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Analysis of factors affecting satisfaction of science and technology team; The case Vietnam

Análisis de factores que afectan la satisfacción del equipo de ciencia y tecnología; el caso Vietnam

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Abstract

In Vietnam, very few studies have been done regarding the factors affecting job satisfaction. Some studies have been carried out in universities, institutions, enterprises and healthcare, banks but large public sector institutions, such as S&T human resources, have not been studied. This study is based on data analysis of agencies and organizations in Khanh Hoa province, Vietnam from 2018 to 2022. And to use the adjusted JDI model with 6 factors including (i) Job position instead of job nature, (ii) Income, (iii) Working environment conditions including two factors: leadership and colleagues, (iv) training and retraining, (v) promotion instead of promotion opportunity factor, (vi) recruitment to the payroll. Researchers using quantitative methods surveyed 1,100 employees from 40 different agencies and organizations in Khanh Hoa province, Vietnam. From there, the study proposes a number of implications for the leaders of Khanh

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Hoa province to have an appropriate human resource management policy in order to maintain the satisfaction of human resources and improve the work quality of this team.

JEL Code: J38, J5, J27, M54
Keywords: satisfaction; human resource; science and technology human resource; science and technology team; management

Resumen

En Vietnam, se han realizado muy pocos estudios sobre los factores que afectan la satisfacción laboral. Se han llevado a cabo algunos estudios en universidades, instituciones, empresas y centros de salud y bancos, pero no se han estudiado las grandes instituciones del sector público, como las de recursos humanos en ciencia y tecnología. Este estudio se basa en el análisis de datos de agencias y organizaciones en la provincia de Khanh Hoa, Vietnam, de 2018 a 2022. Y se utiliza el modelo JDI ajustado con 6 factores que incluyen (i) puesto de trabajo en lugar de naturaleza del trabajo, (ii) ingresos, (iii) condiciones del entorno de trabajo que incluyen dos factores: liderazgo y colegas, (iv) capacitación y reciclaje, (v) promoción en lugar del factor de oportunidad de promoción, (vi) reclutamiento para la nómina. Los investigadores que utilizan métodos cuantitativos encuestaron a 1.100 empleados de 40 agencias y organizaciones diferentes en la provincia de Khanh Hoa, Vietnam. A partir de ahí, el estudio propone una serie de implicaciones para que los líderes de la provincia de Khanh Hoa tengan una política de gestión de recursos humanos adecuada con el fin de mantener la satisfacción de los recursos humanos y mejorar la calidad del trabajo de este equipo.

Código JEL: J38, J5, J27, M54

Palabras clave: : satisfacción; recurso humano; recurso humano de ciencia y tecnología; equipo de ciencia y tecnología; gestión

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Introduction

Today, retaining good employees, especially S&T human resources in organizations, is becoming more and more important. The stability of human resources will help businesses save costs (training, recruiting) and limit possible risks, build trust and shape corporate culture. Both theory and practice show that creating employee satisfaction will positively affect organizational loyalty and labor efficiency. Employees who feel satisfied with their jobs reduce risks such as strikes, non-cooperation and inactivity. Therefore, organizations pay great attention to understanding the factors affecting job satisfaction and well implement policies to make employees feel satisfied and create enthusiasm at work. This study on satisfaction with science and technology human resources in Khanh Hoa province, Vietnam with 2 large cities and 7 districts, with two main purposes: (1) Assessing the level of satisfaction of human resources. S&T human resources of the province (2) Assess the importance of each factor to the level of job

satisfaction. Survey sample is based on proportions to ensure representativeness of each area. The results of the study show that most of the variables are positively correlated with employee motivation in the workplace.

The study also combines the use of computer tools, analysis, and data structure design of management software (SiHRMS) to apply: effectively manage and exploit human resources of science and technology in Khanh Hoa province.

The characteristics of the research object are S&T human resources, they have high professional qualifications, are the core of the workforce that needs stability and certainty in life. In addition, they always want to constantly learn and be trained to improve their expertise.

On the basis of research and research results, the authors will make some feasible and reasonable recommendations on policies to create job satisfaction for science and technology human resources in Khanh Hoa province, central Vietnam in particular and other localities, during the period from 2022 to 2035. In the context of strong global economic integration and the explosion of the 4.0 technology revolution, there is a great need for high- quality human resources to build the country. Therefore, the proposed solutions are aimed at building and developing a team of sustainable S&T civil servants with quality, bravery and long-term commitment to the job.

Research objectives

The study aims to analyze and evaluate the factors affecting the job satisfaction of S&T human resources in Khanh Hoa province, Vietnam and then propose mechanisms and policies and solutions to the actions of management. Specifically: First, determine the factors affecting the satisfaction of S&T staff in Khanh Hoa province, Vietnam .Secondly, evaluate the impact level of each factor in Khanh Hoa province. Finally, propose solutions to the management and use of S&T human resources in Khanh Hoa province,Vietnam.

Research question

To this end, this study focused on answering the following research questions:
What factors mainly affect the satisfaction of S&T human resources?

- Does job position affect the satisfaction of S&T human resources?
- Does income affect the satisfaction of S&T human resources?
- Does the working environment affect the satisfaction of S&T human resources?

- Does appointment promotion affect the satisfaction of S&T human resources?
- Does recruitment on the payroll affect the satisfaction of S&T human resources?

Literature and research model

Theoretical basis of job satisfaction

Research on job satisfaction assessment is carried out very early in the world starting in the early 20th century with Happrock (1930), Luddy (2005) and emphasizing the factors that influence satisfaction Job satisfaction includes job position, supervision of superiors, relationships with colleagues, job content, remuneration and rewards including: promotion, physical condition of the working environment. the structure of the organization.

Herzberg et al. (1959) suggested that there are two groups of factors related to job satisfaction, namely motivation factor group and maintenance factor group. Motivating factors include achievement, recognition, challenging work, progress, and work maturity. Maintenance factors include company policy and corporate governance, supervisory supervision, wages, interpersonal relationships, working conditions, personal life, and security for work. Only motivating factors can bring satisfaction to employees and if they do not do well, individual maintenance factors will cause dissatisfaction among employees.

Hackman & Oldham's (1974) job characteristics model has 5 core characteristics: skill diversity, job understanding, meaningful work, autonomy in work and feedback, characteristics. This core point affects three psychological states: understanding the meaning of work, responsibility for work results and awareness of work results, from this psychological state will produce public results job.

One of the most famous is the JDI (job descriptive index) model developed by Smith et al. (1969) from Cornell University. The JDI indicator set developed by Smith et al. (1969) has been applied quite a lot by its reasonableness and ease of application. Currently, the world has over 1,200 different studies assessing job satisfaction using JDI index published in international journals. The JDI model evaluates the employee's job satisfaction based on 05 research variables: (1) Job nature, (2) Training and promotion opportunities, (3) Leadership; (4) Colleagues and (5) Income. The JDI model is considered to possess good content, the concepts are grounded and reliable, Kerr (1995) and Tran Kim Dung (2005). JDI is also seen as a useful tool to choose from for assessing job satisfaction (Price, 1997). Although being appreciated in both theory and practice, but JDI also has its weaknesses. The first is that using a questionnaire with 72 questionnaires is considered too long, making it difficult to investigate. Second, the answer question type in the original JDI model was the Yes - No answer, which could not rate many

different levels of employee satisfaction. Thirdly, there is no question in the JDI to assess the overall satisfaction of employees (Spector, 1997).

Alan Price (2000) also comprehensively covers the evolution of human resource management and the changing nature of work. Notably, he analyzed and clarified factors: equal opportunities, human resources, employee relations, reward management and employee development.

N.Gregory Mankiw (2009) one of the 20 famous economists in the world, when researching theories of economic growth, he also the role of human factors is mentioned as one of the determinants of production. He also built the Solow economic model to explain the scale and efficiency improvement of labor on growth

Nowadays, researchers use adjusted JDI model with questionnaires designed in the form of Likert scale to help assess more levels of employee perception and the number of questions is also adjusted, even less than the original JDI. For example: Tran Kim Dung (2005); Ha Nam Khanh Giao & Vo Thi Mai Phuong (2011); Dao Trung Kien et al (2013). Tran Kim Dung (2005) conducted research to measure job satisfaction using the JDI scale and Maslow's theory of needs (1943). The result has two new factors: welfare and working conditions are added to the factors affecting employee satisfaction. These studies have shed light on the organizational characteristics and employee policies of the companies/ organizations studied. Since then, studies have made many reasonable recommendations to improve personnel policy.

Factors affecting job satisfaction

In the scope of this study, factors affecting job satisfaction are also determined on the basis of the JDI model's indicators, including:

- Collaborative nature: Relating to the challenges of the job, suitability to personal competencies and work comfort.
- Training and promotion opportunities: Related to employee's perception of training opportunities, personal capacity development, promotion opportunities in the organization.
- Leadership: Relates to the relationship between superiors and subordinates such as leadership support, leadership style, leadership ability.
- Co-workers: Related to the behaviors, co-worker relationships at work.
- Income: Related to fairness in payment of employees both inside and outside the business.

The concept of S&T human resources

According to UNESCO, the "S&T human resource" of a country / region includes all those who have a college / university or higher degree (corresponding to the third level of training according to the international classification of education and training) in a S&T field and those who have not received the formal training as above, but do a job in a S&T discipline that requires the equivalent of a college or university or higher.

Thus, "S&T human resources" only considers qualifications and does not consider occupations and activities (whether operating in the S&T field or not). To calculate and analyze S&T human resources, UNESCO divides S&T human resources as follows:

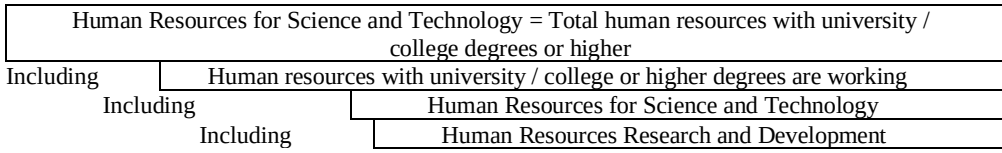


Figure 1. S&T human resources according to UNESCO
Source: UNESCO

For Vietnam, S&T human resources are also specified in the Law on Science and Technology (2013) and legal documents such as: Decree 08/2014 / NĐ-CP, dated January 27, 2014. Detailing and guiding the implementation of a number of articles of the Law on Science and Technology; Decision No. 1318/QĐ-BKHCN, dated June 5, 2015, approving the direction, objectives, and tasks of science and technology for the 2016-2020 period; Decision No. 2395/QĐ-TTg, dated December 25, 2015 approving the project on training and retraining science and technology human resources at home and abroad with the state budget.

Research models

After consulting JDI model in combination with theory of factors affecting job satisfaction of employees. The authors used the questionnaire, Likert scale structure with many levels of answers instead of the Yes or No question in the original model. The questionnaire was divided into two main parts. The first section covers demographic profiles such as age, sex, education, and department while the second section includes independent and dependent variables measured on the 5-point Likert Scale (1 = Strongly disagree and 5 = Strongly Agree). Therefore, the Likert scale will bring accurate efficiency and avoid confusion for the

surveys. The scale of observed variables is referenced and sampled from individual questionnaires within the framework of the Khanh Hoa provincial topic "Management, use and development of human resources of Science and Technology in Khanh Hoa province" (Doan Hong Le , 2021)

Due to the specificity of the research object is S&T human resources in Khanh Hoa province - people with high professional qualifications, are the core of the workforce, they need stability and convenience in life to focus on their work. Besides, they always want to constantly learn, constantly be trained to improve their professional qualifications.

Therefore, the research team uses the adjusted JDI model with 6 factors including (i) job position instead of nature of work, (ii) income, (iii) working environment conditions include two former factors are leaders and colleagues, (iv) training and retraining, (v) appointment of a promotion instead of a promotion opportunity factor, (vi) recruitment to payroll. In which, the two factors "training and retraining" and "recruiting for staff" are two new factors of the model. (See figure 2).

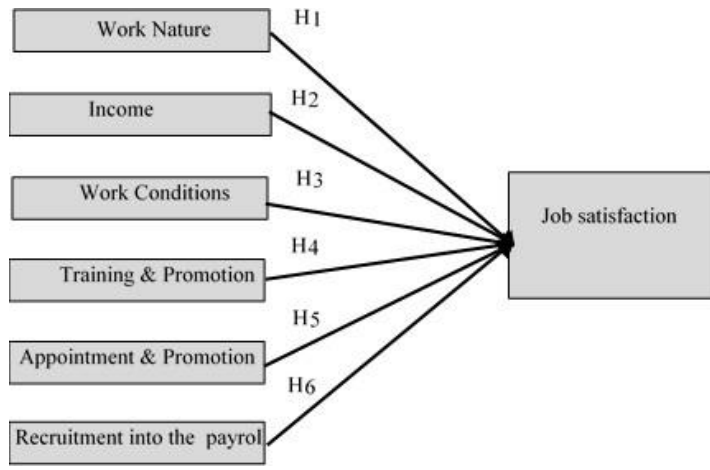


Figure 2. Research model
Source: Author synthesized from research hypothesis

Research hypothesis

H1: Factor "Job position" has a positive impact on job satisfaction.

The factor "Job position" reflects the suitability of the nature of the job with the capacity and desires of the employee. Appropriate job position is shown through aspects such as: the appropriateness of capacity, expertise, ability to understand the work performed, the work that brings motivation and creativity of employees.

H2: Factor "Income" has a positive impact on job satisfaction

The factor "Income" in this study is considered under aspects such as the match between the salary and the contribution of S&T human resources, S&T human resources who can live with their current salary, income. Income other than salary, such as bonus and allowance, is distributed fairly. In addition, this study also examines aspects of the relationship with the salary of other units. Although there are some researchers who believe that there is little evidence that wages affect job satisfaction, under conditions in developing countries like Vietnam, wages are still an important factor affects job satisfaction.

H3: The factor "Working environment conditions" positively affects job satisfaction.

The factor of working conditions is the condition of the workplace of the employee, including factors such as: leaders, colleagues, equipment to serve the work of the employee... Helping mind, stress-free relationships, a friendly working environment, trustworthy interpersonal relationships, good working conditions will appreciate their work well, otherwise they feel inadequate are satisfied with the working conditions they have to accept.

H4: Factor "Training and fostering" positively affects job satisfaction.

The factor "Training and retraining" is the equipment and enhancement of appropriate industrial knowledge and skills so that the trained person can assume a certain job on the basis of pre-trained knowledge.

H5: Factor "Promotion appointment" has a positive impact on job satisfaction.

The factor "Promotion appointment" is a concept reflecting whether employees are given career development and advancement opportunities in the organization in the working process or not. Promotion opportunity is seen as a motivating or motivating factor in Herzberg's theory.

H6: The factor "Recruitment to payroll" positively affects job satisfaction.

The 'Payroll' factor such as a fixed-term contract approved and approved by state-owned enterprises, a commitment to retirement when the employee reaches retirement age, job stability, although the salary may not be high, but the bonus is very high.

Data analysis

The questionnaires built were valid for data collection and analysis. All data is then encoded, imported, processed and analyzed using Excel and SPSS 20.0

This study has 6 independent variables and 32 observations, grouped into the following groups: (i) job position, (7 items); (ii) income and benefits, (4 items); (iii) working conditions, environment, (7 items); (iv) training and retraining, (4 items); (v) appointment, promotion, (4 items); (vi) recruitment, (6 items). (See table 1).

Table 1
Factors of variables

Variable	Variable name
	JOB POSITION
JP1	Current work is relevant to the area of expertise
JP2	He /she loves his current job
JP3	The current job is stable
JP4	Be introduced and clearly oriented
JP5	Competence and qualifications to meet the requirements of the job
JP6	Have a chance to show off your capabilities in your current job
JP7	He / She is satisfied with the current job position.
	INCOME AND BENEFITS
IB1	Income is commensurate with one's own qualifications and abilities
IB2	The income is commensurate with the job position
IB3	Non-wage income facilitates peace of mind to work
IB4	You are satisfied with the income from your current job.
	WORKING CONDITIONS, ENVIRONMENT
WEC1	Equipment for the work is complete and modern
WEC2	Factors that support good work (information, documents ...)
WEC3	Friendly colleagues, always ready to help
WEC4	Direct superiors have high professional qualifications and management capacity
WEC5	Recognized for qualifications and competencies
WEC6	Your opinions are always listened to and responded to
WEC7	Mr./Ms. are satisfied with the current working environment and conditions.
	TRAINING, RETRAINING
TR1	Training and retraining opportunities at the agency are equal and Transparent
TR2	Satisfactory training and retraining support regime
TR3	Working time to be properly trained
TR4	You are satisfied with the training and retraining opportunities at the agency.
	APPOINTMENT OF PROMOTION
AP1	The appointment is fair, objective and transparent
AP2	The conditions for a promotion are reasonable
AP3	You are very optimistic about your potential for promotion and success in the workplace
AP4	You are satisfied with the promotion opportunities at the agency.
	RECRUIMENT
RE1	Exam/admission information is provided publicly and transparently
RE2	Object standards for examination/admission are clear and Reasonable
RE3	Content of the entrance exam/admission examination is appropriate
RE4	The examination/examination process is serious and transparent
RE5	Exam/examination results are public and transparent
RE6	Overall, the examination/examination organization is good
	SATISFIED WORK
SW1	Please tell us your level of general satisfaction with your current job
SW2	Your assessment of the current policy regimes to attract and retain highly qualified S&T human resources in Khanh Hoa province.

Scource: Authors 'explain for the variables

Research methodology

Overview of survey data

Survey data on the total number of science and technology human resources in Khanh Hoa province based on the Project: "Management, use and development of science and technology human resources in Khanh Hoa province for the period 2021-2025", (attached to Decision No. 4819/QD-UBND dated December 23, 2021 of Khanh Hoa Provincial People's Committee).

Sample size

The sample size depends on the methods analyzed in this study. It uses exploratory factor analysis (EFA). This method also requires at least 200 observations (Gorsuch, 1997). Hatcher (1994) determined a minimum sample size of five times the observations. Another experience in determining the sample size for EFA is that the number of observations should be at least 5 times the number of factors (Trong & Ngoc, 2005). Besides, according to Tabachnick and Fidell (2007), to get the best results from the regression, the minimum sample size must meet the requirements: $n \geq 8m + 50$ (where n is the sample size, m is the number of independent variables of a model).

Based on statistics: 31,251 people of S&T human resources in Khanh Hoa province, the authors calculate the minimum total sample size that meets the statistical requirements with an error of e = +/- 5% (i.e. The accuracy of the statistical answers will fluctuate in the range of + -5%). Accordingly, the formula for calculating the minimum sample size should be as follows:

n= N/(1+N.e2)1 where n: Sample size N: Total sample

e: random error (we choose the error to be 3%).

So the sample size to investigate is: (n= 31.251/ [1+31.251x (0.03)2] = 1073 ballots)

However, in order to increase the representative value of the total sample and prevent the probability of loss of the questionnaire during the survey, the study take a total sample of 1100 votes, based on the selection of stratified sampling (or symmetric stratification). At the same time, through the preliminary investigation, the research team has selected 40 typical units of 10 departments and agencies to conduct the survey.

This study has 6 independent variables and 32 observations. Based on the research project and Decision No. 4819/QD-UBND above, as well as data collected from observations on statistics of Science

and Technology units in the province, the authors submitted 1100 questionnaires and received 1100 confirmed responses

Therefore, the sample size meets the requirements of factor analysis. The survey was conducted in Khanh Hoa province, Vietnam from August 2018 to March 2022.

Through preliminary investigation, the group of subjects selected 40 typical units of 10 departments and agencies to survey. (See table 2).

Table 2
List of selected units to survey.

No.	Name of agency, unit of investigation
1	Office of People's Council of Khanh Hoa Province
2	Provincial People's Committee Office
3	Department of Planning and investment
4	Department of Home Affairs of Khanh Hoa province
5	Department of Agriculture and Rural Development
6	Department of Resource base and Environment
7	Department of Construction of Khanh Hoa province
8	Department of Information and Communications of Khanh Hoa Province
9	Department of Science and Technology
10	Department of Culture and Sports of Khanh Hoa province
11	Department of Education and Training of Khanh Hoa province
12	Department of Health of Khanh Hoa province
13	Department of Industry and Trade of Khanh Hoa province
14	Department of Foreign Affairs of Khanh Hoa province
15	Department of Labor, War Invalids and Social Affairs
16	Khanh Hoa Provincial Inspectorate Office
17	Department of Finance of Khanh Hoa province
18	Customs Department
19	Police of Khanh Hoa province
20	State Bank of Khanh Hoa Province Branch
21	Khanh Viet Corporation
22	State Company Limited Salanganes Nest Khanh Hoa
23	Khanh Hoa Electricity Joint Stock Company
24	Cam Ranh Shipbuilding Company Limited
25	Nha Trang Seafoods Joint Stock Company-F-17
26	Khanh Hoa Provincial General Hospital
27	Pasteur Institute
28	Aquarium Institute
29	Veterinary Sub-Institute of Central Vietnam
30	The Hydrometeoro logical Station of the South Central region
31	Research Institute of Aquaculture III
32	Nha Trang Institute of Technology Research and Application
33	Nha Trang University
34	Khanh Hoa University
35	Nha Trang Vocational College
36	Van Phong Economic Zone Authority
37	Nha Trang City People's Committee

38	People's Committee of Cam Ranh City (Economic Division)
39	Office of People's Council and Town People's Committee
40	People's Committee of Cam Lam district

Source: Author synthesized from research

Scale research

The topic applies the SERQUAL service quality scale, which is a multidirectional scale with 7 factors and 34 observed variables to assess the satisfaction of the S&T workforce on work for the agencies and unites; The reliability of the scale is assessed through Cronbach's alpha coefficient (0.6 or more is acceptable), so that the non-conforming variables will be rejected if the Corrected Item - Total correclation (Corrected Item - Total correclation) coefficient) less than 0.3; redefine the scale components by exploratory factor analysis. Conditions to apply factor analysis are variables correlated with each other. To determine how the variables are correlated, we use Barlett's test to test hypotheses:

H0: variables are not related.

H1: There is correlation between the variables.

We expect to reject the hypothesis H0, that is to accept the hypothesis H1 that the variables are related to each other. This is obtained when the tested P value must be less than the processing significance level α. At the same time, factor analysis is considered appropriate when the value of the KMO system (Kaiser - Mayer - Olkin) is in the range from 0.5 to 1, then the correlations are large enough to apply factor analysis.

After the factors are drawn and saved as new variables, these variables will be replaced by the original set of variables to include in regression analysis. Multivariate regression analysis method to estimate the influence of work motivation factors (independent variable) on S&T human resource satisfaction (dependent variable). The regression equation takes the form:

$$SW = ß0 + ß1JP + ß2IB + ß3WEC + ß4TR + ß5AP + ß6RE$$

Inside:

SW: dependent variable (Satisfaction level of S&T human resources) Independent variables:

JP: Job position

IB: Income

WEC: Working environment conditions

TR Training and retraining

AP: Appointment of promotion

RE: Recruitment

The impact components (independent variables) and affected factors (dependent variables) are both measured by observed variables, these observed variables are measured by the Likert 5-level scale. Analysis was performed with the help of SPSS 22.0 software.

Research results and discussion

Descriptive statistics

Through the process of surveying 1100 people of S&T human resources of 40 organizations in Khanh Hoa province, it shows that the lowest age is 21, the highest is 61. The average age of this group is 36.29 years old. The gender ratio of science and technology human resources in Khanh Hoa province is quite balanced, with 532 respondents being female (48.4%), 568 respondents being male (51.6%). (See figure 3). This proves that women are gradually getting rid of the regime "respect for men, despise women", they have the opportunity to learn and provide professional training equally as men.

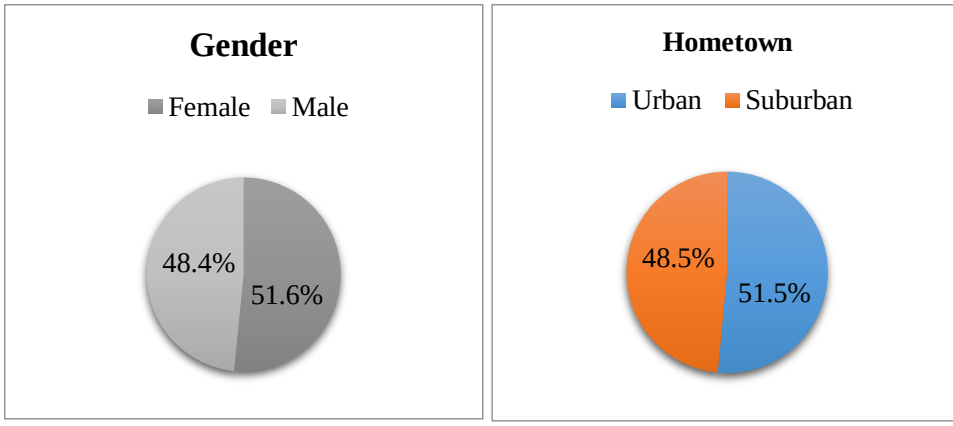


Figure 3. Demographic survey results
Source: Author's survey

The hometown of this team comes from many different localities across the country with up to 533 people (48.5%) who are from outside Khanh Hoa province, the proportion of people in the province accounts for 51.5%. In general, Khanh Hoa is a highly integrated locality, so it has attracted a lot of science and technology human resources from other localities to work.

Besides, Khanh Hoa is also a province with many central agencies and military units located in the area, so many officers from other localities come here to work. Because of this, through statistics, the

proportion of science and technology human resources in administrative agencies accounts for 36.4%; non-business units accounted for 15.5%; Hospital accounts for 8.4%; enterprises accounting for 20.5%; the research institute / university sector accounts for 18.5% and in other units 0.7%. As can be seen, this contingent is mainly located in administrative units, businesses and research training institutions in Khanh Hoa province. (See figure 4).

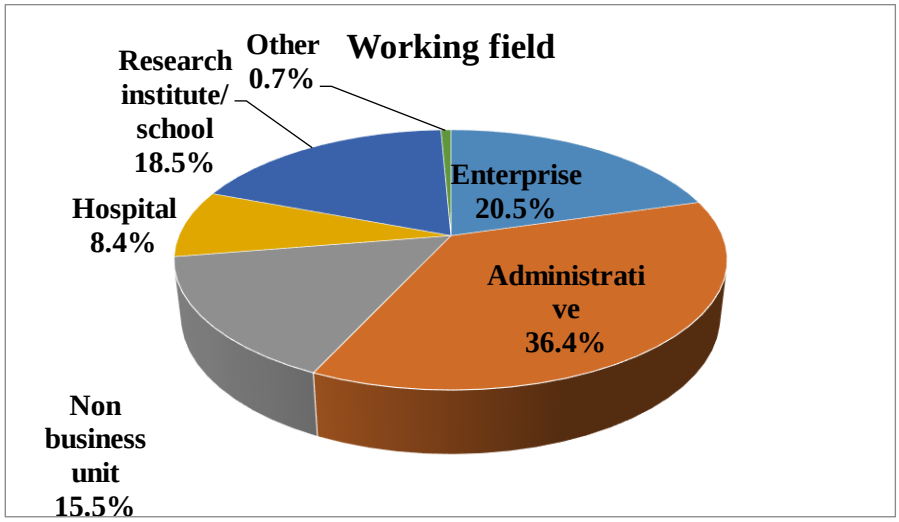


Figure 4. Working field
Source: Author's survey

Because the survey object belongs to S&T human resource, the human resources with university degree account for the highest number with 66.6%; masters of science make up 26.5%, doctor 2.5% and doctor of science 1 %. In general, the distribution of degrees is quite balanced in a pyramid scheme from university to doctor of science. (See figure 5) This is consistent with the general context of Khanh Hoa and Vietnam today.

Most of this team has 5 years or more working experience, with 71.4%; The proportion of staff with experience under 5 years accounts for more than 28%. (See figure 6)

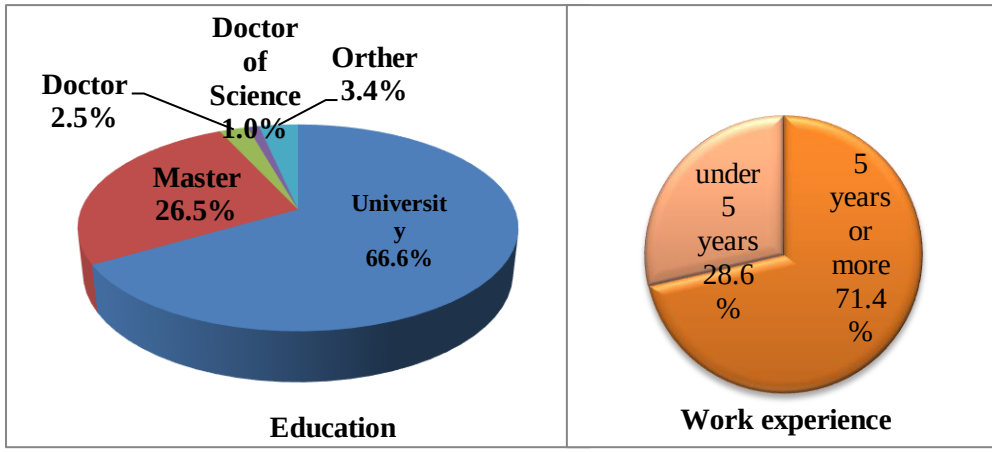


Figure 5 and 6: Education; Work experience
Source: Author's survey

In general, Khanh Hoa is a highly integrated locality, so it has attracted a lot of science and technology human resources from other localities to work. Besides, Khanh Hoa is also a province with many central agencies and military units located in the area, so many officers from other localities come here to work. Because of this, through statistics, the proportion of science and technology human resources in administrative agencies accounts for 36.4%; non-business units accounted for 15.5%; Hospitals account for 8%; enterprises accounting for 20.5%; the research institute / university sector accounts for 18.5% and in other units 0.7%. As can be seen, this contingent is mainly located in administrative units, businesses and research training institutions in Khanh Hoa province. Because the survey object belongs to S&T human resource, the human resources with university degree account for the highest number with 66.6%; masters make up 26.5%, doctor 2.5% and doctor of science 1%. In general, the distribution of degrees is quite balanced in a pyramid scheme from university to doctor of science. This is consistent with the general context of Khanh Hoa and Vietnam today. Most of this team has 5 years or more working experience, with 71.4%; The proportion of staff with experience under 5 years accounts for more than 28%.

The results of testing the reliability of the factors in the model

The results of testing the reliability of the factors in the research model show that all the factors included in the model are reliable. Cronbach Alpha coefficients are all greater than 0.6 (the smallest with the

dependent variable "job satisfaction" with Cronbach Alpha coefficients equal to 0.659), the total variable correlation coefficients of observed variables are greater than 0.3 (the minimum is two The variables HLCV1 and HLCV2 are 0.39), which shows that the research concepts built from the observed variables have internal consistency and are well-measured concepts. (See table 3).

Table 3
Results of assessing reliability Cronbach's Alpha's scales.

Variable	Average scale if variable type	Scale variance if variable type	Total variable correlation	Squared correlation	Cronbach's Alpha if variable type
Job position (Cronbach's Alpha: 0.928), N=7					
JP1	24.67	20.191	.771	.614	.917
JP2	24.67	20.142	.822	.694	.911
JP3	24.61	20.647	.771	.605	.916
JP4	24.84	20.568	.707	.522	.923
JP5	24.52	21.497	.735	.577	.920
JP6	24.71	20.758	.763	.613	.917
JP7	24.68	20.532	.837	.712	.910
Income (Cronbach's Alpha: 0.947), N=4					
IB1	10.46	9.134	.872	.809	.930
IB2	10.44	8.966	.899	.844	.922
IB3	10.60	8.740	.823	.706	.947
IB4	10.48	8.851	.899	.812	.922
Working environment conditions (Cronbach's Alpha: 0.933), N=7					
WEC1	24.15	19.302	.719	.676	.930
WEC2	24.06	19.219	.781	.720	.923
WEC3	23.78	19.716	.792	.657	.922
WEC4	23.72	19.513	.780	.655	.923
WEC5	23.89	19.933	.780	.666	.923
WEC6	23.97	19.348	.819	.723	.919
WEC7	23.96	19.718	.832	.723	.918
Training and retraining (Cronbach's Alpha: 0.960), N=4					
TR1	11.64	6.846	.869	.757	.957
TR2	11.76	6.765	.907	.831	.946
TR3	11.73	6.852	.899	.816	.948
TR4	11.70	6.716	.931	.870	.939
Appointment of promotion (Cronbach's Alpha: 0.955), N=4					
AP1	11.62	6.918	.880	.810	.944
AP2	11.67	6.911	.901	.841	.938
AP3	11.74	7.075	.868	.805	.947
AP4	11.70	6.941	.912	.856	.934
Recruitment (Cronbach's Alpha: 0.973), N=6					
RE1	20.82	16.376	.902	.841	.969
RE2	20.80	16.458	.926	.876	.967
RE3	20.87	16.387	.904	.834	.969
RE4	20.84	16.311	.916	.857	.968
RE5	20.78	16.328	.906	.838	.969
RE6	20.86	16.355	.916	.850	.968
Satisfied work (Cronbach's Alpha: 0.659), N=2					
SW1	3.19	.585	.390	.152	.
SW2	3.73	.485	.390	.152	.

Source: Authors calculated from survey data

Factor analysis

Independent factor analysis and discovery

The analytical results from the research data show that the factor loading factors are greater than 0.3, KMO coefficient of 0.963 is greater than 0.5, Bartlett test is statistically significant (p-value, 0.05), Eigenvalue is large more than 1, the variance explained by 79.341% is greater than 50%. That proves that research data using factor discovery analysis is appropriate. The observed variables form 5 new groups of factors as shown in the table 4:

Table 4
Exploratory analysis of independent factors.

Rotated Component Matrix[a]					
	Component				
	1	2	3	4	5
TR4	.779				
AP4	.757				
TR3	.753				
TR2	.739				
AP2	.729				
AP3	.724				
AP1	.720				
TR1	.716				
RE2		.877			
RE6		.874			
RE4		.868			
RE5		.860			
RE3		.858			
RE1		.844			
JP1			.783		
JP2			.776		
JP7			.732		
JP5			.719		
JP3			.697		
JP6			.637		
JP4			.626		
WEC3				.711	
WEC2				.687	
WEC4				.680	
WEC6				.659	
WEC1				.635	.450
WEC7	.405			.615	
WEC5			.408	.592	
IB4					.868
IB2					.834

IB3					.824
IB1					.816
KMO			0.963		
p-value (Bartlett test)			0.000		
Eigenvalue	17.787	3.095	1.764	1.552	1.191
Explanatory variance (%)			79.341%		

Source: Authors analyzed from research data

On the scale of the initial scales in section 4.2, the results of factor analysis extracted 5 groups of factors, including: (1) Training and retraining (TR); (2) Recruitment (RE); (3) Job position (JP); (4) Working environment conditions (WEC) and (5) Income (IB).

Analysis to discover the dependent factor

The analytical results from the research data show that from two observed variables forming a factor, the factor loading coefficients are greater than 0.3, the coefficient KMO is 0.500 just enough to accept, test Bartlett has the statistical significance (p-value, 0.05), the eigenvalue value is greater than 1, the variance explained by 69.49% is greater than 50%. That shows that factor analysis with research data is appropriate. The dependent variable 'job satisfaction' is only one factor, or in other words it is a unidirectional research concept. (See table 5).

Table 5
Analytical discovery of dependent factors.

Observed variables	Ingredient
SW1	.834
SW2	.834
KMO	0.500
p-value (Bartlett test)	0.000
Eigenvalue	1.390
Explanatory variance (%)	69.49%

Source: Authors analyzed from research data

Analysis Pearson correlation

Table 6 presents the results of Pearson correlation analysis among factors, showing that all factors have a positive impact on the level of job satisfaction ($p < 0.05$).

Table 6
Results of Pearson correlation analysis.

		Correlation coefficients					
Observed variables		SW	TR	RE	JP	WEC	IB
Pearson Correlati on	SW	1.000	.305	.219	.152	.119	.309
	TR	.305	1.000	.003	-.004	.000	.004
	RE	.219	.003	1.000	.005	.002	.001
	JP	.152	-.004	.005	1.000	.000	.002
	WEC	.119	.000	.002	.000	1.000	-.001
	IB	.309	.004	.001	.002	-.001	1.000
Sig. (1-tailed)	SW	.	.000	.000	.000	.000	.000
	TR	.000	.	.466	.453	.497	.451
	RE	.000	.466	.	.443	.476	.484
	JP	.000	.453	.443	.	.495	.472
	WEC	.000	.497	.476	.495	.	.485
	IB	.000	.451	.484	.472	.485	.
N	SW	969	969	969	969	969	969
	TR	969	969	969	969	969	969
	RE	969	969	969	969	969	969
	JP	969	969	969	969	969	969
	WEC	969	969	969	969	969	969

Source: Authors analyzed from research data

Results of regression analysis

The analytical results show that the p-value of the F-test is 0.000 (<0.05), which shows that there is at least one research variable in the model that affects the dependent variable (SAT). Corrected coefficient R2 adjusted by 0.628 shows that the independent variables explain 62.8% of the change of the dependent variable, 37.2% of the change of the dependent variable is influenced by other factors, not included in the model. The variance magnification factor (VIF) is both less than 2, proving that the multi collinearity phenomenon does not affect the estimation results. (See table 7).

Table 7
Results of Regression analysis.

Coefficients[a]								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.033	.027		1.228	.220		
	TR	.295	.027	.303	11.033	.000	1.000	1.000
	RE	.211	.027	.217	7.876	.000	1.000	1.000
	JP	.147	.027	.152	5.513	.000	1.000	1.000
	WEC	.116	.027	.119	4.336	.000	1.000	1.000
	IB	.299	.027	.307	11.182	.000	1.000	1.000

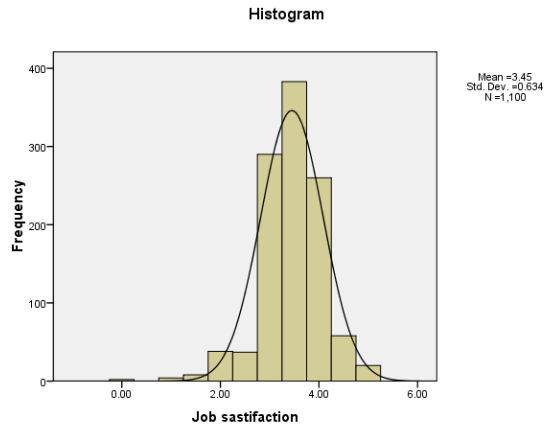
Source: Authors analyzed from research data

At this point, the regression equation can be rewritten as follows:

$$SW = 0.33 + 0.295\ TR + 0.211\ RE + 0.147\ JP + 0.116\ WEC + 0.299\ IB + e$$

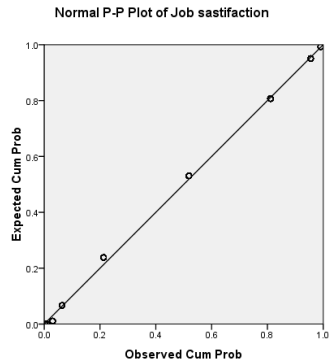
Evaluate regression assumptions

Histogram of normalized residual frequencies



The mean value (mean) = 3.45, the standard deviation is 0.634, close to 1, so the residual distribution is approximately normal. Indeed, looking at the distribution chart with a bell-shaped curve and the data distributed quite evenly on both sides.

Normalized residual plot normal P-P plot



The data points are concentrated around the diagonal, without large deviations from the diagonal, the skewness value is -0.681 within +-1.96 (with a 5% significance level), so the residual is approximately normal.

Test the difference

Results of check out gender differences

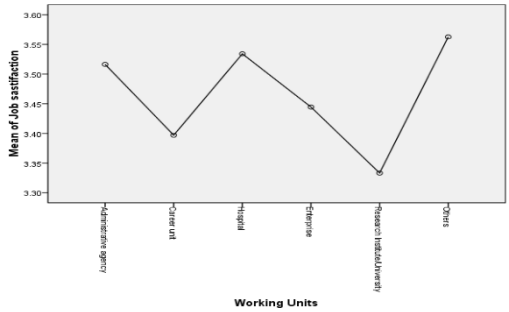
The F-test Sig is equal to 0.061 > 0.05, there is no difference in variance between the two groups of men and women, we will use the t-test results in the Equal variances assumed row. Sig t-test equals 0.320 > 0.05, accepting the hypothesis H0, meaning there is no difference in job satisfaction between male and female employees at work. The average value of the two male/female groups is 3.47 and 3.43, with almost no difference.

Independent Samples 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
Job sastifaction	Equal variances assumed	3.521	.061	-.994	1087	.320	-.03789	.03812	-.11269	.03690
	Equal variances not assumed			-.999	1086.171	.318	-.03789	.03793	-.11232	.03654

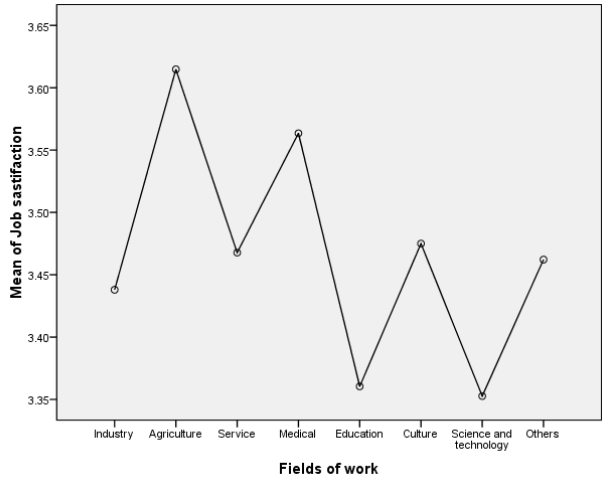
Results of check for differences in work units

Levene's test Sig is equal to 0.054> 0.05, however it has not been determined that there is a difference in variance between work units, we will use the Welch test results in the Robust Tests of Equality of Means table. Welch's Sig test is equal to 0.026 < 0.05, meaning there is a difference in job satisfaction between employees of science and technology human resources working at different units.



Results of check for differences in work fields

The Levene test sig is 0.008 < 0.05, there is a difference in variance between work fields, we will use the Welch test results in the Robust Tests of Equality of Means table. Welch's Sig test is equal to 0.008 < 0.05, meaning there is a difference in job satisfaction between employees of science and technology human resources working in different fields.



Conclusions

The results of this study show that job satisfaction of S&T human resources in Khanh Hoa province is influenced by 5 key factors in the adjusted model, namely (1) Training and retraining (TR); (2) Recruitment (RE); (3) Job position (JP); (4) Working environment conditions (WEC) and (5) Income (IB)

Through research shows that the level of job satisfaction is underestimated. This shows that employees, especially S&T human resources, are not satisfied with their jobs. It is understandable because in the difficult economic context, especially the impact of the Covid -19 pandemic, the income level is lower; At the same time, spending pressures and threats of job loss can make workers feel dissatisfied.

Research results also show that the influence of the research variables on job satisfaction is different. The most influential variable is the variable "Income", followed by the variable "training and promotion", the third is the variable "Recruitment", the fourth is the variable "Job position" and finally the variable "Condition. work environment". Thus, it can be seen that with the specific nature of the S&T human resource, which is the head of the province's economic development, the factors of Income, the need for training and retraining have a great impact to this force.

Recommendation

The results of this analysis give labor managers some implications to further improve job satisfaction of S&T human resources so that they try to contribute and stick more with the organization as well as with home province.

Firstly, for the income factor, the units need to consider calculating annual price slippage to raise salaries and reward employees so that they can ensure their lives. From there, officials can be assured to dedicate themselves to the organization. Income should be paid fairly between different workers. The income should be paid according to the level of contribution and level of completion of the job. The unit can actively build salary norms through the results of employee contribution and work completion. Examine the income level commensurate with the employee's performance in relation to the units in the industry or other industries, ensuring a competitive level of income.

Secondly, regularly organize the training of S&T human resources in the province at domestic establishments and at the same time have plans to train abroad, especially in countries with advanced S&T qualifications. Focus on training to meet the needs of human resources in the fields of information technology, biotechnology, material technology, energy technology, mechanical technology - automation and technology application enterprises, high technology. To train, foster and orient to form and develop single- disciplinary and multidisciplinary research groups. Gradually forming specialized research groups in a number of key disciplines and fields, a team of experts and leading scientists in each field to guide the development of the local S&T field / field in order to applying the implementation of key socio-economic programs and developing 3 key economic regions (Nha Trang City, Cam Ranh Bay area and Van Phong Bay) to create a driving force for socio-economic development the provincial.

Thirdly, Khanh Hoa should, based on the request of a public non-business unit, the head of the agency competent to recruit public employees shall consider and decide on exceptional recruitment without following the recruitment order and procedures. (Provisions in Article 15, Article 16 and Article 17, Section 4, Chapter, the application of Clauses a, b, c in Section 1 of Article 14 of Decree 29/2012 / ND-CP) regarding the recruitment, use and management of public employees in order to have policies to attract good human resources. In addition, the organization of public employee recruitment exams should be widely disseminated and propagated and created conditions for S&T human resources subjects to participate.

Fourth, the working position is a driving force that motivates employees to apply their intellectual abilities to the work they are undertaking. Therefore, after completing the recruitment of employees, unit leaders must arrange and assign jobs to suit new employees, contribute to promoting their existing strengths, and create should be comfortable, love the assigned job. It is necessary to consider and evaluate the professional qualifications of S&T human resources, see who is suitable for what jobs, then arrange to ensure "the right person with the right job".

Fifthly, need to pay attention to and improve the relationships that exist in the organization. Employers should pay special attention to middle-level leaders who directly manage labor. Some points to note in the relationship between leaders and employees that need to be considered are (i) always treating subordinates equally; (ii) attaching importance to working capacity rather than personal relationships; (iii) Always pay attention to and support subordinates in the working process; (iv) Demonstrating the ability to lead and manage the work under their charge; (v) Always encourage and respect employees' talents and contributions, even the smallest contributions. Honoring employees if there is an opportunity; (vi) In order for the employees to participate more in the decisions of the unit, to absorb the employees' comments on the decisions of the unit. In addition to leadership factors, the unit needs to arrange and improve the working environment and equipment to meet work needs.

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