

**A PRELIMINARY STUDY OF THE ENTERPRISES' NEEDS
FOR INFORMATION AND COMMUNICATION TECHNOLOGY
GRADUATES: AN ONLINE SURVEY**

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Abstract

Information and communication technology (ICT) is a crucial sector in education that plays a significant role in the development of nations. In line with the "Labour Market Observatory in Vietnamese Universities" project, a detailed overview of employment needs in the ICT sector for undergraduate students in Hanoi and Ho Chi Minh City has been revealed. As a project participant based in Hanoi, Hanoi University of Industry was responsible for collecting data from enterprises through an online survey. This paper focuses on two main aspects: the demographic information of the participating enterprises' representatives and their responses regarding recruitment needs. A total of forty-four enterprises, which have established collaborations with Hanoi University of Industry, agreed to take part in the survey. Descriptive statistical analyses were conducted to identify trends in the recruitment of ICT engineers. The results indicated a growing demand for engineers in renowned ICT companies, with developers being the most sought-after job position. These findings from Hanoi University of Industry underscore the continued prominence and promising employment opportunities for ICT engineers.
Keywords: *Information and communication technology, information technology, enterprise needs.*

Nghiên cứu ban đầu về nhu cầu nhân lực sinh viên tốt nghiệp lĩnh vực Công nghệ thông tin và Truyền thông qua khảo sát trực tuyến

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Tóm tắt

Công nghệ thông tin và truyền thông (CNTT-TT) là ngành giáo dục có ý nghĩa quyết định đối với sự phát triển của mỗi quốc gia, được hỗ trợ bởi dự án "Labour market observatory in Vietnam Universities", bức tranh nhỏ về nhu cầu việc làm của doanh nghiệp trong lĩnh vực CNTT-TT đã được làm sáng tỏ cho sinh viên đại học tại Hà Nội và Thành phố Hồ Chí Minh. Là thành viên của dự án tại Hà Nội, Đại học Công nghiệp Hà Nội được chọn để thu

thập dữ liệu từ các doanh nghiệp thông qua khảo sát trực tuyến. Là một phần của cuộc khảo sát, bài viết trình bày hai nội dung chính, thứ nhất, liên quan đến thông tin nhân khẩu học của đại diện doanh nghiệp tham gia khảo sát và thứ hai, phản hồi của doanh nghiệp về nhu cầu tuyển dụng. 40 doanh nghiệp đã và đang hợp tác với Đại học Công nghiệp Hà Nội đồng ý tham gia khảo sát. Các phân tích thống kê mô tả đã được thực hiện để làm nổi bật các xu hướng tuyển dụng kỹ sư CNTT-TT. Kết quả cho thấy các tên tuổi lớn trong lĩnh vực CNTT-TT có nhu cầu ngày càng tăng đối với các kỹ sư tương lai. Hơn nữa, các lập trình viên (developers) vẫn là công việc được các doanh nghiệp có nhu cầu tuyển dụng cao trong năm 2023 và 2024. Kết quả khảo sát từ Đại học Công nghiệp Hà Nội cho biết rằng cơ hội việc làm cho các kỹ sư CNTT-TT vẫn rất lớn và đầy hứa hẹn.

Từ khóa: Công nghệ thông tin và truyền thông, công nghệ thông tin, nhu cầu doanh nghiệp.

1. Introduction

The current era of rapid globalization, job insecurity, and the emergence of new universities has created uncertainty between higher education and the job market [1]. In order to secure employment after graduation in such dynamic times, undergraduates need to improve their awareness and prepare for an unpredictable future and unstoppable career. To bridge the gap between training and the job market demands and to help undergraduates get ready for graduate employment, the project “Labour Market Observatory in Vietnam Universities” (LAB-MOVIE), supported by the European Union, has been implemented since 2019. One of the project’s aims is to enrich the student’s understanding of the labour market in three sectors in Vietnam. Among the five universities to participate in the project, Hanoi University of Industry (HaUI) significantly contributes to Information and Communication Technology (ICT) sector [2]. At Hanoi University of Industry, the Center for Enterprise Partnership, HaUI Institute of Technology, and the Faculty of Information Technology are responsible for calling for ICT enterprises to participate in the survey and then build up the website platform for students to enhance their awareness of enterprises’

diagram of organization structure and their recruitment requirement [3].

It is asserted by Jung et al. (2019) that modern companies hardly survive or keep a “competitive advantage without information and communication technology” [4]. ICT has been studied in various sectors in different countries, such as the necessity of ICT-based economic development in Ghana [5] or the application of ICT into education in Singapore [6] and trends in enhancing ICT professional competencies for pre-service teachers in Vietnam [7]. ICT plays a crucial role in education because students need ICT skills to meet the requirement of a skilled workforce and well-informed citizens [8]. However, there is limited research on predicting ICT human resource needs in Vietnam. It seems to be less empirically researched from employers’ assessments. With the support of the European Union, this study fills in the gap in ICT-related academic works in Vietnam. This paper presents partial results of the project LAB-MOVIE by surveying the ICT companies in Vietnam regarding the enterprise’s recruitment needs.

This paper is divided into three main parts. The first part introduces the study's context and highlights the research gap. The second part consists of four sub-sections: a thematic review of

ICT and the labor market, data collection and analysis, presentation of the paper's results, and further discussions. The conclusion, the final part, summarizes the research findings and identifies areas for future study to address the identified research gap.

2. Content

2.1. Literature Review

2.1.1. Information and Communication Technology

ICT, which stands for Information and Communication Technology, can be defined as “a diverse set of technological tools and resources used to transmit, store, create, share or exchange information” [9, p.120] or “all those technologies that enable the handling of information and facilitate different forms of communication among human actors, between human beings and electronic systems, and among electronic systems” [10, p.3]. In other words, ICT consists of information technology and communication technology covering tools and resources for the transmission, storage and creation of information. Information technology is mainly concerned with computers’ hardware and software, while communication technology is related to the Internet, televisions, radios, and telephones. The communication technology sector covers telecommunication which consists of wired telecommunication, wireless telecommunication, and satellite telecommunication. The ICT industry can be classified into two main sectors: ICT manufacturing and ICT service, which consist of information processing and products for transmission and display [11, p.7], [12]. Although the ICT industry in Vietnam ranks above 100 worldwide, which is a modest position on the global ICT map [13], it is widely admitted that the

Industrial Revolution 4.0 and blended learning-based education trend after the Covid-19 pandemic has made the ICT industry in Vietnam on the way to move fast.

2.1.2. Enterprises’ feedback

According to Cheng et al. (2022), the employer is identified to be an influential stakeholder in setting developmental directions for higher education and creating opportunities for students to explore their full potential [14]. They are expected to participate in higher education reform by making their voices of the job market’s demands heard by higher education institutions. It has been shown that job opportunity for university graduates is not also a global issue for nations but also a common issue for each nation’s higher education institutions. Universities need to receive employers’ voices through university and enterprise partnership activities.

The relationship among employers, universities and graduates is characterized by a “pull-push circle” [15, p.55]. This circle implies that employers recruit suitable graduates by seeking evidence about their graduate employability, so the job applicants pressure universities to train, assess and verify these skills. Universities are likely to put more effort into preparing them when graduates’ employability skills are assessed and informed regularly by employers.

2.1.3. Enterprises’ needs in ICT sectors

According to TOPDev, the leading company in investigating the IT labour market, the hiring demands in the ICT sector are very high. It is estimated that for the software industry, until 2024, the Vietnam IT market can expect 800.000 developers/engineers, of which nearly 20.000 annual IT graduates can meet the employers’ requirements. It is very noticeable that Vietnam is on the

pathway to making a “Make in Vietnam” mission by 2025, which means that the need for high-qualified engineers who can master and create technology to make the products in Vietnam is about to increase and is bringing challenges for the newly-graduated students [16].

IT requirements are classified into three groups: in-sourcing for the enterprises’ internal use, out-sourcing for their external use and mixed-sourcing for both enterprises’ internal and external uses [17]. Regarding internal uses, enterprises are likely to search for the positions they may lack. For internal uses, the demand for IT professionals depends on changes in the fluctuation of the labour market and their partners’ development. Enterprises with the needs of IT human resources for mixed uses are more diverse and extensive compared with those that expect to employ personnel for internal or external purposes.

2.2. Research methodology

The survey was implemented online (<https://bit.ly/LABMOVIE>). The online questionnaire-based survey design was advantageous because it saves cost and can draw frequency or describe trends [18, p.535]. In specific, Google Forms was exploited for collecting data. In the project scope, Hanoi University of Industry prepared the survey to send to enterprises in Hanoi, while Nguyen Tat Thanh University invited enterprises in Ho Chi Minh. The survey by Hanoi University of Industry covers four parts: information of enterprise’s representative to respond to the questionnaire, the enterprise’s basic information, the enterprise’s employees, and the enterprise’s recruitment needs in the two years. In the limitation of the article, two main contents of the survey, which were extracted from the survey, are reported. Firstly, the

respondents’ demographic information covers five questions that clarify the participants’ generic information regarding gender, their positions in enterprises, their working numbers of time, and their workplace. Secondly, the ICT enterprises’ needs for recruiting fresh employees are displayed. Two questions are answered regarding the positions enterprises plan to recruit and the number of job opportunities in ICT human resources companies expect to search for in 2023 and 2024. The respondents were required to give short answers corresponding to each question.

As stated by Shah et al. (2015), data sources of employers are often collected in six ways by two popular kinds: organization-based and individual-based [19]. Forty-four enterprises were selected to send the online questionnaire by HaUI-based employer sources. They are the enterprises with good partnerships with Hanoi University of Industry by participating in graduate employment surveys or receiving students for internship or experiential learning activities.

The official letter by the Rector of Hanoi University of Industry attached with the survey questionnaire was sent to lists of enterprises by post and email. After one week, only a minor number of respondents gave feedback. Therefore, the authors contacted the enterprise's representative from the human resource division or technical department by phone to explain the purpose of the survey and confirm the person who could join the survey. After five months, from 18 January to 18 June 2022, all answers from selected employers were recorded.

Job positions' names were listed and classified, while the quantity of future job positions was counted and ranked by performing descriptive statistic methods.

2.3. Results

2.3.1. Demographic profile

Simple statistical analysis was conducted to examine the general information of the participants. Table 1 presents the gender distribution of the respondents, indicating a higher proportion of female participants compared to males. Specifically, 63.64% of the participants were female, while nearly two-fifths of the respondents were male. Furthermore, the participants were categorized based on their job positions. Notably, approximately half of the respondents held managerial positions. Among them, 27.27% belonged to the medium-level management group, while 15.91% held high-level management positions. A significant number of respondents were officers (56.82%), directly involved in the hiring process for new employees.

The participants exhibited considerable experience in human

resources, with over 70% of them having worked in enterprises for two to ten years, and a small percentage (2.27%) having more than ten years of experience. The majority of respondents were employed in private enterprises (77.27%), while the remaining worked for foreign direct investment (FDI) companies.

The surveyed enterprises represented various business sectors related to information and communication technology, with each enterprise potentially operating in one or multiple sectors. Information technology-related enterprises outnumbered communication technology enterprises. Most information technology companies were engaged in computer programming, consulting services, and other computer-related activities. Conversely, many communication technology companies specialized in wireless telecommunications.

Table 1. Summary of respondent information.

| Characteristics | Category | Overall (N=44) | |
|-------------------------------|---|----------------|-------|
| | | N | % |
| Gender | Male | 16 | 36.36 |
| | Female | 28 | 63.64 |
| Position | Staff | 25 | 56.82 |
| | Medium-level management | 12 | 27.27 |
| | High-level management | 7 | 15.91 |
| Working experience | Below than 2 years | 12 | 27.27 |
| | 2-5 years | 24 | 54.55 |
| | 5- 10 years | 7 | 15.91 |
| | More than 10 years | 1 | 2.27 |
| Enterprise form | Private | 34 | 77.27 |
| | Foreign direct investment | 10 | 22.73 |
| Enterprises' business sectors | Computer programming, consulting services and other computer-related activities | 38 | 86.36 |
| | Data processing, information portal and related activities. | 23 | 52.27 |
| | Wired telecommunication operations | 3 | 6.82 |
| | Wireless telecommunication operations | 6 | 13.64 |
| | Satellite telecommunication operations | 2 | 4.55 |

2.3.2. *Future ICT-related recruitment needs*

Table 2 illustrates enterprises' perspectives for predicting recruitment demands in the coming time. Developer is supposed to be the most hunted position by ICT companies. In addition,

jobs for hardware repair and maintenance (IT engineer), software development (software engineer), computer network protection (cybersecurity engineer) and data analysis for business (data analyst) keep crucial positions in the top four.

Table 2. Enterprises' needs for ICT jobs

| No. | Category | Overall (N=44) | | Ranking |
|-----|------------------------|----------------|-------|---------|
| | | N | % | |
| 1 | Developer | 29 | 65.91 | 1 |
| 2 | Cybersecurity engineer | 5 | 11.36 | 2 |
| 3 | Software engineer | 4 | 9.09 | 3 |
| 4 | Data analyst | 3 | 6.82 | 4 |
| 5 | IT engineer | 3 | 6.82 | 4 |

2.3.3. *Top 10 enterprises with high recruitment demands.*

In response to the question relating to the recruitment needs in 2023 and 2024, it has been shown in Table 3 that the demands for new employees in the ICT sector are high. Ten out of forty-four enterprises which expect the most significant number of new staff are ranked. It is highlighted in Table 3 that nearly 10.000 job vacancies are hunted by the top ten companies in the survey. In addition, it is worth noting that FPT software is the leading company with recruiting expectation of 6.000 IT employees in the next two years. The

two other companies that expect to recruit many employees belong to HCL Vietnam Co., Ltd. and RikkeiSoft Joint Stock company. They are outsourcing enterprises that support other enterprises with some specific IT tasks.

Moreover, among four companies relating the need for internal personnel in computer programming and web system, Misa Joint Stock company are seeking the most significant number of IT human resources, which are followed by Gameloft Co., Ltd. (100 future employees), Kaisoft Vietnam Co., Ltd (50 prospective employees) and AgileTech Vietnam Co., Ltd (20 future persons).

Table 3. Companies with high employee recruitment needs

| No. | Enterprises | Main business | Wanted quantity of employees | Ranking |
|-----|------------------------------------|---------------|------------------------------|---------|
| 1 | FPT Software Co. Ltd. | Outsourcing | 6.000 | 1 |
| 2 | HCL Vietnam Co., Ltd. | Outsourcing | 1.500 | 2 |
| 3 | RikkeiSoft Joint Stock company | Outsourcing | 1.000 | 3 |
| 4 | SmartOSC Joint Stock company | Outsourcing | 500 | 4 |
| 5 | LTS Group | Outsourcing | 300 | 5 |
| 6 | Adamo Software Joint Stock company | Outsourcing | 230 | 6 |

| | | | | |
|----|---|------------------------|--------------|----|
| 7 | Misa Joint Stock company | Computer programming | 140 | 7 |
| 8 | Gameloft Co., Ltd. (The branch in Hanoi) | Computer programming | 100 | 8 |
| 9 | Kiaisoft Vietnam Co., Ltd | Web system development | 50 | 9 |
| 10 | AgileTech Vietnam Co., Ltd | Computer programming | 20 | 10 |
| | Total | | 9.840 | |

2.4. Discussions

Some significant findings can be referred to from the study. Firstly, most participants work in IT-related enterprises, and the minority serve communication technology-related enterprises. Secondly, developers will be the most promising position for university graduates. Thirdly, FPT Software Co., Ltd was the big company that can bring students the most opportunity to work among forty-four enterprises.

In the first place, the survey findings show that most participants have worked for computer-related enterprises. Nearly 90% of respondents served the information technology sector instead of the communication technology one. It is implied that national digital transformation, implemented widely in Vietnam since 2021 [16], has positively changed the IT labour market.

In addition, the research result also indicates that the developer is predicted to be the most hunted position by ICT companies. Incredibly, 29 enterprises need the working position of developers. However, in the period from now to 2024, about 20.000 IT university graduates can enter the labour market [16], accounting for about 2.5 % of demand, which can cause a shortage of ICT engineer supply for the national aim of shifting from being assembled in Vietnam into being produced in Vietnam

for the “Make in Vietnam” products.

This study has found that FPT Software Co. Ltd. is the leading company with the highest expectation of IT employees in the next two years. Some possible reasons can be explained as follows. In terms of internal use, FPT Software Co. Ltd. is one component of FPT Corporation which means that its’ fundamental mission is to serve the development of the Corporation. In addition, located in Hoa Lac Hi-tech Park, FPT Software Co. Ltd. has good lands to attract talent for developing software products for foreign clients [20]. Ranking among the top three most prominent firms in producing software, FPT Software Co. Ltd. focuses on providing software on orders for Japan, Malaysia, Australasia, and the USA [21].

It is noted that the top ten enterprises in the survey can provide more than 1.000 job opportunities for IT engineers. Apart from FPT Software Co. Ltd, HCL Vietnam Co., Ltd. is the outsourcing company with the second most significant number of university engineers in ICT. Although a vast number of jobs can be created for future engineers, about 65% of 57.000 IT university graduates cannot meet the labour market for the software industry. The problem may be the gap between employers’ requirements and some students’ limited employability competencies.

3. Conclusion

The present study explored the industry needs for graduates of Information and Communication Technology in the coming time. From the perspective of 44 enterprises, the developer will be a job position with the highest demand. FPT Software Co. Ltd is the leading enterprise searching for the most significant number of engineers (6.000 persons), followed by five other outsourcing companies hunting more than 3.500 persons.

The scope of the study was limited to enterprises in cooperation with Hanoi University of Industry. Further research

should be conducted to investigate other large enterprises in the ICT sector, such as CMC Group, TMA Solution, and VNG Corp. Moreover, the participants involved more human resource officers than high-level management leaders. Future studies are suggested to invite more participants at different management levels.

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