International Journal of Advanced Multidisciplinary Research and Studies

Developing human resources in information technology firms in Vietnam

Le Thi Lan
Hanoi People's Council, Vietnam

Corresponding Author: **Le Thi Lan**

Abstract

The main objective of this study was to identify, evaluate, and to measure the attributes of developing human resources results of information technology (IT) firms listed on Vietnam stock market. The study was based on a field survey using a semi-structured questionnaire on a sample of 150 human resources staffs. But, only 105 filled questionnaires were satisfactory and therefore included in the analysis. By using seceral statistical analytical tools, i.e., descriptive statistics, Cronbach's Alpha analysis and Independent T-test, the study has identified and measured three (3) attributes of developing human resources results of information technology (IT) firms listed on Vietnam stock market that have great effects on employees. There is not, statistically, significant difference in the level of developing human resources results of information technology (IT) firms listed on Vietnam stock market from these different genders and work experiences. Based on the findings, some recommendations are given for (IT) firms listed on Vietnam stock market to improve the quality of human resources.

1. Introduction

The information technology (IT) industry plays the role of both a soft infrastructure and a driving force for promoting the development of all industries and fields of social life. Thanks to IT, a series of new branches of science, industry and service were born, allowing to solve development problems, overcome difficulties and bottlenecks in management and operation of agencies, organizations and fields. Information technology human resources of enterprises is one of the particularly important factors in developing the national IT industry in a sustainable way and promoting economic development in the integration process. However, according to the leading information technology (IT) recruitment platform in Vietnam TopDev on Vietnam IT market report - Tech Hiring 2022: Vietnam has promising IT human resources in terms of quality and quantity as well as potential market and strong growth; The biggest challenge that Vietnamese IT enterprises are facing is the shortage of qualified IT personnel. In addition, according to TopDev's 2021 Vietnam IT human resource market report, in the past 5 years, the demand for IT human resources in Vietnam has been constantly increasing. In 2021, Vietnam needs 450,000 IT human resources, however, the current total number of programmers in Vietnam is currently 430,000, which means 20,000 programmer positions will not be filled in the near future.

Along with the strong development of the digital technology era, the digital economy in Vietnam requires strong information technology (IT) human resources in both quantity and quality. With the trend of digital transformation in enterprises, there is a huge need for IT human resources to do digital transformation jobs. The shortage is basically due to market demand, especially, there is a shortage of high-quality personnel who can do the job.

It is forecasted that from 2022 to 2024, Vietnam will still have a shortage of 150,000-195,000 programmers/engineers annually. This gap is expected to remain high until 2024 when demand reaches 800,000 developers. This shortfall comes from the gap between the programmer's qualifications and the employer's requirements. Notably, currently only 35% of the 57,000 students majoring in IT can meet the requirements of enterprises, the rest must be retrained (Giang Nam, 2022) [3].

At the end of January 2022, Deputy Prime Minister Vu Duc Dam signed Decision 146 approving the project "Enhancing awareness, universalizing skills and developing human resources for national digital transformation to 2025, with orientation to 2030". Along with the Government's digital transformation program and the 4.0 revolution, the birth of a series of enterprises in the field of IT, together with existing ones, has created an excitement in recruiting human resources for the industry.

Human resource development is a very necessary job in order to improve the quality of labor and develop human resources, to

meet the development needs of the economy, society and global competition, to ensure the long-term and sustainable competitiveness for enterprises.

For the above reasons, it is necessary to set new development requirements in terms of quantity, quality as well as the structure, scale, and professional qualifications of our country's IT human resources, especially the development of high-quality human resources for the IT industry. Investing in technology and people is the key to determining the future development of the IT field.

The remainder of this paper is structured as follows. Section 2 presents the relevant literature review and theoretical basis. Section 3 describes the data sample collection and methodology employed in the research. Section 4 sets out a key result. and the discussion, while Section 5 concludes the paper.

2. Theoretical background and literature review

According to the International Labor Organization, Human resource development encompasses a broader scope, not only occupation domination or training in general, but also capacity development and capacity utilization into productive employment, as well as satisfying professional and personal life.

Kaleem (2017) [7] explored the general practice of HRM programs and establish the influences of properly managing the human resources for better development of selected organizations. The author had surveyed four leading organizations with 300 total respondents, in which 80 workers are working on top managerial positions and the remaining 220 staff members are working on the core non-managerial position. The response rate was 97.98% that signifies the interest rate of staff in the development of effective HRM policies in their organizations. The results of the survey showed that in those organizations where human resource management practices are poorly planned and implemented and managed by non-experts so called managers, programs and policies of these organizations are perceived poorly by their employees. The study also showed that the enormous benefits of sound human resource management which were highly appreciated by their employees.

Le and My (2018) [9] affirmed human resource for science and technology plays a big role in the process of socioeconomic development of the country. Consequently, the approach to research a systematic way on the use and development of human resources science technology is the significant job and urgent, especially in the trend of the Industrial Revolution 4.0 and stages growing accelerated in Khanh Hoa province currently. The authors presented the results and limitations of human resource development of technology and science in Khanh Hoa. Thus, it helps the local leaders and researchers have a general overview of science and technology human resources in general, the real situation of human resources in Khanh Hoa in particular.

Tuan (2021) [10] used secondary data in the period from 2011 to 2019 collected from the Ministry of Industry and Trade, Vietnam Logistics Business Association (VLA) with published studies and statistical analysis methods, to assess the situations of human resource development in logistics in Vietnam recently. The results show that besides the initial successful achievements, the development of logistics human resources in Vietnam still has many limitations in terms of quantity, quality and training program.

Duong and Phuong [2] thought that, The XIII Party Congress to set the goal that by 2045, Vietnam will become a developed country with high income. To get this goal, one of the key solution given by the Resolution is to develop a high-quality labour force to serve the international integration procedures. Especially, since ASEAN Economic Community was established in 2015, the issue of free movement for skilled workers has shown big challenges to Vietnamese labours, who were mostly underqualified. The authors analyzed main issues in the XIII Party Congress Resolution on developing high quality labour source and basic legal frame on free movement for skilled workers in ASEAN Economic Community, from this above analysis, the article recommends some solutions to address the issue of improving the quality of labour force in Vietnam in order to implement the Resolution, meeting the demand of regional integration.

Duong (2022) [1] believed that, the Fourth Industrial Revolution (Industry 4.0) is an inevitable development trend and it is taking place more and more strongly. The industry 4.0 brings not only opportunities but also challenges to businesses, especially small and medium-sized enterprises (SMEs). The author presented the current human resource development in SMEs and points out issues relating to this matter. This paper also proposes some solutions to help SMEs better develop their human resources.

According Lan (2022) [8], along with the development of the Fourth Industrial Revolution in recent years, the digital transformation is accelerating quickly in almost all countries around the world, including Vietnam. The digital economy offers great development opportunities, but workers need to be prepared with the right skills and competencies for future job requirements. The author analyzed the current situation of human resources in Vietnam, and points out the challenges facing Vietnamese human resources during the development of the digital economy.

Based on findings from a number of previous studies and findings from the interviews with those experts, this research has identified developing human resources results of IT firms listed on Vietnam stock market (DHR) in three (3) attributes, including (i) labour quantity, (ii) labour structure and (iii) the quality of human resources.

3. Research subject and methodology

Research Subject: The subject of this research is developing human resources results of IT firms listed on Vietnam stock market.

Qualitative Research Methodology:

This research used a qualitative research methodology based on some in-depth interviews with three (3) lecturers with extensive experiences in human resources management in IT firms of the National Economics University and University of Labor and Social Affairs. These are the two leading universities in Vietnam in training human resource management. At the same time, three (3) experts were also interviewed who are head of human resources department in IT firms. The contents of the interviews focused on the subject of developing human resources results of IT firms listed on Vietnam stock market.

Quantitative Research Methodology

For the purpose of this research, a questionnaire was designed which consisted of three (3) variables, including (i) labour quantity in the firm is sufficient, (ii) labour structure in the firm is suitable and (iii) the quality of human

resources in the firm is good; with a 5-point Likert scale from 1: "Strongly disagree" to 5: "Strongly agree". The method of data collection was accomplished through the survey with a number of human resources staffs in IT firms listed on Vietnam stock market. A total of 150 questionnaires were sent and received the filled questionnaires with full information for data entry and analysis from 105 respondents. The size of this sample was consistent with study of Hair *et al*. (1998) [4] that the research sample must be at least 5 times the total number of indicators in the scales. The questionnaire of this study included three (3) indicators, and therefore, the minimum sample size to be achieved is 5 * 3 = 15 observations. Then, data from these 105 questionnaires was cleaned and coded with the necessary information in the questionnaires, inputted the analyzed by using SPSS22.

The steps of data analysis were as follows:
1. Descriptive statistics,
2. Cronbach's Alpha to assess the reliability of the scale,
3. Independent T-test.

4. Research results
4.1 Descriptive statistics
Information of data collected is shown in Table 1. It shows that among the 105 respondents, about 55.2% were male while the remaining 47 (44.8%) were female. Among the respondents, 47.6% participants have work experiences for less than 5 years, and over 5 years accounted for 52.4%.

Table 1: Respondents by gender and work experience

	Frequency	Percent	Cumulative Percent
Gender			
Male	58	55.2	55.2
Female	47	44.8	100.0
Work experience			
Less than 5 years	50	47.6	47.6
Over 5 years	55	52.4	100.0
Total	105	100.0	

Next, Table 2 indicates that the respondents agree with the dependent variables of "developing human resources results of IT firms" where three attributes were quite high with an average of 4.08 compared with the highest of the Likert 5-point scale. All 3 attributes were rated at an average of 4.01 or higher.

Table 2: Descriptive Analysis of attributes of developing human resources results of IT firms listed on Vietnam stock market

	N	Minimum	Maximum	Mean	Std. Deviation
DHR1	105	2	5	4.01	0.849
DHR2	105	2	5	4.10	0.803
DHR3	105	2	5	4.13	0.809
Valid N (listwise)	105			4.08	

Thus, the vast majority of human resources staffs participating in the survey assumed that there are three attributes of developing human resources results of IT firms listed on Vietnam stock market. The main reason for this assessment is that they have real evidence about human resources results of IT firms. The developing human resources affects business activities of IT firms and the economy, promoting the attraction of FDI capital into Vietnam.

4.2 Cronbach's Alpha
Developing human resources results of IT firms listed on Vietnam stock market has been measured by the Cronbach's Alpha. Results of testing Cronbach's alpha of attributes are presented in Table 3 below.

The results also show that attributes of the dependent variables have Cronbach's Alpha coefficients that are greater than 0.6, and the correlation coefficients of all attributes are greater than 0.3. So, all the attributes of the dependent variables are statistically significant (Hair *et al*., 2010; Hoang & Chu, 2008) [5, 6].

Table 3: Results of Cronbach's Alpha Testing of Attributes

Cronbach's Alpha	N of Items
.890	3

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
DHR1	8.23	2.255	0.783	0.847
DHR2	8.14	2.354	0.801	0.831
DHR3	8.10	2.383	0.774	0.854

4.3 Independent T – test
Comparison of the results of the evaluation of developing human resources results of IT firms listed on Vietnam stock market between participants have different genders (male and female) can be seen in Table 4. According to the results shown in Table 4, Sig Levene's Test is 0.497, which is more than 0.05. The variance between male and female is not different. Moreover, Sig value T-Test = 0.848 > 0.05, which means that there is not, statistically, significant difference in the level of developing human resources results of IT firms listed on Vietnam stock market from these different genders (Hair *et al*., 2010; Hoang & Chu, 2008) [5, 6].

Table 4: Differences of developing human resources results of IT firms listed on Vietnam stock market between Participants have different genders - Independent Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
DHR	Equal variances assumed	0.464	0.497	0.192	103	0.848	0.02812	0.14655	-0.26252	0.31877
	Equal variances not assumed			0.190	92.973	0.850	0.02812	0.14838	-0.26654	0.32279

Comparison of the results of the evaluation of developing human resources results of IT firms listed on Vietnam stock market between participants have work experiences for 5 years or less with those over 5 years can be seen in Table 5. According to the results shown in Table 5, Sig Levene's Test is 0.325; which is more than 0.05. The variance between the two 5 years or less and over 5 years work experiences is not different. Moreover, Sig value T-Test = 0.260 > 0.05, which means that there is not, statistically, significant difference in the level of developing human resources results of IT firms listed on Vietnam stock market from these different work experiences (Hair *et al*., 2010; Hoang & Chu, 2008) [5, 6].

Table 5: Differences of developing human resources results of IT firms listed on Vietnam stock market between Participants 5 Years or Less Work Experiences and Over 5 Years Work Experiences – Independent

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
DHR	Equal variances assumed	0.978	0.325	-1.132	103	0.260	-0.16424	0.14503	-0.45188	0.12340
	Equal variances not assumed			-1.124	96.548	0.264	-0.16424	0.14618	-0.45438	0.12590

4.4 Discussion
Labour quantity of IT firms

Table 6: Labour quantity of IT firms listed on Vietnam stock market

No	Stock code	Quantity	No	Stock code	Quantity
1	ABC	153	18	SAM	636
2	ADC	350	19	SGT	285
3	CKV	75	20	SMT	120
4	CMG	4.654	21	SRA	7.229.980
5	CMT	61	22	SRB	5
6	CNC	322	23	ST8	545
7	CNN	1.019	24	SVT	100
8	ELC	223	25	TST	103
9	FOX	8.984	26	TTN	293
10	FPT	37.180	27	TTZ	30
11	HPT	375	28	UNI	10
12	IFC	18	29	VAT	45
13	ITD	96	30	VEC	55
14	KST	86	31	VIE	27
15	LTC	10	32	VLA	8
16	ONE	77	33	VTC	140
17	POT	364			

Resources: Cafef.vn [11]

IT firms listed on the Vietnam stock market are also directly affected by the labor market as well as the size and characteristics of production and business of enterprises. Therefore, the number of employees also changes over the years. The main cause of the increase or decrease in the number of employees is that the direct labor increases or decreases because the production and business scale of the enterprise increases or decreases.

There is a significant difference in the number of employees at listed IT firms because of the different sizes of enterprises and the number of employees is relatively suitable to meet the production and business activities of enterprises.

Labour structure of IT firms

IT firms have a labor structure according to (i) Labor qualifications; (ii) By gender; (iii) The nature of the labor contract (indefinite contract, seasonal contract - under 1 year or probationary period; definite contract from 1-3 years); (iv) By type of labor (Direct labor, indirect labor); (v) By age, (vi) By seniority, etc. According to labor structure by qualifications, employees with bachelor's degrees, engineers make up the majority of IT firms. When it comes to labor structure by gender, most of the IT firms are male that has a higher proportion than female employees (except for some enterprises such as ELC); characteristics of these products and services require intelligence, care, meticulousness, persistence, etc. Therefore, the number of male workers recruited to work in enterprises is higher than that of female employees; on the other hand, very few female students study IT. This structure is suitable with the production and business characteristics of IT firms.

Enterprises with stock code ELC have the following labor structure (See table 7):

Table 7: Labour structure in ELC firm

Level of labor	
Graduate	29
Bachelor or engineer	182
College	6
Middle	6
Gender	
Male	81
Female	142
Total	223

Resources: Cafef.vn [11]

Labor structure has a great influence on human resource development. In recent years, the labor structure of IT enterprises has had a big change in young human resources. This is also a human resource equipped with advanced and systematic knowledge, but they are also easy to change because they still want to have development opportunities in other enterprises.

The quality of human resources of IT firms
Physical health status

Conditions at work are very important to the health of employees, a good working environment has an impact on human function, state, working ability, working attitude, and health, so IT enterprises always set the first goal is the safety and health of employees. Every year, enterprises organize periodical health checks for officials and employees, periodically check equipment and fixed assets to avoid occupational accidents, organize cultural, sports and even dances to create a comfortable spirit for employees...

Improving knowledge and skills

To improve knowledge and skills, IT enterprises organize monthly, 6-monthly, and year-end training courses

depending on the position of each job. After these training courses, the majority of employees feel that their knowledge has been significantly improved.

Competence and quality
Most of the IT companies listed on the Vietnamese stock market have developed regulations on time, uniforms and working procedures and transferred them to departments and divisions. Each employee must be responsible for completing the work, if the employee has an unexpected leave, he must notify the head of the department/division to have a plan to arrange a replacement to avoid the production line being stopped. Enterprises also encourage and reward employees timely so that they have goals to strive for, and create many quality products for the Company... In addition, enterprises continue to propagate and educate employees to uphold the spirit of self-training, improve moral qualities, be wary of negativity; train the will and enhance the working spirit to improve labor productivity in a sustainable way.

5. Conclusion and implications
This study evaluates and measures 3 criteria reflecting the results of human resource development of IT enterprises, including: (i) Labour quantity of IT firms, (ii) labor structure of IT firms and (iii) quality of Human Resources of IT firms. All three criteria are highly appreciated by employees.

In recent years, the wave of foreign investment into Vietnam has brought many opportunities to the IT labor market, the labor market has become the most exciting ever. Vietnam has been attracting large IT companies in the world and in the region to invest, so recruiting activities and building a team of engineers to develop products and services are promoted. Therefore, IT enterprises should develop adequate, appropriate and timely human resource development plans.

Digital transformation in Vietnam is also taking place strongly, which is no longer a new story but is considered an inevitable trend for the economic development of each country. Many traditional enterprises have also entered the e-commerce model, thus, creating a shortage of IT personnel in the market, while the ability to respond is still limited. In addition, for employees working in the IT field, they are welcomed with many pretty good policies on salary, bonus and incentives for the most flexible working model possible. Therefore, IT enterprises should have policies to retain employees.

Interviewed experts said that, despite being sought after with attractive salaries, the supply of human resources in the IT field has not yet met the demand and growth rate expected of the industry. Besides, the demand for recruiting technology personnel is very high. Although the resources are quite abundant, enterprises have to screen to select the right personnel in terms of capacity, culture and thinking close to their own orientation.

Further research on determinants influencing the developing human resources; the impacts of developing human resources on employees' performance and attracting foreign direct investment to Vietnam in the context of developing countries like Vietnam is identified and discussed.

This study has some limitations such as the research sample is not large and the scope of research on space includes only information technology listed on Vietnam's stock market.

6. References
1. Duong PTT. Human resource development of SMEs in the Industry 4.0 era. Industry of Trade Magazine. 2022; 12:216-219. [Vietnamese]
2. Duong VN, Phuong HT. Developing high-quality human resources to meet regional integration requirements. Vietnam Lawyer Journal. 2022; 4:37-41. [Vietnamese]
3. Giang Nam. Lack serious of information technology human resources, 2022. From: https://nld.com.vn/cong-doan/thieu-tram-trong-nhan-luc-cong-nghe-thong-tin-20220921190204498.htm). [Vietnamese]
4. Hair JF, Joseph F Jr, Anderson Rolph E, Tatham Ronald L, Black Wiliam C. Multivariate data analysis, 5th edition, Prentice Hall, Upper Saddle River, NJ, 1998.
5. Hair JF, Anderson RE, Babin BJ, Black WC, Multivariate data analysis: A global perspective: Pearson Upper Saddle River, ed.: NJ Publishing, 2010.
6. Hoang T, Chu NMN. Analysis of research data with SPSS, Hong Duc Publishing House, 2008. [Vietnamese]
7. Kaleem M. Development of Human Resources to Increase Policy Capacity in Public Sector. Human Resource Research. 2017; 1(1):14-40. Doi:10.5296/hrr.v1i1.11487
8. Lan NTH. Solutions to develop human resources for the digital economic development in Vietnam. Industry of Trade Magazine. 2022; 8:232-238. [Vietnamese]
9. Le DH, My LTH. Development of khanh hoa's human resources for science and technology. Journal of Economics and Development. 2018; 258:94-104. [Vietnamese]
10. Tuan NV. Situations and solutions for developing logistics human resources in Vietnam. Journal of Economics and Development. 2021; 292(2):87-95. [Vietnamese]
11. Website: cafef.vn. [Vietnamese]