Applicant Interface), List of Applicants Making Apply Offer – (Company Interface), Detailed Applicant Information – Graphic – (Company Interface), and Detailed Applicant Information – (Company Interface).

Selection, Placement and Survey

Based on the information lines presented on DFD level 0-process 5.0 (Figure 2) the output resulting from the selection and placement is based on the applicant number accepted to work in a company. Both the applicant and the company have equal rights to accept or refuse the result. Therefore, the DFD level 0-process 5.0 contains information on the deal agreement between sides, the applicant and the company. When the deal agreement occurs, the company must input data on the deal agreement that the applicant has accepted the offer of job placement from the company. The system is integrated with the Taxation Directorate General (DJP) database to integrate the Tax File Number database that the applicant will be subject to income tax (PPh 21) as he starts working and the system can trace that the applicant has already worked.

The triggers for selection and placement are the *apply requisition* and *join requisition entities* that contain information on the candidates required to follow the selection and interview session. Attributes of selection and placement entities consist of presence status as an instrument to help the company to mark the realization of the applicant's presence on the selected schedule. The presence data will enter into the selection database which will become the data history of both the applicants who have agreed to confirm with the offer to join and those who have been appointed for selection. The employee status attribute includes data that shows the employment status of the working applicant, whether in training, apprenticeship, contract, or permanent worker. The employment status should be filled by the company to become a future system tracing on the applicants who have already been employed. The salary attribute only provides information on the amount of salary agreed by both sides. The starting working date attribute marks the date the applicant begins working in the company. This attribute should be filled by the company (Iswati and Zarkasyi, 2019).



Result of System Development

The result of the system development creates reports that can help facilitate universities, companies, and applicants to see the job market.

Synchronization Report

This report aims to show the data needed by universities. The data includes the average waiting time of the applicants to find jobs, average first salary received by the applicant at work, the number of applicants absorbed into the job market and the ratio of absorption and the total number of the university students and alumni. The number of applicants working in the area of competence that is accountant, the number of applicants working not in the area of competence, the number of applicants working in their hometowns, and the number of applicants working not in the hometowns every month, the recapitulation of the survey result.

Standard Requirement Report

Standard Requirement Report is necessary to see the job market competence trend that is currently needed in the job market. The competence can be used as a reference by the universities on the graduate profiles for specific accountant professions. The report is displayed in graphic and number.

Survey Report

The survey reports aim is for universities to gain feedback on the needed competence by the job market of their graduate users, and the satisfaction level of their graduate users and the comments from the graduates on the satisfaction levels and relevance levels of the course subjects regarding their jobs. The report is very useful to help all related sides, such as companies and alumni, to present their aspirations. The report can also be used for internal data by universities.

Conclusion and Suggestion

The study concludes the following points: the proposed integrated e-recruitment system is supported by the integration of data from companies, universities, Department of Industry and Trade, Department of Population, Department of Higher Education, and helps avoid fictitious data. The proposed e-recruitment system can provide automatic reports on the job market information including placement number, workforce demand, competence demand; and the proposed e-recruitment system facilitates relevant sides to input and recruit outstanding workforce and select job offer of interest.



The study is expected to provide references for further studies in investigating the implementation development of a new system in the processes of workforce recruitment and planning.



REFERENCES

- Ahmad, A & Setiawan, H. (2011) “Cloud computing : Solusi ICT?,” *Jurnal Sistem Informasi (JSI)*, 3(2), pp. 336–345.
- Armstrong, M. (2006) *Human Resource Management Practice (10thed)*. London: Kogan Page.
- Iswati, S. and Zarkasyi, A. F. (2019) “Social enterprise in the context of educational institution : Lessons from Gontor , Indonesia Empresa social en el contexto de la institución educativa : Lecciones de Gontor , Indonesia,” *opcion*, 35(19), p. 2.
- McLeod, Jr, R., & Schell, G. (2008) “Upper Saddle River: Pearson Education.,” in *Management Information Systems (10thed)*.
- Truong, H.L, & Dustdar, S. (2015) “Principles for Engineering IoT Cloud Systems, IEEE Cloud Computing,” 2(2), pp. 68–76.
- Wahyuni, N. . (2014) *Pendidikan Tinggi Indonesia yang semakin tertinggal*.