On the Promotion of Human Recourses Productivity

H. Esmaeili[1+], K. Hoghooghi[2] and M. Esmaeili[3]

[1, 2, 3] Department of Economic, Management, accounting, Tabriz Branch, Islamic Azad University, Tabriz, Iran

Abstract. Continuity in productivity system needs emprises such as, organizational structure reform and human recourses development. The ways of increasing productivity also, needs enough cognition of existing situation and organizations' job culture. This article argues about literature review, determinants of productivity and effective factors to promote productivity. So productivity is studied offering an experimental model of human force productivity in 27 countries from OIC for a period of ten years (2000-2009), using econometric software Eviews7. Findings show that all studied variables influenced labor productivity and to have higher productivity and offering effective and efficient services, organizations should pay more attention to instruct human forces.

Keywords: human recourses, development, productivity,

1. Introduction

In the past decades production processes have changed. Traditional factors of production, like natural resources, labour and capital have lost significance. At the same time the importance of intangible inputs, like information and knowledge, rose. This transformation had some serious consequences for measuring and managing productivity [1]. Whereas Drucker sees the main difference in the shift in factors of production, Castells (1996) argues that the main difference between past and present is the application of information technology. According to Florida, driving force behind the transformation is the rise of human creativity as the key factor in our economy and society. What's more fundamentally true is that we now have an economy powered by human creativity. Creativity – 'the ability to create meaningful new forms' (…) - is now the decisive source of competitive advantage" [2]. Although we are still speaking about 'products' and 'productivity', an ever increasing share of GDP resides in economic commodities that have little or no physical manifestations [3]. Output has become intangible, which makes it hard to quantify. Moreover, production processes have become diffuse, because the traditional clear distinction between input, transformation and output have faded, which makes it very difficult to relate changes in output to changes in the use of means of production [4]. Consequence of this change is that managers have lost sight of the sources of productivity and productivity growth. Castells characterizes this problem as 'the productivity enigma'. In order to identify and improve productivity we should be able to identify the sources of productivity. If there is a new economy, we should be able to pinpoint the historically novel sources of productivity that make such an economy a distinctive one [2]. According to Castells, the difference between the old and the new is mainly characterized by the way we produce and distribute information and knowledge. So it is not only about a shift in the factors of production, it is also about the way we are organized or the "cultural-institutional attributes of the whole social system". These attributes are the real sources of productivity. In this paper we study the effective factors on productivity with intellectual perspective. These factors are human capital, R&D and investment. Our empirical results show that human capital, R&D and investment have positive effect on productivity and to improve labour productivity rate organizations in these countries should pay more attention to these variables and their effects.

2. Literature Review

In a review of the related literature, Stam [1] found productivity to be an elusive construct, as there are two different interpretive perspectives. On the one hand, productivity refers to the amount of output per unit of input (labour, equipment, capital), while the concept of knowledge predominantly refers to a human

[1] Corresponding author: Tel (00989141039168); fax (00984115255788); (esmaili_habibeh@yahoo.com)

ability productivity. Both outputs and inputs are measured in physical volumes and thus are unaffected by price changes. Constant prices as of one period are used to add up the units of different outputs and inputs in order to combine them into aggregate measures. The ratios may relate to the national economy, to an individual industry, or to a company. Productivity measures are sub-divided into partial and total factor or multi-factor productivity measures. The former are defined as the relationship between output and one input, such as labour or capital, while the latter represents the relationship between output and an index of two or more inputs. The most readily available and widely used measure of productivity is labour productivity, the ratio of output to some measure of labour input (employment or hours). This term sometimes creates confusion in the mind of the general public as it may seem to imply that the level of labour productivity or the rate of growth of labour productivity is attributable solely to the effects of labour. In fact, labour productivity reflects the influence of all factors that affect productivity, including capital accumulation, technical change, and the organization of production [5]. labour productivity and total factor productivity are both extremely useful concepts. It is incorrect to say that total factor productivity is a superior or preferred measure of productivity compared to labour productivity as the two concepts serve different purposes. For those interested in how efficiently all factors of production are used in the production process, then total factor productivity is the relevant productivity measure since it takes account of the productivity of factors of production other than labour, such as capital, intermediate goods, and energy. For those interested in the potential of the economy to raise the standard of living, labour productivity is the relevant productivity measure since it tells how much is produced by each worker and hence how much real income there is to be distributed among the population [6].

3. Determinants of Productivity

The world is fast moving from a production-based economy to a knowledge-based one ([7]; [8]). Drucker states that the most important contribution. Management needs to make in the 21st century is similarly to increase the productivity of knowledge work and the knowledge worker. The knowledge-based view of the firm identifies the primary rationale for the firm as the creation and application of knowledge ([9]; [10]; [11]; [12]). Therefore, the ability of firms to generate and exploit new forms of knowledge is vitally important [13]. The economic challenge of the post-capitalist society will therefore be the productivity of knowledge work and the knowledge worker. Productivity is a tricky construct. Some scholars adopt a macro-economic perspective to interpret productivity as a result, while others apply a managerial perspective to interpret productivity as a human ability.

3.1. Human Capital and Productivity

Human Capital represents the knowledge acquired from individual employee's skills, experience and expertise. In this sense, distinct employee profiles provide diverse components of human capital, bringing added value to the organizational assets. Thus, Human Capital is a source of tacit knowledge and is acquired through experience and explicit knowledge. It can be enhanced by social relations, human value improvements and organizational commitment [14]. Also, by mobilizing collabourators to participate in daily organizational routines, the organizational productivity increases ([15]; [16]; [17]; [18]) high levels of Human Capital can reduce the amount of time and investment necessary to obtain information and solve problems. One of the reasons for the renewed interest in organizational change by labour economists was the attempt to understand why technology seemed to increase the demand for human capital, and thus contribute to the rise in wage inequality experiences by the US, UK and other countries since the late 1970s [19]. The accumulation of human capital is an important part of the development process, and this accumulation is influenced in major ways by public programs for schooling and health. Also important are government policies that promote or discourage free markets and interventions that affect the degree of international openness. Various subfields of economics try to identify and unearth the underlying factors responsible for the large disparities in economic performances across countries, sectors, firms, and various units within a firm. We know that such a disparity commonly exists even among apparently homogeneous set of economic units. Moreover, the magnitude is often large enough to dwarf those explicable in terms of conventional analysis of production function. An important candidate accounting for the productivity difference is the quality of labour inputs, i.e., human capital which cannot be accounted for by conventional

measures of human capital, such as education attainment. Ichiniowski and Shaw [20] find 6.7% productivity difference between a line with the most innovative human resource practices and a line with the most traditional human resource management system (among comparable steel finishing lines, even after controlling for environments, technology and human capital elements of the lines in question).

3.2. R&D and Productivity

Although investments in R&D have risen steadily and the process has been continuously improved by key innovator companies in the industry, the risks of failure at each stage of the cycle remain unacceptably high in the view of both the industry participants and the beneficiaries of their products, including patients and payers. R&D subsidies and an abundance of skilled labour reduce the marginal cost of conducting R&D and increase the rate of innovation development and therefore, the productivity growth rate. Recent years have seen substantial progress towards including research and development (R&D) as a capital investment within the national income accounts [21]. Economists at the United States Bureau of Economic Analysis (BEA) ([22]; [23]) have prepared initial versions of a potential R&D satellite account. The U.S. National Science Foundation has agreed to support BEA's further work on R&D accounts, and the BEA is committed to publish R&D accounts for the United States. Economists in Australia [24] and in the Netherlands [25] have also reported initial R&D stocks for their countries. One main motive for adding R&D is to broaden the accounts to include a further important source of economic growth. A broader perspective on R&D has to include knowledge spillovers, which have often been a central theme in discussions of productivity growth.

4. Data and Methodology

The sample used in this paper is a balanced panel consisting of 27 countries[2] from OIC for a period of ten years (2000-2009). The data source used in the study is World Development Indicator 2010 (WDI). The information collected through this source has been used to construct the following variables for each of 27 countries:

Y: labour Productivity: GDP (constant 2000US$)/ labour Force (Total)

HC: Human Capital: Public Spending on Education, Total (% of GDP)

R&D: Research and Development Index: Scientific and technical journal articles/ labour Force (Total)

KL: Capital Stock Per Capita: Capital Stock/ labour Force (Total)

But because of missing capital stock data for selected countries in WDI [26], we use PIM method (Perpetual Inventory Method) suggested by United Nations Organization and used by most countries. The real investment series are accumulated into stock estimates using the PIM and the application of industry specific geometric depreciation rates that are assumed equal across all countries. This method is represented as:

$$K_t = K_{t-1} + I_t - \delta K_{t-1} \quad (1)$$

And to obtain first period capital stock the relation is:

$$K_{t-1} = \frac{I_{t-1}}{g-\delta} \quad (2)$$

That Kt and g is Investment average growth rate. For investment data we use Gross Fixed Capital Formation (Constant 2000 US$).

To estimate our equation we first test the variables stationary using unit root test. Table1 provides the results of the unit root test using the Philips-Perron Test. The result shows that, lnY, lnKL, lnHC and lnR&D are stationary. That is integrated of order zero I (0).

Table1: Phillips-Perron Fisher Unit Root Test on Variables

Variable	PP Statistic	P-Value	Result
ln Y	80.0482	0.0122	I(0)
ln KL	72.4641	0.0475	I(0)
ln HC	74.6230	0.0330	I(0)

[2] Azerbaijan, Bangladesh, Benin, Cameroon, Egypt, Arab Rep., Guyana, Indonesia, Iran, Islamic Rep., Kazakhstan, Kuwait, Kyrgyz Republic, Lebanon, Malaysia, Maldives, Mali, Mauritania, Morocco, Niger, Pakistan, Saudi Arabia Senegal, Sierra Leone, Tajikistan, Tunisia, Turkey, United Arab Emirates and Djibouti

$\ln R\&D$	113.226	0.0000	I(0)

The following equation has been estimated in this study:

$$\ln Y_{i,t} = \alpha \ln Y_{i,t-1} + \beta_1 \ln KL_{i,t} + \beta_2 \ln HC_{i,t} + \beta_3 \ln R\&D_{i,t} + \epsilon_{i,t} \quad (3)$$

Where, this equation is based on the Panel Generalized method of moments (GMM) using cross section weights [27].

Table2: Model Estimation Results

Variables	Coefficient	Std. Error	t- Statistic	P-Value
$\ln Y$	0.851601	0.024225	35.15390	0.0000
$\ln KL$	0.064686	0.003989	16.21467	0.0000
$\ln HC$	0.094851	0.052948	1.791402	0.0751
$\ln R\&D$	0.074105	0.010754	6.890684	0.0000
J-statistic = 22.08146		Instrument rank= 24		
Sargan- Test= 0.3361				

As discussed in the earlier sections, the factors affecting labour productivity have been investigated in the study and as expected the studied variables affect labour productivity in following way:

As anticipated, capital stock (KL) is an important determinant of labour productivity and has a positive sign. Human capital (HC) as a component of intellectual capital has positive and meaningful effect on labour productivity. Research and development (R&D) also has positive and meaningful effect on labour productivity.

5. Summary and Conclusion

In the past years, attention has focused closely on the productivity of developing countries. This interest is the result of a major slowdown in the rate of productivity growth compared with that of the previous years. Many analysts have tried to explain the causes of this slowdown and its effects on countries economy and production system, most often using labour productivity. A review of previous studies finds that intangible capital has been identified as a set of intangibles (resources, capabilities, and competences) that drive organizational performance and value creation. The purpose of this study was to theoretically and empirically examine the effect of variables on labour productivity in selected countries. This study provided evidence that all studied variables influenced labour productivity.

The ratio of capital stock to labour force represents labour force or capital expansion used in production and indicates the required capital to create a new job in industry, so in developing and more population countries an increase in labour productivity (per capita production) is possible by increase in the ratio of capital stock to labour force.

Human capital is science; knowledge, skill, experience, power and health stored by labour force schooling and health that cause to increase labour force productivity in production process. The result brings out the crucial role played by the human capital variable in enhancing productivity and its growth.

A firm invests in R&D and related activities to develop and introduce process and product innovations. By enhancing its productivity, these investments in knowledge create long-lived assets for the firm, just like its investment in physical capital, and change the firm's position relative to that of other firms. R&D subsidies and an abundance of skilled labour reduce the marginal cost of conducting R&D and increase the rate of innovation development and therefore, the productivity growth rate.

6. References

[1] Stam, Chistiaan, Intellectual Productivity, 26th McMaster World Congress. *Hamilton, Ontario, Canada*: January 19-21, 2005.

[2] Castells, M., the Rise of the Network Society, the Information Age: Economy, Society and Culture. *Blackwell Cambridge*, MA: Oxford UK Vol.1. 2002.

[3] Youngman, R., Understanding Today's Economy and its Residuals. *PRISM, London*: March, www.euintangibles.net. 2003.

[4] Stam, C. D., Making Sense of Knowledge Productivity, Beta Testing the KP Enhancer: *Journal of Intellectual Capital*, Vol. 8 No. 4, pp. 628-640. 2007.

[5] Machlup, F, the Production and Distribution of Knowledge in the United States: Princeton. *NJ: Princeton University Press.* A, 1972.

[6] Gregory, N. Austin, America Insecure Changes in the Economic Security of American Families: Low-Income Working Families, *the Urban Institute*, 2100 M Street, NW, Washington, DC 20037, 2010.

[7] Drucker, P. F., Management Challenges for the 21st Century: Elsevier Butterworth Heinemenn, 1999.

[8] Drucker, P. F, Knowledge-worker productivity: the biggest challenge. *California Management*

[9] Powell, W, Snellman, K, the Knowledge Economy: Greenwich: CT. *JAI Press* (Vol. 30), 2004.

[10] Demsetz, H, The theory of the firm revisited (In Williamson O. and Winter S.ed.). *New York: the Nature of the Firm, oxford University Press,* 1991.

[11] Grant, R. M, Prospering in dynamically - competitive environments: organizational capacity as knowledge integration. *Organization Science*, Vol.7, pp. 375-387, 1996

[12] Anand, N., Gardner, H. K, Morris, T. Knowledge-based innovation: Emergence and embedding new practice areas in management consulting firms. *Academy of Management Journal*, Vol. 50 No. 2, pp. 406-426, 2007

[13] Adler, P. S., & Kwon, S. 2002. Social capital: prospects for a new concept. *Academy of Management Review*: *27(1)*, 17- 40.

[14] Swanson, R., The Foundations of Performance Improve and Implications for Practicing. *Advance in Developing Human Resources*: 1(1), 1-25, 2004.

[15] Sharabati, A. & Javad, S., & Bontis, N, 2010. Intellectual capital and business performance in the pharmaceutics sector of Jordan. *Management Decision*: 48(1), 105-131.

[16] Teixeira, M. L. M., Popadiuk, S., Confiança e desenvolvimento de capital intelectual: o que os empregados esperam de seus líderes? *Revista de Administração Contemporânea*: 7(2), 73-92, 2003.

[17] Walsh, K., Enz, C. A., Canina, L., The impact of strategic- orientation on intellectual capital investments in customer service firms. *Journal of Service Research*: 10(4), 300-317, 2008.

[18] Machin, Stephen, John Van Reenen, Changes in Wage Inequality: *New Palgrave Dictionary of Economics* (Bruce Weinberg and Chris Taber, ads)*,* 2008.

[19] Ichiniowski, C. and K. Shaw, Beyond Incentive Pay: Insiders' Estimates of the Value of Complementary Human Resource Management Practices. *Journal of Economic Perspectives*: 17(1): 155-180, 2003.

[20] Canberra, Group, On the Measurement of Non-Financial Assets: *Second Meeting*. 13-15 October, Paris, Items 91 to 102, 2003

[21] Carson, Carol S., Grimm, Bruce T., Moylan, Carol E., 1994. A Satellite Account for Research and Development, *Survey of Current Business*, November 1994, pp: 37- 71, 2006.

[22] Fraumeni, Barbara, Okubo, Sumiye, R&D in the National Income and Product Accounts: A First Look at its Effect on GNP. *National Bureau of Economic Research, University of Chicago Press, Chicago*,pp. 275-316, 2005.

[23] Okubo, Sumiye, Robbins, Carol A., Moylan, Carol E., Sliker, Brian K., Schultz, Laura I., Mataloni, Lisa S., *BEA Research and Development Satellite Account: Survey of Current Business,* pp. 14-46, 2006.

[24] Australian Bureau of Statistics: Capitalize Research and Development. *Paper presented at meeting of Canberra II Group, Washington, D.C.*, pp. 17-19, 2004.

[25] De Haan, Mark. Progress Report on R&D capitalization: The Netherlands. *paper presented at meeting of Canberra II Group, Washington, D.C.,* March 17-19, 2004.

[26] World Development Indicators: WDI, (2010).

[27] Baltagi, B.H, Econometric Analysis of Panel Data: Third Edition. *Chichester, West Sussex: John Wiley & Sons, Ltd,* 2005.