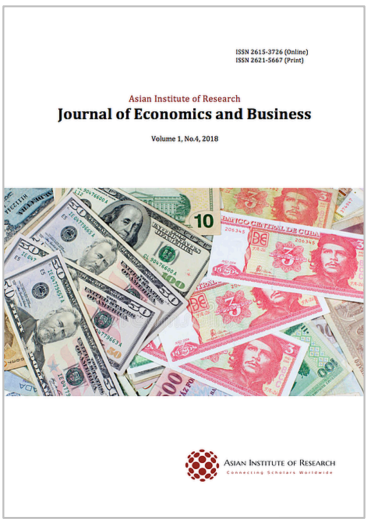


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# Impact of Human Resources Recruitment and Management of Process, Quality, Technology on Total Factor Productivity of Cooperative Industry

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**Abstract**
The objective of this research is to evaluate the impact of human resources recruitment and management of the process, manufacturing quality, and technology on outcomes of cooperative industry (total factor productivity (TFP) and revenue (R)). We link indicators of management and outcomes of management based on two sets of data: (i) annual business survey by General Statistic Office (GSO) and (ii) technological survey of cooperate industry in 2016 including 3.830 enterprises considered input and output variables of 4 management models. The results of the estimation show that general management and management of process and quality improvement management have a good impact on increasing revenue and TFP of enterprises. However, the human resources recruitment problem has not met the objective of increasing revenue and TFP of enterprises yet. The ability of management on both human and technological resources of the business on average has not been effective in encouraging revenue and TFP.

## Introduction

Human resources recruitment is not only an important part in human resources practices of firms, but also it is an important topic in the field of human resources management (Boudreau, 1991; Jones & Wright, 1992; Kleiner, 1990).

An increasing part of the recruitment job contains work practices, including comprehensive employee recruitment, incentive compensation, effective work management systems, extensive employee involvement and training can improve knowledge, skills, and abilities of a firm current and potential employees, increase their motivation, reduce shirking and inhance retention of quality employee while encouraging nonperformers to leave the firm (Jones & Wright, 1992; U.S. Department of Labor, 1993). Unfortunately, their dataset does not contain information other than information about the level of the employee that we consider a representative variable for the selection.

This paper analyses the impact of management based on two sets of data, although indicators are not complete, but it also contributes to conclusions about human resources practices that can help create a resource of sustained competitive advantage, especially when they are aligned with a firm's competitive strategy (Begin, 1991; Butler, Ferris, & Napier, 1991; Cappelli & Singh, 1992; Jackson & Schuler, 1995; Porter, 1985; Schuler, 1992; Wright & McMahan, 1992).

Previous human resources researches have often been conducted in three ways: (i) analytical studies using enterprise-level impact estimates of human resource management practices. This approach is supported by the development of a tool that reflects a system of highly effective work practices researched by enterprises; (ii) the analysis is comprehensive, which means the independent variable includes both intermediary results and enterprise-level measures of financial performance and these results are based on a sample. Those businesses obtained from a variety of industries. Moreover, the analyzes address two methodological issues based on survey researches on this topic: Potential for simultaneity, or reverse causality, between highly effective work practices and business performance and trend of survey responses; (iii) the study provides a first step in predicting the impact of business practices on business performance based on either the degree of complementarity or internal suitability among the practicality and level of alignment, or external relevance, between a system in an enterprise based on the business practices and competitive strategies of the enterprises.

It is possible to believe that individual performance is linked to enterprise-level results that are prevalent both academically and experimentally. This concept comes from the fact that employees of a company can provide a unique source of competition that is difficult for competitors to imitate (see Wright and McMahan (1992), Barney (1991)). The study by Wright and McMahan (1992) showed the importance of human resources in creating competitive advantage.

Human resource management practices influence employees' skills through the development of human capital. The recruitment process provides qualified applicants. A reliable and relevant selection program will have a significant impact on the quality and type of skills that new employees have.

The influence of highly skilled workers will be limited if they are not motivated to perform. Human resource management practices, however, can influence employee motivation by motivating them to work harder and smarter. Baily (1993) also pointed to the contribution of the skilled and motivated workforce to be limited to rigid stereotyping because they did not have the opportunity to use the skills and competencies to design the ways new and better ways of expressing their roles in the workplace. Human resource management practices can, therefore, affect the performance of an organization by providing an organizational structure to motivate members among employees and allow them to improve. Their work is a more creative way.

Therefore, the theoretical overview clearly suggests that the behavior of employees in the company has important implications for the performance of the organization. And human resource management practices can influence the performance of individuals through their influence on the skills and motivations of their work. The structure of the organization also allows employees to improve their work creatively.

This study differs from other studies in pure human resource management in that we consider that workers in the present era can only work effectively if they combine in harmony and technology. So we analyze human resource management and technology management at the same time. That is, we suggest the following hypotheses:

***Assumption 1: If recruiting the right people to the right job will help businesses increase revenue (R) and aggregate factor productivity (TFP).***

***Assumption 2: If the right people are recruited, technology innovation will help businesses increase revenue (R) and aggregate factor productivity (TFP).***

The remainder of this study includes: Presenting the methodology in section 2, presenting data descriptions descriptions and variables in section 3, the results of the estimation in section 4 and finally the conclusion.

## 1. Methodology

To illustrate the impact of the recruitment practices, process management and technology quality on factor productivity (TFP) of manufacturing firms, we use a two-step process: (i) Step 1 presents the TFP estimation

procedure and (ii) the model estimates the impact of human resource recruitment and process management, technology quality on factor productivity (TFP) of the manufacturing sector.

*1.1. TFP estimation methodology*

We use the semi-parametric estimation of the production function parameters proposed by Olley-Pakes (1996) to account for the endogenous problem of enterprise input selection. We assume that at the beginning of each period, a business will select labor and investment inputs, which together with the current capital value determine the quantity capital at the beginning of the next period. Capital accumulation scheme is given as:

$$k_{t+1} = (1 \quad) k_t + i_t \tag{1}$$

*In which:* k means capital and I means investment

We start with the Cobb-Douglas production function model:

$$y_{it} \quad m_{it} = \quad + \ _l \ l_{it} + \ _k \ k_{it} + \ _{it} + \ _{it} \tag{2}$$

Where y - m is the logarithm of output and is equal to the logarithm of value, l is the logarithm of labor, i and t denote the enterprise and period respectively. And ω is the symbol for productivity, and η is the symbol for the measurement error (possibly chain correlation) or an unpredictable productivity shock during the period in which we can adjust labor. Both ω and η are not observable. The difference is that ω is a stop variable in business decision making and affects input demand, and η is not. Labor is assumed to be a freely variable input. Capital is a fixed factor and is only affected by the distribution of ω conditional information on t-1 period and past value of ω.

Because the unobserved productivity shock is assumed to be correlated with the $k_{it}$, the estimated coefficient $\beta_k$ will be deviated. The point of this approach is that the observable characteristics of the entrepreneurs can be modeled as a monotonous function of the firm's productivity. Inverting this function allows us to model unobserved components of productivity as a function of observable variables, namely investment.
Investment decisions depend on the amount of capital and productivity of entrepreneurs:

$$i_t = i_t (\ _t, k_t) \tag{3}$$

By reversing the above equation, we can express the unobserved productivity ω by the observed level of investment and capital, and thus we can control ω in the estimation:

$$_t = h_t (i_t, k_t) \tag{4}$$

Instead of (4) (2), we obtain the estimated percentage in the first step:

$$y_{it} \quad m_{it} = \quad + \ _l * l_{it} + \ _k * k_{it} + h(i_{it}, k_{it}) + \ _{it} \tag{5}$$

The function of h(.) is unknown. Therefore, coefficients $\beta_i$ and $\beta_k$ can not be estimated at this stage. We estimate the partial linear model by using the form of the polynomial of capital and investment to approximate the function form of h(.). From this stage, we have a firm estimate of the labor input coefficient (βl) as well as the estimate of the third hat of $i_{it}$ and $k_{it}$, and we call it $\Psi_{it}$.

$$\Psi_{it} = \alpha + \beta_k * k_{it} + h(i_{it}, k_{it}) \tag{6}$$

So:

$$h(i_{it}, k_{it}) = \Psi_{it} - \beta_k * k_{it} \tag{7}$$

The second step of the estimation procedure is to look at expectation of $y_{t+1} - m_{t+1} - \beta_l * l_{t+1}$.

$$E[y_{t+l} \quad m_{t+l} \quad _l * l_{t+l} / k_{t+l}] = \quad + \ _k * k_{t+l} + E[\ _{t+l} / \ _t] \quad _k * k_{t+l} + g(\ _t) \tag{8}$$

Assume $\omega_{it}$ corresponds to the sequence, we can rewrite $\omega_{it+1}$ as a function of $\omega_t$, we denote $\xi_{t+1}$ as technological advances in $\omega_{t+1}$. Using (4) and (7), the above equation becomes the function of $i_{it}$ and $k_{it}$.

$$y_{t+l} \quad m_{t+l} \quad _l * l_{t+l} = \ _k * k_{t+l} + g(\ _t \quad _k * k_t) + \ _{t+l} + \ _{t+l} \qquad (9)$$

Where g is the third polynomial of $_t \quad _k * k_t$. This equation is estimated in the second stage of the procedure. Only at this stage will we be able to obtain stable estimates of $\beta_k$. Because the capital used in the given period is assumed to be known at the beginning of the period and $_{t+l}$ is the independent mean of all variables at the beginning of the period, $_{t+l}$ the mean independent of $k_{t+l}$. We use the smallest nonlinear squared to estimate the above equation.

*1.2. A model for assessing the impact of human resource management on the output*

Arnold and Feldman (1982), Baysinger and Mobley (1983), Cotton and Tuttle (1986) claimed that perceptions of job security, union status, compensation, job satisfaction, ownership rights, as well as the age, gender, education and number of dependents, the commitment of the organization, whether a job fulfills the individual's expectations and intentions of looking for a new job are all about anticipation of employee's engagement with the company. Sheridan (1992) argued that the perceptions of organizational culture could influence the output of the business. Among empirical studies based on the effects of specific human resource management practices on aggregate revenue, McEvoy and Cascio (1985) point to interventions in job enrichment and previewing actual work may have been effective in influencing the output.

*In order to find the impact of human resource management on the outputs, we set up two model groups to assess the impact of human resource recruitment practices and process management, the influence of technology quality on total factor productivity (TFP or R-revenue) from manufacturing enterprises:* (i) model for assessing the impact of human resource recruitment practices and process management, technology quality on aggregate factor productivity (TFP) ) of the manufacturing enterprises, aiming to test hypothesis 1 and (ii) model for assessing the impact of human resource recruitment practices and technological process management on the revenue in the manufacturing sector to test hypothesis 2.

In this section, we will present two model groups: the first group consists of model 1 and model 2 which illustrates how human resource management and technology affect output and TFP. The second group, model 3 and model 4, is the expansion of models 1 and 2, which is complemented by the reflection variables that combine management of manpower and technology.

Model 1:

$$\ln R = \ _0 + \ _1 x_{1,i} + \ _2 x_{2,i} + \ _3 x_{3,i} + \ _4 x_{4,i} + \ _5 x_{5,i} + \ _6 x_{6,i} + \ _7 x_{7,i} + \ _8 x_{8,i} + \ _9 x_{9,i} + \ _{10} x_{10,i} + \ _{11} x_{11,i}$$
$$+ \ _{12} x_{12,i} + \ _{13} x_{13,i} + \ _{14} x_{14,i} + \ _{15} x_{15,i} + \ _{16} x_{16,i} + \ _{17} x_{17,i} + \ _{18} x_{18,i} + \ _{19} x_{19,i} + \ _{20} x_{20,i} + \ _{21} x_{21,i} + u_i$$

Model 2:

$$\ln TFP = \ _0 + \ _1 x_{1,i} + \ _2 x_{2,i} + \ _3 x_{3,i} + \ _4 x_{4,i} + \ _5 x_{5,i} + \ _6 x_{6,i} + \ _7 x_{7,i} + \ _8 x_{8,i} + \ _9 x_{9,i} + \ _{10} x_{10,i} + \ _{11} x_{11,i}$$
$$+ \ _{12} x_{12,i} + \ _{13} x_{13,i} + \ _{14} x_{14,i} + \ _{15} x_{15,i} + \ _{16} x_{16,i} + \ _{17} x_{17,i} + \ _{18} x_{18,i} + \ _{19} x_{19,i} + \ _{20} x_{20,i} + \ _{21} x_{21,i} + u_i$$

Model 3:

$$\ln R = {}_0 + {}_1x_{1,i} + {}_2x_{2,i} + {}_3x_{3,i} + {}_4x_{4,i} + {}_5x_{5,i} + {}_6x_{6,i} + {}_7x_{7,i} + {}_8x_{8,i} + {}_9x_{9,i} + {}_{10}x_{10,i} + {}_{11}x_{11,i} + {}_{12}x_{12,i} + {}_{13}x_{13,i} + {}_{14}x_{14,i} + {}_{15}x_{15,i} + {}_{16}x_{16,i} + {}_{17}x_{17,i} + {}_{18}x_{18,i} + {}_{19}x_{19,i} + {}_{20}x_{20,i} + {}_{21}x_{21,i} + {}_{22}x_{718,i} + {}_{23}x_{719,i} + {}_{24}x_{720,i} + {}_{25}x_{721,i} + {}_{26}x_{918,i} + {}_{27}x_{919,i} + {}_{28}x_{920,i} + {}_{29}x_{921,i} + u_i$$

Model 4:

$$\ln TFP = {}_0 + {}_1x_{1,i} + {}_2x_{2,i} + {}_3x_{3,i} + {}_4x_{4,i} + {}_5x_{5,i} + {}_6x_{6,i} + {}_7x_{7,i} + {}_8x_{8,i} + {}_9x_{9,i} + {}_{10}x_{10,i} + {}_{11}x_{11,i} + {}_{12}x_{12,i} + {}_{13}x_{13,i} + {}_{14}x_{14,i} + {}_{15}x_{15,i} + {}_{16}x_{16,i} + {}_{17}x_{17,i} + {}_{18}x_{18,i} + {}_{19}x_{19,i} + {}_{20}x_{20,i} + {}_{21}x_{21,i} + {}_{22}x_{718,i} + {}_{23}x_{719,i} + {}_{24}x_{720,i} + {}_{25}x_{721,i} + {}_{26}x_{918,i} + {}_{27}x_{919,i} + {}_{28}x_{920,i} + {}_{29}x_{921,i} + u_i$$

Where LnTFP and LnR are dependent variables.

**Independent variables include**:

(1) X1: Innovation is a variable that can take one of 10 values from 1 to 10

(2) X2: Process improvement is a dummy variable receiving value 1 if there is a process improvement and not in the opposite case.

(3) $X_3$: Quality improvement is a dummy variable receiving value 1 if there is a process improvement and not in the opposite case.

**Variables represent recruitment of manpower**

(4) $X_4$: Labor recruited but not trained that equals the number of unskilled laborers divided by the total labor force of the enterprise.

(5) $X_5$: Labor recruited but trained less than 3 months that equals to the number of laborers trained under 3 months divided by the total labor force of the enterprise.

(6) $X_6$: Labor recruited at primary level which equals to the number of laborers recruited at primary level divided by the total labor force of the enterprise.

(7) $X_7$: Labor recruited at intermediate level which equals to the number of employed workers with intermediate degree divided by the total labor force of the enterprise.

(8) $X_8$: Labor recruited with a college degree which equals to the number of employed workers with college-level degree divided by the total labor force of the enterprise.

(9) $X_9$: Labor recruited with a graduate degree which equals to the number of employed workers with university degree divided by the total labor force of the enterprise.

(10) $X_{10}$: Labor recruited at masters level which equals to the number of employed workers with master degree divided by the total labor force of the enterprise.

(11) $X_{11}$: Labor recruited with a doctoral degree that equals to the number of employed workers with doctor degree divided by the labor force of the enterprise.

(12) $X_{12}$: Labor recruited outside the above criteria which equals the number of workers recruited divided by the labor force of the enterprise.

**General innovation and innovation inside enterprise**

(13) $X_{13}$: General innovation is measurement variable of the management of basic research activities without affecting any specific output.

(14) $X_{14}$: Internal corporate innovation is the measurement of management of the research activities that addresses specific issues, which have been identified to only affect businesses.

**Variables belonging to human resources management and operating process**

(15) $X_{15}$: Salary improvement is a dummy variable that assumes a value of 1 in the case of wage improvements and zero in the opposite case.

(16) $X_{16}$: Expansion product is a dummy variable that assumes a value of 1 in the case of product expansion and zero in the opposite case.
(17) $X_{17}$: The expansion of manufacturing factor is a dummy variable that assumes a value of 1 in the case of expansion of the production sector and zero in the opposite case.

**Variables belonging to technological management**

(18) $X_{18}$: Decision on buying and spending on purchasing technology from Vietnamese enterprise.
(19) $X_{19}$: Decision on upgrading and spending on purchasing technology upgrades from Vietnamese enterprises.
(20) $X_{20}$: Decision on buying and spending on purchasing technology from foreign enterprises.
(21) $X_{21}$: Decision on upgrading and spending to upgrade technology from foreign enterprises.

**Dummy variables belonging to technological management**

(22) $X_{188}$: Dummy variable with the value of 1 on decision to buy technology from Vietnamese enterprises and zero in the opposite case.
(23) $X_{189}$: Dummy variable receives value of 1 on decision to upgrade and spending to upgrade technology from Vietnamese enterprises and zero in the opposite case.
(24) $X_{200}$: Dummy variable receives value of 1 on decision to buy and purchasing technology from foreign enterprises and zero in the opposite case.
(25) $X_{211}$: Dummy variable receives value of 1 on decision to upgrade and spending to upgrade technology from foreign enterprises and zero in the opposite case.

**Variables belonging to human resources management and technology**

The following variables test human resource management and technology in the sense that personnel recruitment is consistent with technological innovation decisions.

(26) $X_{718}$: To be the multiplication of dummy variables $x_{188}$ and variable $x_7$. This variable indicates whether the recruitment of technical staff at intermediate level meets the decision to buy technology from Vietnamese enterprises or not.
(27) $X_{719}$: To be the multiplication of dummy variables $x_{189}$ and variable $x_7$. This variable indicates whether the recruitment of technical staff at intermediate level meets the decision to upgrade technology from Vietnamese enterprises or not.
(28) $X_{720}$: To be the multiplication of dummy variables $x_{188}$ and variable $x_7$. This variable indicates whether the recruitment of technical staff at intermediate level meets the decision to buy technology from foreign enterprises or not.
(29) $X_{721}$: To be the multiplication of dummy variables $x_{200}$ and variable $x_7$. This variable indicates whether the recruitment of technical staff at intermediate level meets the decision to buy technology from Vietnamese enterprises or not.
(30) $X_{918}$: To be the multiplication of dummy variables $x_{188}$ and variable $x_9$. This variable indicates whether the recruitment of staff at university level meets the decision to buy technology from Vietnamese enterprises or not.
(31) $X_{919}$: To be the multiplication of dummy variables $x_{189}$ and variable $x_9$. This variable indicates whether the recruitment of staff at university level meets the decision to buy technology from Vietnamese enterprises or not.
(32) $X_{920}$: To be the multiplication of dummy variables $x_{200}$ and variable $x_9$. This variable indicates whether the recruitment of staff at university level meets the decision to buy technology from foreign enterprises or not.
(33) $X_{921}$: To be the multiplication of dummy variables $x_{200}$ and variable $x_7$. This variable indicates that the recruitment of staff at university level meets the decision to upgrade technology from foreign enterprises or not.

## 2. Data and results

### *2.1. Data*

The data used for this study include the GSO 2000 to 2016 enterprise survey data and the GSO statistical survey data for 2016. We consider these two data set into one. From the first data set (GSO annual enterprise survey) we used the following criteria: turnover (R), capital (K), labor (L), intermediate input (M ), investment (I), worker's income (salary, bonus), depreciation, etc. Using the income approach and information obtained on enterprise surveys, we calculated every business. Use and calculation and information about capital, labor, and other information and use parametric techniques to estimate the TFP of each enterprise and extract TFP by 2016 for use as one dependent variable of the model. Using information from dataset of the survey on technology, we built the variables on human resource management and technology management as well as variables describing the interaction between human resource management and technology management. in production and business activities.

### *2.2. Results*

In this section, we represent the results of models 1, 2, 3, and 4. For distinguishing between human resources and technology management with human resource management and technology and the ability to coordinate both human resource management and technology management. We split into 2 tables. Table 1 outlines the impact of human resource and technology management on revenue (R) and on total factor productivity (TFP). Table 2 shows the impact of human resource and technology management on the combination of human resource and technology management to revenue (R) and total factor productivity (TFP).

**Table 1: Estimates of models 1 and 2 by OLS and (II) the feasible generalized least square**

| | OLS method | | II | |
|---|---|---|---|---|
| | LnR | LnTFP | LnR | LnTFP |
| x1 | -0.0031<br>(0.0097) | -0.0057<br>(0.0044) | -0.0032***<br>(0.0004) | -0.0055***<br>(0.0001) |
| x2 | 0.1817**<br>(0.0728) | 0.0178<br>(0.0334) | 0.1782***<br>(0.0048) | 0.0159***<br>(0.0014) |
| x3 | 0.0168<br>(0.0782) | -0.0608*<br>(0.0359) | 0.0149***<br>(0.0029) | -0.0617***<br>(0.0014) |
| x4 | -1.0997***<br>(0.1300) | -0.5206***<br>(0.0597) | -1.1044***<br>(0.0072) | -0.5215***<br>(0.0012) |
| x5 | -0.7120***<br>(0.1289) | -0.4930***<br>(0.0596) | -0.7116***<br>(0.0067) | -0.4919***<br>(0.0014) |
| x6 | -0.3911**<br>(0.1668) | -0.2829***<br>(0.0767) | -0.3953***<br>(0.0099) | -0.2872***<br>(0.0032) |
| x7 | -1.1327***<br>(0.2441) | -0.3851***<br>(0.1120) | -1.1355***<br>(0.0164) | -0.3861***<br>(0.0049) |
| x8 | -1.0389***<br>(0.3904) | -0.4894***<br>(0.1792) | -1.0498***<br>(0.0247) | -0.4933***<br>(0.0097) |
| x9 | -0.8044***<br>(0.2947) | 0.5380***<br>(0.1342) | -0.8232***<br>(0.0278) | 0.5383***<br>(0.0042) |
| x10 | -1.5664<br>(1.4696) | -0.2153<br>(0.6756) | -1.3239***<br>(0.1818) | -0.1814*<br>(0.1091) |
| x13 | 0.0060<br>(0.0042) | 0.0006<br>(0.0019) | 0.0062***<br>(0.0007) | 0.0007***<br>(0.0002) |
| x14 | 0.0183***<br>(0.0056) | 0.0088***<br>(0.0026) | 0.0183***<br>(0.0003) | 0.0088***<br>(0.0003) |
| x16 | 0.2935***<br>(0.0667) | 0.0807***<br>(0.0307) | 0.2895***<br>(0.0032) | 0.0812***<br>(0.0008) |
| x17 | 0.1136<br>(0.1026) | -0.0594<br>(0.0471) | 0.1133***<br>(0.0036) | -0.0583***<br>(0.0022) |
| x19 | -0.0001<br>(0.0001) | -1.5E-05<br>(3.62E-05) | -0.0001***<br>(0.0000) | 0.0000***<br>(0.0000) |

| | | | | |
|---|---|---|---|---|
| x20 | 0.0000*** (0.0000) | 6.85E-06** (4.17E-06) | 0.0000*** (0.0000) | 0.0000*** (0.0000) |
| _cons | 11.3468*** (0.1274) | 2.3957*** (0.0586) | 11.3560*** (0.0074) | 2.3976*** (0.0019) |

*Source: Author estimates from GSO data*

Table 1 presents two methods for estimating OLS (columns 2 and 3) and estimates using the least significant general means of elasticity to overcome the defects of the model (columns 4 and 5). First of all, the two estimation methods show that the sign of the coefficients do not change, but the estimation results are more meaningful.

First of all, innovation management skills $x_1$: The signs of coefficients of this variable are negative, meaningless in models 1 and 2 but statistically significant in models 3 and 4. This indicates that managers innovative skills not only did not meet the demand for increased sales and TFP but also revealed to be counterproductive.

*Process management* ($x_2$) and quality improvement management ($x_3$): The sign of the coefficient of this variable is positive, statistically significant in models 3 and 4. This indicates that process governance ($x_2$) and good quality improvement management are required to increase sales and increase TFP of businesses.

*The issue of recruiting inputs* is shown in the sign and coefficients of variables $x_4$, $x_5$, $x_6$, $x_7$, $x_8$, $x_9$, and $x_{10}$. The signs of these variables are negative and statistically significant in all four models excepted for the coefficients of $x_{10}$ in model 1. This suggest that recruitment of such items has not met the target to increase revenue and TFP.

*The issue of production and personnel management* are shown in signs and coefficients of variables $x_{13}$, $x_{14}$, $x_{16}$ and $x_{17}$. The markers of these $x_{13}$, $x_{14}$, $x_{16}$ variables are positive and statistically significant in most models. This suggests that general innovation management, internal innovation, and product expansion strategy have met the goal of increasing sales and TFP of business. However, the strategy of expansion of the field has failed to increase TFP since mark of $x_{17}$ is negative and statistically significant in models 3 and 5.

*The decision on purchasing to upgrade technology* has only a positive impact on revenue and TFP when the technology is purchased from overseas.

**Table 2: Estimations of models 1 and 2 by the feasible generalized least square (to overcome the variance of variance)**

| Dependence variables: LnR | | | | Independence variables: LnTFP | | | |
|---|---|---|---|---|---|---|---|
| Var | Coef. | Var | Coef. | Var | Coef. | Var | Coef. |
| x1 | -0.0075*** (0.0004) | x17 | 0.1014*** (0.0039) | x1 | -0.0074*** (0.00014) | x17 | -0.0589*** (0.00375) |
| x2 | 0.1391*** (0.0026) | x19 | -0.0002*** (6.26E-06) | x2 | 0.00078 (0.00119) | x19 | -0.00004*** (0.00001) |
| x3 | -0.0434*** (0.0016) | x20 | 2.05E-05*** (4.00E-06) | x3 | -0.0838*** (0.00104) | x20 | 0.00001*** (0.00000) |
| x4 | 0.0007*** (3.04E-06) | x718 | 0.0034*** (0.0011) | x4 | 0.00005*** (0.00000) | x718 | 0.00146*** (0.00030) |
| x5 | 0.0002*** (8.82E-06) | x719 | -0.0040*** (0.0014) | x5 | -0.00005*** (0.00000) | x719 | -0.0012*** (0.00032) |
| x6 | 0.0008*** (1.78E-05) | x720 | -0.0046*** (0.0014) | x6 | 0.00005*** (0.00000) | x720 | -0.00044 (0.0003) |
| x7 | 0.0025*** (4.03E-05) | x721 | 0.0069*** (0.0022) | x7 | 0.00026*** (0.00000) | x721 | 0.00084 (0.00065) |
| x8 | 0.0016*** (5.35E-05) | x918 | -0.0046*** (0.0010) | x8 | -0.0001*** (0.00003) | x918 | -0.0024*** (0.0002) |
| x9 | 0.0113*** (2.95E-05) | x919 | 0.0095*** (0.0021) | x9 | 0.00385*** (0.00002) | x919 | 0.00118*** (0.0004) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| x10 | 0.0120*** (0.0002) | x920 | 0.0018 (0.0021) | x10 | 0.00580*** (0.00036) | x920 | -0.00057 (0.00049) |
| x13 | 0.0006 (0.0005) | x921 | -0.0042* (0.0022) | x13 | -0.0004*** (0.00002) | x921 | -0.00025 (0.00052) |
| x14 | 0.0040*** (0.0007) | _cons | 10.3582*** (0.0019) | x14 | 0.00625*** (0.00009) | _cons | 2.07180*** (0.00124) |
| x16 | 0.1689*** (0.0009) | | | x16 | 0.05898*** (0.00098) | | |

*Source: author estimates from GSO data*

Table 2 presents estimates of models 3 and 4 using the feasible generalized least square to overcome the defects of the model. Models 3 and 4 differ from models 1 and 2 in considering the ability to simultaneously manage the human and technological resources of the business. Therefore, we did not repeat the analysis results in models 1 and 2 but only additional analyzes of the concurrent management capabilities of enterprises.

First of all, the recruitment of technically qualified graduates seem appropriate when purchasing domestic technology and upgrading technology from overseas because of the positive coefficients of $x_{718}$ and $x_{721}$ and statistically significant. It is not, however, suitable when using new technology from overseas and upgrading technology in the country because the mark of the coefficient of $x_{719}$ and $x_{720}$ is positive and statistically significant.

We consider recruiting staff at university graduates, in general, seem not compatible with buying local technology and buying technology from overseas because the mark of the coefficients of $x_{918}$ and $x_{921}$ is negative and is statistically significant, $x_{20}$. There are only the coefficients of $x_{919}$ which are positive and statistically significant, meaning that the level of sophistication would be only suitable for technological upgrading and not suitable for use of new technology. These conclusions are however limited because we have not separated the number of college graduates how many are the technical department so the inclusion of all may not be entirely accurate.

**3. Conclusion**

This study was designed to test two hypotheses. By combining two sets of survey data, we have built a database, creating variables for the two hypothesis test models. has given. The first hypothesis where the right recruitment of the right person will help the company to increase revenue (R) and aggregate factor productivity (TFP) has been rejected data. This can have profound implications as the training of human resources is problematic, and the problem of professional training for recruiters is a big policy issue. Proper adoption of appropriate technology innovations will enable businesses to increase revenue (R) and aggregate factor productivity (TFP), which is only acceptable for only one of four cases. This is a very important issue of governance where appropriate technology could be matched with people to be effective. However, the results of this research are limited by the separation of technical and non-technical workers, especially at the university level, so further research needs to be undertaken to draw stronger conclusions.

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