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Human Capital Externalities and Productivity in Cities

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ABSTRACT

Purpose: Human Capital Theory states that individuals invest in their human capital in order to enhance own productivity which is in turn rewarded by higher wages. The theory asserts that investments in human capital are undertaken by individuals until the point where the marginal productivity gained equals the marginal opportunity cost (from the individual's viewpoint). Benefits of human capital accumulation by a person need not pertain to that person solely. An individual's investment in her own human capital may also increase productivity of the other factors of production, i.e. physical capital or human capital of others. Importantly, the channels of such influence – the most prominent of which is sharing of knowledge and skills through formal and informal interaction between people in the same industry, city, region or economy – may not be internalized within firms or families. This gives rise to human capital externalities.

Methodology: The technique used is DEMATEL method. A questionnaire was constructed and answered by eleven experts. Then the DEMATEL method was applied to analyze the importance of criteria and the casual relations among the criteria were constructed. The study period is 2021-2022.

Findings: Factors affecting productivity in cities can be divided into several categories:

Factors related to human resources, Factors related to management, Factors related to the government, Equipment and facilities, Technology, Environmental factors, Materials and energy.

Originality/Value: Human capital can be defined as those skills, abilities, and knowledge embodied in an individual which contribute to a productive process by creating value, whether it be economic or social.

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1. Introduction

Economists, as early as Smith [1] and Marshall [2], recognized that cities bestow productivity advantages on both firms and workers. Marshall suggested three possible sources of these advantages: sharing of inputs, labor market pooling, and knowledge spillovers. More recent research examines a wider range of possible sources and there is now a broad literature focusing on different sources. Duranton and Puga classify these sources into sharing, matching, and learning mechanisms. Sharing includes sharing infrastructure and facilities, input suppliers, larger local markets, and risks as well as gains from variety. Learning is facilitated by bringing together large number of people, enhancing both knowledge generation and its diffusion. Other scholars focus on increased competition and the resulting survival of more productive firms as additional mechanisms for improving productivity, or on industrial culture and local institutions as important contributors to productivity differences. Most of the literature suffers from the inherent difficulty in isolating the partial contributions of these different factors, as well as from the difficulty in measuring the spatial extent of their influence [3].

Urban economic theory since Smith and Marshall predicts that the larger the labor market, the greater the productivity of both firms and workers. Firms in larger cities have a larger - and, in addition, a more diverse - pool of workers to choose from and can therefore employ workers that are better fitted to the firm's specific requirements. The more fit workers are for their prospective jobs, the less on-the-job training they require, and the more valuable they are to the firm [4]. Taken together, the firm's employees can then be more specialized, allowing the firm to reap the benefits of the division of labor and to become more productive. The firm thus becomes more profitable and can pay its workers better wages and salaries [5].

In addition, large and diversified labor markets also allow firms to withstand both positive and negative shocks by quickly changing their labor profiles through hiring and firing workers. They allow firms to quickly fill vacancies. They also allow younger firms to experiment with different labor profiles before settling on the most productive ones. Workers, on their part, can choose from a greater pool of jobs, allowing them to find the jobs most suitable for their skills, aptitudes and temperaments, and income expectations. They also allow workers to find jobs that allow them to interact with knowledgeable workers, speeding up their learning, expanding their contact networks, and therefore their job prospects and their future earnings. The higher productivity of firms and the higher wages of workers attract more firms and more workers, thus enabling larger cities to continue to grow their economies and their populations [6].

2. Literature Review

2.1. The Productivity of Cities

The fundamental advantage of cities is that of scale and density; the concentration of people enables economic and social interactions to occur more frequently and effectively. There is a great deal of evidence that cities have higher productivity than other areas [7]. Cities are also centers of innovation and entrepreneurship where new firms develop and new sectors grow. Similar effects have been found in developing countries, although less research has been undertaken and outcomes are mixed. Importantly, the potential of cities is not just to raise productivity in existing activities, but also to provide the environment in which new activities can take root. To be successful, new activities need to draw on the skilled workers and suppliers that can only be found in cities [8].

Why do cities have this economic advantage? Studies of agglomeration economies point to a number of mechanisms. One is that cities offer large markets. A large local market makes it easier to establish new firms and to grow them to scale at which they are efficient. This makes for more competition, breaking down monopoly power as multiple firms come to compete for customers. As well as offering larger markets, cities also offer more suppliers of the inputs that firms use; the presence of local suppliers means that inputs can be tailored to firms' needs and supplied rapidly and flexibly. Given the need to raise the potential for long term growth, understanding how to increase the productivity of these cities is therefore an urgent policy question. It is well known that, in many countries, the economic productivity of a city increases with its size. This is in part a result of sorting, as better educated individuals have a tendency to live and work in larger cities [9]

However, even beyond this compositional effect, in recent years a substantial body of evidence has accumulated that suggests the productivity of a given individual increases with the size of the city in which they work. In addition to identifying the existence of such agglomeration externalities, the literature has begun to make progress towards identifying their determinants [10]. There are a number of reasons why areas towards the top of the hierarchy of urban structures, with dense population of people and institutions, should lend themselves to high productivity growth. This is a well- developed literature, based on two fundamental principles of economics: division of labor and economies (and diseconomies) of scale [11].

2.2. Human Capital Externalities (HCE)

While we are not aware of any other up-to-date survey of the UWP literature, various authors have already taken the effort to review the literature on HCE. This allows us to review the HCE literature only briefly. Our main contribution then lies in section 4, where we shed light on the interrelations between the UWP and HCE [4].

2.3. Types of HCE*

In general, three different types of externalities have been identified in the literature. Market externalities, which can be further subdivided into technological and pecuniary externalities, are frequently juxtaposed with non-market externalities.

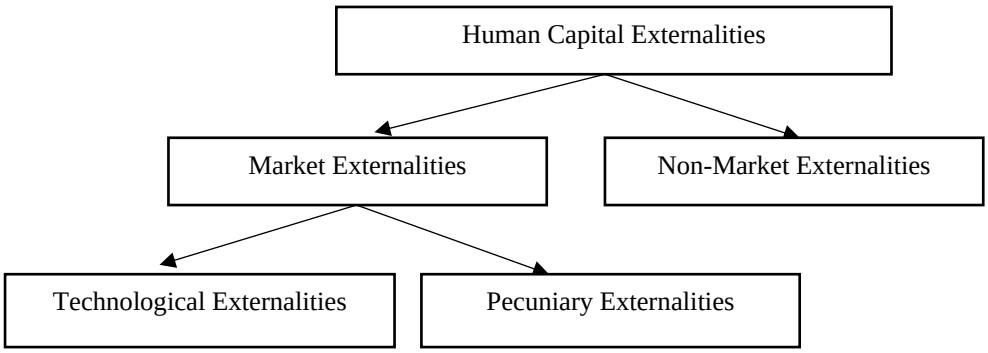

Fig. 1. Types of Human Capital Externalities [12]

Established examples for non-market externalities arising from higher levels of human capital are a decrease in crime rates, as well as differences in health-related behavior and political participation. Our

* Human Capital Externalities

primary focus in this survey is on the importance of HCE as a wage determining factor, however, hence on market externalities. Technological human capital externalities arise if educated workers increase the productivity of other workers, for example through processes of informal learning, without being compensated. Jovanovic & Rob [13] show theoretically that proximity to qualified individuals can increase the acquisition of skills and facilitate the diffusion of knowledge.

In contrast to technological HCE, pecuniary HCE arise from market interactions rather than from direct effects on production possibilities. Assuming costly labor market search and complementarity between human and physical capital, Acemoglu [14] develops a framework in which investment decisions in physical capital are based on expectations on the prospective level of education of the workforce. Since firms anticipate future educational attainments from the contemporary aggregate level of human capital, a more educated workforce leads to an increase in physical capital investment. HCE arise because with asymmetric information a fraction of workers with low human capital will also enjoy a productivity increase through working with an increased stock of physical capital. As factors are paid their marginal product, these workers will realize wage gains because of investment decisions taken by third parties. Despite the positive connotation of HCE in the literature the occurrence of negative HCE is at least a hypothetical option. Negative effects can arise if the individual level of schooling is mainly interpreted as a signal of productivity by potential employers, even though education has no true effect on productivity. Thus, individual schooling imposes a cost since third parties are induced to alter their behavior by an inherently worthless signal. Through their ubiquitous nature HCE are of prime importance for the design of public policy. However, ample subsidies for the generation of human capital in most Western countries stand in stark contrast to a general ignorance of the size of human capital externalities [12].

2.4. Human Capital Development on Labor Productivity

The concept of human capital was shaped by a change in the composition of the capital involved in the product development process. Potelienė & Tamašauskienė [15] define human capital as a personal knowledge, acquired skills, education, innate abilities, experience, attitudes, behavior, intellect, creativity, entrepreneurship, motivation, innovation, insights, accumulated experience, physical, emotional and mental condition of health, energy, orientation in the environment, the ability to properly and timely use the knowledge and skills, and other personal characteristics that increase the productivity and income in the form of wages [16]. It is the most developed concept of human capital, covering both human capital components and the goals and result of its development (increasing labor productivity and income). Based on this definition, it can be said that the concept of human capital is multidimensional and includes elements of human capital and the impact of accumulation and utilization of its resources on individual income and can be analyzed in a micro and macro level. As many authors note human capital influences the country's economic growth, labor productivity and increases national competitiveness. In the model, human capital is treated as the complex of two main elements: education and health, which are developed through investment in education and in the form of additional training and investment in health care. It should be noted that in all analyzed researches, human capital is related to formal education and training in work [5]. Meanwhile, health as an element of human capital is ignored. According to Bloom et al., it can be stated that the impact of investment in health improvement on productivity can occur directly because a healthier person is working more productively, and also through life expectancy changes, increased population learning abilities and creativity, reduced income inequality, which makes it possible to accumulate more human capital

resources due to higher investment in education and through active increase in the share of labor force in the population [17]. The impact of human capital components on labor productivity occurs both directly and indirectly. The direct relationship between investment in employee training and experience also investment in employee health, which are measured at macro level by public and private investment in the education system and healthcare system, as well as private training costs, generates increasing labor productivity. Figure (2) presents channels of human capital impact on labor productivity [18].

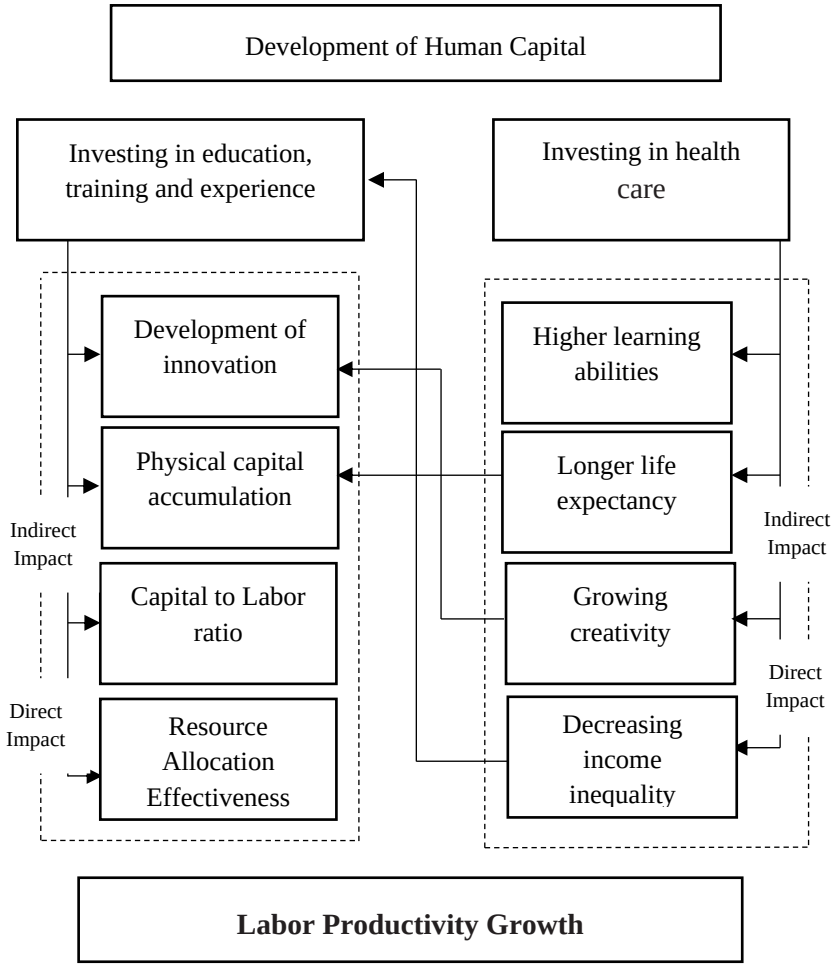

Fig. 2. Human Capital Development on Labor Productivity [18]

3. Data and Methodology

The technique used is DEMATEL method. A questionnaire was constructed and answered by eleven experts. Then the DEMATEL method was applied to analyze the importance of criteria and the casual relations among the criteria were constructed. The study period is 2021-2022.

Table 1. Most Productive Countries, 2021

Country	GDP (PPP) Per Hour	Rank	2021 Population
Norway	$75.08	1	5,465,630
Luxembourg	$73.22	2	634,814
United States	$67.32	3	332,915,073
Belgium	$60.98	4	11,632,326
Netherlands	$60.06	5	17,173,099
France	$59.24	6	65,426,179
Germany	$57.36	7	83,900,473
Ireland	$56.05	8	4,982,907
Australia	$55.87	9	25,788,215
Denmark	$55.75	10	5,813,298

Factors and components that lead to the productivity of human resources in cities are shown in Table (2). The commonalities and differences of human resource productivity indicators in selected countries are as follows.

Table 2. Factors and components of productivity of human resources in cities

City / Indicators	Norway	United States	Belgium	Netherlands	France	Germany
Equipment and Facilities (F1)		✓		✓	✓	✓
Experience (F2)	✓					
Technology (F3)		✓		✓		
Innovation (F4)		✓	✓			✓
Wage and Salaries (F5)		✓				✓
Skill Specification (F6)			✓	✓		
Aggregate City Human Capital (F7)	✓					
Education (F8)		✓	✓		✓	
Learning by Learning (9)		✓		✓		✓
Knowledge Spillovers (F10)		✓		✓		✓

4. DEMATEL Method

DEMATEL method was originally developed between 1972 to 1979 by the Science and Human Affairs Program of the Battelle Memorial Institute of Geneva, with the purpose of studying the complex and intertwined problematic group. It has been widely accepted as one of the best tools to solve the cause and effect relationship among the evaluation criteria. The procedure of DEMATEL method is presented below:

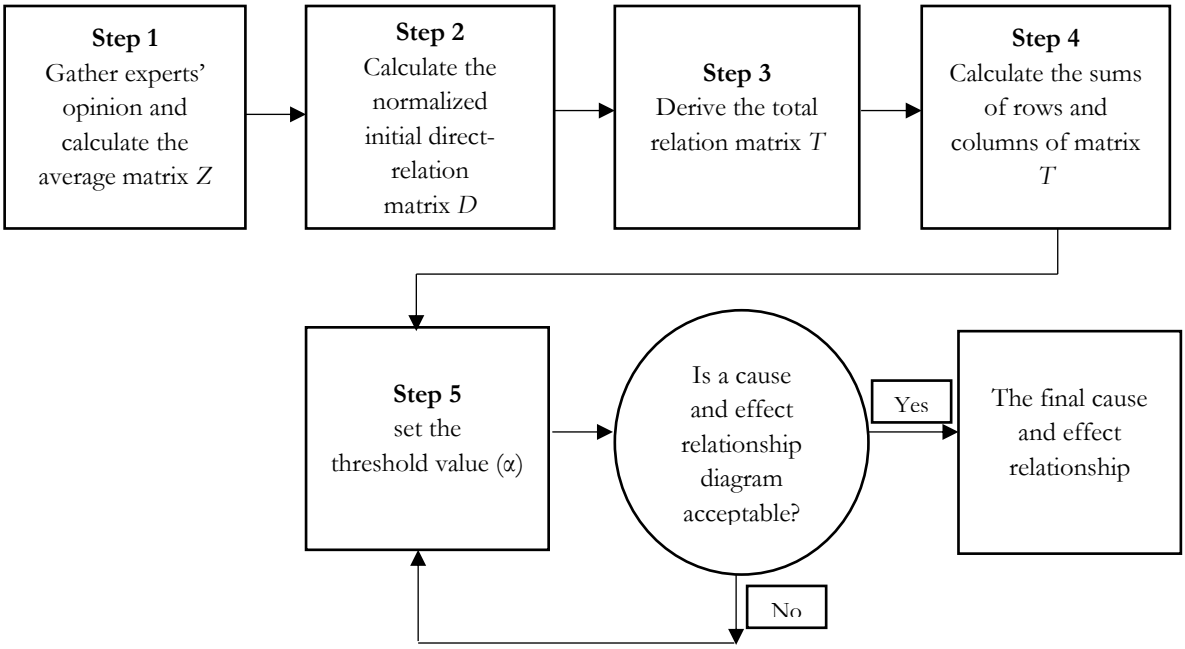

Fig. 3. The process of the DEMATEL method [19]

Step 1: Gather experts' opinion and calculate the average matrix Z

A group of m experts and n factors are used in this step. Each expert is asked to view the degree of direct influence between two factors based on pair-wise comparison. The degree to which the expert perceived factor i impact on factor j is denoted as x_{ij}. The integer score is ranged from 0 (no influence), 1 (low influence), 2 (medium influence), 3 (high influence), and 4 (very high influence), respectively. For each expert, an n x n non-negative matrix is constructed as $X^k = X_{ij}^k$, where k is the expert number of participating in evaluation process with $1 \leq k \leq m$. Thus, $X_1, X_2, X_3, \ldots, X_m$ are the matrices from m experts.

To aggregate all judgments from m experts, the average matrix $Z = [z_{ij}]$ is shown below:

$$z_{ij} = \frac{1}{m}\sum_{i=1}^{m} x_{ij}^k \quad (1)$$

Step 2: Calculate the normalized initial direct- relation matrix D

The normalized initial direct-relation matrix $D = [d_{ij}]$, where value of each element in matrix D is ranged between [0, 1]. The calculation is shown below.

$$D = \lambda * Z \quad (2)$$

Or

$$[d_{ij}]_{n\times n} = \lambda [z_{ij}]_{n\times n} \quad (3)$$

Where

$$\lambda = min\left[\frac{1}{max1 \le i \le n \sum_{j=1}^{n}[z_{ij}]}, \frac{1}{max1 \le i \le n \sum_{i=1}^{n}[z_{ij}]}\right] \quad (4)$$

Based on Markov chain theory, λ is the powers of matrix $D, D_2, D_3, \ldots, D_\infty$ guarantees the convergent solutions to the matrix inversion as shown below [19].

$$\mathrm{Lim}_{m\to\infty} D^m = [0]_{n\times n} \quad (5)$$

Step 3: Derive the total relation matrix T

The total-influence matrix T is obtained by utilizing, in which, I is an n x n identity matrix. The element of t_{ij} represents the Indirect Effects that factor i had on factor j, then the matrix T reflects the total relationship between each pair of system factors [19].

$$T = Lim_{m\to\infty}(D + D^2 + \cdots + D^m) = \sum_{m=1}^{\infty} D^i \quad (6)$$

Where

$$\begin{aligned}\sum_{m=1}^{\infty} D^i &= D^1 + D^2 + \cdots + D^m = D(I + D^1 + D^2 + \cdots + D^{m-1}) \\ &= D(I-D)^{-1}(I-D)(I + D^1 + D^2 + \cdots + D^{m-1}) \\ &= D(I-D)^{-1}(I - D^m) = T = D(I-D)^{-1}\end{aligned} \quad (7)$$

Step 4: Calculate the sums of rows and columns of matrix T

In the total-influence matrix T, the sum of rows and the sum of columns are represented by vectors r and c, respectively.

Where $[C_j]^{"}$ is denoted as transposition matrix. Let r_i be the sum of i_{th} row in matrix T. The value of r_i indicates the total given both directly and indirectly effects, that factor i has on the other factors. Let c_j be the sum of the j_{th} column in matrix T. The value of c_j shows the total received both directly and indirectly effects, that all other factors have on factor j. If $j = i$, the value of $(r_i + c_i)$ represents the total effects both given and received by factor i. In contrast, the value of $(r_i - c_i)$ shows the net contribution by factor i on the system. Moreover, when $(r_i - c_i)$ was positive, factor i was a net cause. When $(r_i - c_i)$

Was negative, factor i was a net receiver.

Step 5: Set a threshold value (α)

The threshold value (α), was computed by the average of the elements in matrix T. This calculation aimed to eliminate some minor effects elements in matrix T.

$$\propto = \frac{\sum_{i=1}^{n}\sum_{j=1}^{n}[t_{ij}]}{N} \quad (8)$$

Where N is the total number of elements in the matrix T [20].

6. Results and Discussion

In this paper, The Decision-Making Trial and Evaluation Laboratory (DEMATEL) technique was applied to analyze and capture the causal relationship visibly among the criteria and also measure the interaction level and the direction of influence of the criteria. The criteria identified to be crucial in influencing other criteria to co-create and the driving factors for problem-solving were:

Table 3. Relationships Matrix

Factor	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10
F1	0	0.73	0.83	1.73	2.76	0.92	1.23	2.45	2.21	1.7
F2	2.37	0	0	0.32	0.69	0	1.72	1.21	2.68	2.72
F3	1.76	2.45	0	2.98	2.54	0.67	1.45	1.62	1.31	1.87
F4	3.5	2.76	2.12	0	0.42	2.87	1.63	2.23	2.43	2.32
F5	3.83	3.62	3.34	3.12	0	2.92	3.76	3.87	4.66	3.58
F6	2.23	1.34	1.54	2.61	0.87	0	1.84	1.02	1.81	1.59
F7	1.76	3.21	3.56	3.71	3.65	2.73	0	2.34	1.07	2.76
F8	1.89	3.23	1.73	2.67	3.72	0.84	3.77	0	2.09	2.89
F9	3.26	2.26	0.87	2.87	3.83	1.72	2.69	1.53	0	1.67
F10	3.63	4	3.72	3.77	3.93	2.39	3.89	3.26	3.62	0

Table 4. Total Matrix

Factor	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	D	D+R	D-R	Type
F1	0.108	0.13	0.105	0.154	0.179	0.097	0.136	0.159	0.163	0.144	1.378	3.507	-0.75	effect
F2	0.154	0.085	0.065	0.094	0.107	0.056	0.129	0.107	0.155	0.152	1.109	3.206	-0.988	effect
F3	0.168	0.185	0.084	0.193	0.176	0.095	0.147	0.143	0.146	0.156	1.498	3.060	-0.55	effect
F4	0.227	0.202	0.152	0.123	0.134	0.161	0.162	0.167	0.185	0.178	1.696	3.745	-0.265	effect
F5	0.319	0.311	0.249	0.293	0.2	0.217	0.297	0.279	0.322	0.286	2.776	4.738	0.814	cause
F6	0.164	0.136	0.117	0.170	0.117	0.064	0.141	0.112	0.142	0.132	1.3	2.655	-0.053	effect
F7	0.218	0.255	0.224	0.263	0.25	0.184	0.15	0.203	0.186	0.225	2.162	4.085	0.24	cause
F8	0.216	0.252	0.171	0.23	0.252	0.13	0.252	0.133	0.208	0.225	2.072	3.809	0.335	cause
F9	0.238	0.217	0.133	0.218	0.238	0.144	0.206	0.165	0.134	0.177	1.876	3.816	-0.063	effect
F10	0.312	0.319	0.258	0.307	0.303	0.202	0.298	0.264	0.293	0.186	2.747	4.613	0.881	cause
R	2.128	2.097	1.562	2.049	1.962	1.354	1.922	1.736	1.94	1.865	-	-	-	-

The results show that Education, Aggregate City Human Capital, Wage and Salaries and Knowledge Spillovers are part of influencing variables (cause) and other variables are known as influencing variables (effect). Also, the results show that the highest degree of effectiveness related to Knowledge Spillovers (0.881) and Learning by Learning (-0.988) have the highest degree of effectiveness.

- ***Education***

The person's level of human capital is dependent upon their age and the amount and types of schooling and training received by the individual. There are those skills derived from formal schooling and those that are also gained from on-the-job training, including both general and specialized training. Those include education and average experience. In empirical analysis, the result show that education had a much more significant effect on output productivity than work experience.

- ***Wage and Salaries***

Wages become an important aspect of being effective if linked to the performance significantly. Granting wages remuneration is the most complex task for the industry, is also the most significant aspects for workers, because of the amount of wages reflects the size of the value of their work among the workers themselves, their families and communities. Wages are very important for the industry

because it reflects the industry's efforts to defend human resources in order to have a high loyalty and commitment to the industry. Effective wages strategy is expected to contribute to maintaining the viability of the work force, the realization of the vision and mission, as well as for the achievement of work objectives.

- ***Innovation and Technology***

Innovativeness is one of the fundamental instruments of growth strategies to enter new markets, to increase the existing market share and to provide the company with a competitive edge. Motivated by the increasing competition in global markets, companies have started to grasp the importance of innovation, since swiftly changing technologies and severe global competition rapidly erode the value added of existing products and services.

Thus, innovations constitute an indispensable component of the corporate strategies for several reasons such as to apply more productive manufacturing processes, to perform better in the market, to seek positive reputation in customers' perception and as a result to gain sustainable competitive advantage. Innovations provide firms a strategic orientation to overcome the problems they encounter while striving to achieve sustainable competitive advantage. Innovation has a considerable impact on corporate performance by producing an improved market position that conveys competitive advantage and superior performance. A large number of studies focusing on the innovation-performance relationship provide a positive appraisal of higher innovativeness resulting in increased corporate performance.

- ***Skills and Learning-by-Doing***

Until recent years, empirical studies attempting to measure human capital limited by available data. The overwhelming measure of human capital in the literature has been education as measured by years of schooling, degree attained, or entry/exit rates. Therefore, these studies make implicit assumptions that formal schooling is the most important measure or type of human capital levels. However, education is not the only source of human capital accumulation and does not measure skill levels adequately. The traditional measure, typically the percentage of population with a bachelor's degree or higher, are broadly defined and do not describe the types of skills or education and knowledge-base that workers possess in a region. Similarly, graduates with a degree in the fine arts do not necessarily possess the same productive skill set as a graduate with an engineering degree, for instance. Their contribution to the productive process can be expected to be quite different, while still serving important societal needs. Yet, in the existing measures of educational attainment, each is weighted the same. Furthermore, the presence or absence of a college degree says nothing specific about the variables contributing to innovative activity and knowledge spillovers enhancing production. For instance, the mechanisms for knowledge spillovers and new ideas spring from social interaction and occupations requiring higher levels of critical thinking, problem solving, and other cognitive skills. While education levels undoubtedly play a function in skill and worker development, educational attainment is not the primary indicator of the triggers by which new ideas are generated. Learning-by-doing and on-the-job training are just as important to the formation of human capital as formal schooling.

- ***Knowledge Spillovers and Aggregate City Human Capital***

Once codified information is documented it remains accessible. Conversely, tacit knowledge is tied to the individual when that individual dies so does the tacit knowledge they possess, while the knowledge they created in their lifetime, lives on. There are basic knowledge and skills such as reading, writing,

math, communicating and problem - solving, which help the accumulation and interpretation of other types of knowledge, such as that which is codified. These basic skills must be in place before all else. Therefore, one might expect that the higher the level of basic skills, the faster the accumulation and development of new and additional knowledge. One important distinction between these two knowledge types is the role tacit knowledge plays in spillover externalities. Because tacit knowledge is embodied in an individual, that knowledge is dependent upon the location of the person. In order to be transmitted, people need to be in proximity to other people. Therefore, geography matters in the spillover effects of this type of knowledge. Since tacit knowledge in effect has the qualities of a non-rival good it can be easily transmitted between individuals. Furthermore, it is tacit skills through which new ideas are communicated, explained, and transferred.

7. Concluding Remarks

This research sets out to contribute to the understanding of human capital and its influence on productivity of the regional workforce. The ‘new economy’ or ‘knowledge economy’ is increasingly reliant upon the knowledge, skills, and abilities embodied in its workforce which facilitate the stimulation and generation of new ideas. The need to understand these fundamental changes has shifted regional economic analysis towards the requirements of the workforce of the ‘new economy’ and what is often referred to as human capital. Human capital can be defined as those skills, abilities, and knowledge embodied in an individual which contribute to a productive process by creating value, whether it be economic or social. Concentrations of human capital have been demonstrated to contribute to higher levels of economic activity; a result of higher individual productivity and knowledge spillovers. In empirical studies, the measurement of human capital has over whelming been limited to educational attainment, defined as the percentage of population holding a four-year college degree or higher. However, most leading thinkers on the role of human capital in economic development have recognized that the skills and knowledge embodied in an individual are not limited to his or her formal schooling, but are also gained through basic innate skills, on-the job-training, work experience, and formal and informal social networks. Little research has been done to understand which skills, abilities, and knowledge have the greatest impact on economic growth, and therefore which areas policies can have the most impact. New growth theory suggests that economic activity is directly dependent upon the creation of new knowledge and innovative activity which results from the productive process itself. As economies have shifted to a system where services and knowledge creation are the vital components of growth, the driving force to innovate is highly dependent upon human capital possessed in the workforce. We can draw the content of human capital and its mechanism in promoting economic growth and productivity. Therefore, Factors affecting productivity can be divided into several categories:

- Education
- Aggregate City Human Capital
- Wage and Salaries
- Innovation
- Learning by Learning
- Knowledge Spillovers
- Skill
- Experience
- Technology
- Equipment and Facilities

References

[1] Smith, A. (1776). An inquiry into the nature and causes of the wealth of nations: Volume One. London: printed for W. Strahan; and T. Cadell, 1776.

[2] Marshall, A. (1890). Principles of Economics: an introductory volume, book 4, ch. 6, version numérique. McMaster University, Archive for the History of Economic Thought.

[3] Ma, L., & Ye, R. (2019). Does daily commuting behavior matter to employee productivity?. Journal of Transport Geography, 76, 130-141.

[4] Samadzad, S., & Hashemi, M. (2021). Human Resource Productivity and Work-Life Balance in Learning Organizations. International Journal of Innovation in Management, Economics and Social Sciences, 1(3), 32-45.

[5] Samadzad, S., & Hashemi, M. (2021). Work - Life Balance and Productivity in Learning organization (LOs), Rah publications, Tehran.

[6] Abel, J., Dey, I., & Gabe, T. (2010). Productivity and the density of human capital, Federal Reserve Bank of New York Staff Reports 440.

[7] Chauvin, J. P., Glaeser, E., Ma, Y., & Tobio, K. (2017). What is different about urbanization in rich and poor countries? Cities in Brazil, China, India and the United States. Journal of Urban Economics, 98, 17-49.

[8] Lee, H. W., Pak, J., Kim, S., & Li, L. Z. (2019). Effects of human resource management systems on employee proactivity and group innovation. Journal of Management, 45(2), 819-846.

[9] Whelan, S., & Parkinson, S. (2017). Housing tenure, mobility and labour market behaviour.

[10] Noori, F., & Ghahremani Nahr, J. (2019), Structural-interpretative Patterns of Factors Affecting the Sustainable Development of Agricultural Production Cooperatives (Case Study: East Azerbaijan Province). Journal of Agricultural Economics and Development, 33(3), 281-297.

[11] Noori, F., Garachorlo, N., Samadzad, S. and Ghahremani Nahr, J. (2019), Comparative Study of Factors Affecting Human Resources Productivity in Scientific and Technological Organizations of Selected Countries and Component Evaluation in Academic Center for Education, Culture and Research, Journal of Human Resource Study, 9(1), 71-92.

[12] Duranton, G. and Puga, D. (2004), Micro-Foundations of Urban Agglomeration Economies, Handbook of Regional and Urban Economics, 4, 2063-2117.

[13] Jovanovic, B., & Rob, R. (1989). Growth and diffusion of technology. Review of Economic Studies, 56(4), 569-582.

[14] Acemoglu, D. (1996). A micro foundation for social increasing returns in human capital accumulation. Quarterly Journal of Economics, 111(3), 779-804.

[15] Potelienė, S., & Tamašauskienė, Z. (2013). Human capital investment: Measuring returns to education. Socialiniai tyrimai, (4), 56-65.

[16] Ghahremani Nahr, J. (2020), Improvement the efficiency and efficiency of the closed loop supply chain: Whale optimization algorithm and novel priority-based encoding approach. Journal of Decisions and Operations Research, 4(4), 299-315.

[17] Bloom, D.E., Canning, D. and Sevilla, J. (2004) The Effect of Health on Economic Growth: A Production Function Approach. World Development, 32, 1-13.

[18] Maciulyte Sniukiene, A. and Matuzeviciute, K. (2018), Impact of Human Capital Development on Productivity Growth in Eu Member States, Business, Management and Education, 16(1), 1-12.

[19] Zeng, S.X., Xie, X.M. and Tam, C.M. (2010), Relationship between cooperation networks and innovation performance of SMEs, Technovation, 30(3), 181-194.

[20] Yang, Y.P., Shieh, H. M., Leu, J.D. and Tzeng, G.H. (2008), A novel hybrid MCDM model combined with DEMATEL and ANP with applications. International Journal Operational Research, 5(3), 160-168.

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