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BUSINESS INNOVATIONS FOR UNFOLDING STRATUMS OF HUMAN DEVELOPMENT INDICATORS: A WORLDWIDE EMPIRICAL ANALYSIS

Abstract. *Role of entrepreneurial innovations for human development is still invisible and subject to be investigated. This study uniquely unfolds the stratums of human development indicators caused by the activities of entrepreneurship. For this very purpose, the study utilizes the panel data of human development and entrepreneurship from 129 countries ranging for the years of 2016 to 2018. The human development has been measured through the human development index (HDI), and this data has been accessed from indicators of United nations development program (UNDP). The data of global entrepreneurial innovations (GEI) has been accessed from the global entrepreneurship and development index (GEDI). Both HDI and GEI comprised of composite indexes. GEI is the composite index with three sub-indices and 14 pillars. The three sub-indices are attitudes, abilities and aspiration. Out of 14 pillars opportunity perception, startup skills, risk acceptance, networking and cultural support are associated with attitudes. Opportunity startup, technology absorption, human capital and competition are associated with abilities while production innovation, process innovation, high growth, internationalization and risk capital are associated with aspiration. Although, the data of the HDI index was initially developed since 1990. However, due to non-availability of GEI data, only three years of panel data were included in the study. HDI comprised of three basic dimensions which include the knowledge, standard of living and healthy life. Based on the literature, the study hypothesized that global entrepreneurship positively affects human development worldwide. This proposed relationship was measured through generalized methods of moments through EViews. The data trend had been measured through a scatter diagram, before measuring the specific relationship among the major variables of the study. Through this test, normality of the data ad outliers was also checked. Data dispersion and linearity was checked through the test of standard residuals. After checking the appropriateness of data, parameters of the study were estimated. Results showed a strong and positive correlation between entrepreneurship and human development. By applying generalized methods of moments, the analysis revealed that entrepreneurial innovations could explain the 68 per cent variation in human development. So, it can be safely said that entrepreneurship is an important cause to enhance the capabilities of humans and can ultimately improve HDI worldwide. It is suggested that the nations who want to improve the skills, capabilities and living standards of humans in their respective regions should devise the strategies to promote the entrepreneurial activities.*

Keywords: entrepreneurship, entrepreneurial ventures, human development indicators, global entrepreneurship development index, human development index, human capabilities, human skills, human capital.

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Introduction. This world is bestowed and prosper with the vast talent of humans. The creativity and inventiveness of humans provide a common platform for experiments which enables humans to accept the challenges, to resolve the issues facing at current times and to build up the prospects to tackle the forthcoming hitches. All the progress and growth in this world is human-centric. Still, this unleashed human talent is usually undermined by the policymakers, which might affect the sustainability and deteriorate the practical skills of humans. To through dig out the human endowment, there is a dire need to unfold the stratums of human skills and development so that the realistic contributions in growth can be measured. This study linked human development with entrepreneurship to clarify the stratums of human development with the empirical analysis of 129 countries of the world. As per Toma, Grigore, and Marinescu (2014), there is a powerful connection between entrepreneurship and development, but this connection is yet to be delved out thoroughly.

Entrepreneurship is frequently associated with development and growth, but this association is generally related to individual gain or economic output like the gross domestic product (GDP), self-employment or employment. Impact of entrepreneurship has not been considered for human development although there is a profound contribution of entrepreneurs with broader social and environmental benefits for humans (Acs, Szerb, & Autio, 2017; Gries & Naude, 2011). Usually, the entrepreneurial activities are considered to innovate and risk-taking which can boost up the economy with the input of new idea, new process, new technology, changing the way of competition and finding new and niche markets (Acemoglu, 2012; Lucas Jr, 1988; Naude, 2011). Whenever entrepreneurship is associated with economic output or with production factor, it is known as entrepreneurial capital (Erikson, 2002; Gimeno, Folta, Cooper, & Woo, 1997). This entrepreneurial capital boosts up the growth in two ways, first with the introduction of technical expertise and secondly with the effective utilization and allocation of resources (Eckhardt & Shane, 2003; Iyigun & Owen, 1998; Mueller, 2006).

Although the increase in entrepreneurial activities in any country improves the growth and productivity of that country, it would not automatically describe the development of humans. The reason is that literature has ignored the relationship between entrepreneurship and human development. The reason for this negligence is three tiers: 1) there is lack of a theoretical framework to explain the relationship of entrepreneurship and human development adequately; 2) measuring human development is a complex issue as it is multidimensional and lacking widely acceptable scale; 3) in the past, majority of the researchers has focused on attributes and intentions of entrepreneurship and neglected the impact of entrepreneurship (Gries & Naude, 2011). So, this study measures the influence of entrepreneurship on human development by raising the question of to what extent human development stratums can be unfolded through entrepreneurship.

Role of entrepreneurship is taken as a factor of production, means to earn a livelihood, to fulfil the desire or to achieve the self-actualization need of and individual. Most of the previous scholars (Baumol, 1996; Eckhardt & Shane, 2003; Stuetzer et al., 2018; Venkataraman, 2019) only focused on meagre or micro side of the entrepreneurs and ignored the macro benefits of entrepreneurs which enhances the capabilities of humans at large for all nations. This study uniquely addresses the contribution of entrepreneurship in connection with strengthening the capacities of humans worldwide. As per (Gries & Naude, 2011; Shane & Venkataraman, 2000), there is a lack of theoretical framework which should establish the connection between entrepreneurship and human development. So, this study developed a link between entrepreneurship and human development which can help to understand this relationship for the nations worldwide.

Literature Review. For long term success and growth, it is crucial how nations develop and upgrade their skills and competencies. The competencies of humans are known as human capital which ultimately creates value for that nation in the global economic system. The development to enhance the human competencies cannot only be done through formal education and skill development program, but it's a long-term span of experiences, effective utilization of resources and willingness to develop. All the features

mentioned above are also the characteristics of entrepreneurs, so it can be determined that human development and entrepreneurship interrelated with each other. Thus, for improvement in human capital, entrepreneurial activities should be enhanced. The studies suggested that entrepreneurship was so much important. Therefore, without this input human development would be impaired and undermined without entrepreneurship (Awogbenle & Iwuamadi, 2010; Grant, 1991; Rawhouser, Cummings, & Newbert, 2019; Rocha, 2004).

Martin, McNally, and Kay (2013) measured the human capital formation in a meta-analysis with the help of entrepreneurship. In their study, the main focus was on the education and training programs for entrepreneurs. At first instance, it was observed that there was a lack of consistent evidence to support the relationship between education, training and successful entrepreneurs. Later by using the quantitative technique, it was concluded that entrepreneurial education training had a substantial impact on entrepreneurial outcomes. However, there were weaknesses in the previous studies related to methodological flaws. The overall research concluded that entrepreneurial specific education is very crucial for the growth of entrepreneurship and recommended to conduct the studies on global scales. Earlier the Henry, Hill, and Leitch (2005a) tried to find out the importance of entrepreneurial education for successful entrepreneurs. A little uniformity was found between education and entrepreneurship. Herewith, the conclusion was that education should be given importance to start new ventures. While focusing on education for entrepreneurs, there was a need for the development of these programs' effectiveness as the more sophisticated educational programs lead towards more efficiency of entrepreneurs (Henry, Hill, & Leitch, 2005b). Education and entrepreneurship acted part and parcel for each other, and both helped to boost up the economic activity and growth (Bakar, Islam, & Lee, 2015).

Entrepreneurship and human capital have a deep connection with each other. The entrepreneurial process is supposed to be based on knowledge because this knowledge helped a lot in creating the new venture. Usually, this knowledge is associated with the personal characteristics of the entrepreneur, but the process of initiating a new venture is beyond the dependency on individual characteristics. It is generally accepted that entrepreneurship is the result of a complex of human traits which includes crucial skills, personality, previous employment and experience. Age and social networking also found to have a significant association with entrepreneurial innovations (Madsen, Neergaard, & Ulhoi, 2003). However, in most of the studies, entrepreneurial innovations are not associated with personal experience and characteristics. Thus, natural abilities and education can be partly related to entrepreneurial innovations, but significant contributions came from related experience. It is because the entrepreneurs innovate or come with the new idea which quaked the existing business practices. And such innovations seemed to be impossible in the absence of deep and prolonged experience in the related field (Johannisson, 1991). However, entrepreneurs continuously tackled with unexpected and unseen situations. Such situations are termed as improvisational in the literature. These situations compelled entrepreneurs to act and perform quickly. So, in such awkward situations, only education and experience are not sufficient, but the self-efficacy and interpersonal linkages helped entrepreneurs in successful innovating (Balachandra, 2019).

Allen, Link, and Rosenbaum (2007) examined the patent activities of faculty in the academic sector concerning human attributes development and entrepreneurship. The study revealed that patenting was the unique dimension of entrepreneurship. Herewith, patenting is aided with age and experience, which helped the faculty to become successful entrepreneurs. Thus, patent based on entrepreneurship was considered to be able to enhance the performance and growth of the business (Chung, Lee, & Shin, 2019). Entrepreneurial innovations could not be possible without innovative and creative acts of entrepreneurs. This creativity is directly linked with the mental power and intellectual power of the entrepreneurs. Patenting of physical inventions is more straightforward, but the patenting of intellectual properties tends to be a tedious job.

Furthermore, patenting to intellectual property rights protected the innovativeness of entrepreneurs and yields excellent economic benefits to spending more on research and development. However, in the

long run, this relationship has an inverted U shape relationship, which showed that the economic benefits would not be available in the distant future (Acs & Sanders, 2012). Earlier, Lee, Florida, and Acs (2004) identified the factors which are crucial for the birth of new entrepreneurial innovations. These factors included the population density, unemployment rate, structure of the industry, human capital, finance availability and characteristics of the entrepreneurs.

Technical and managerial capabilities of entrepreneurs enabled them to create successful entrepreneurial innovations and in the formation of human capital (Ucbasaran, Westhead, & Wright, 2008). These capabilities are directly linked with the relevant experiences of the entrepreneurs. Moreover, the success of the entrepreneurial venture is also associated with the information in the mind of the entrepreneur. By putting aside experience, the information sources can be categorized into two primary sources. Firstly, the information can be obtained formally. It can be entrepreneurial education or access to the periodicals or research outputs of the successful entrepreneurs. Secondly, the information source is the informal personal and professional business networks. The literature revealed that formal education and access to information is more helpful for successful entrepreneurial innovations as compared to informal networks (Jimenez et al., 2015; Thai & Turkina, 2014). By comparing the rural and urban constituencies of entrepreneurial innovations, Faggian, Partridge, and Malecki (2017) recognized that capabilities and knowledge of entrepreneurs were fundamental for creating the environment of entrepreneurship or human development. They further added that the patterns of growth for urban and rural entrepreneurship were almost similar except the high-tech employment which was associated with urban areas. Herewith, Tyukhtenko et al. (2019) found that for innovative development of regions, cooperation between state institutions and private enterprises are essential.

Hayton and Kelley (2006) developed a competency-based framework for corporate entrepreneurs. The study identified that innovative products and rendering such services leaded the corporation towards development but this development also required behavioural role and individual competencies. Titko and Bierne (2019) evaluated the competencies of young entrepreneurs in two days of the entrepreneurial workshop. The study concluded that interactive teaching methods helped students to enhance their competencies. It was further added that the teaching methods should be aided with collaborative work, creative problem-solving techniques, effective decision making, performance measurement, commitment, listening and speaking skills enhancement and self-motivation. Competencies are imperative for entrepreneurial development. These competencies may be managerial or entrepreneurial. For successful entrepreneurial innovations, entrepreneurial competencies are required while the managerial competencies are extraneous where the entrepreneurial competencies can be enhanced through entrepreneurship education (Morris, Webb, Fu, & Singhal, 2013).

Entrepreneurial ventures played a vital role for the development of economy across the regions (Toma, Grigore, and Marinescu, 2014) which ultimately improve the living standards of that region and enhance the graph of human development. Furthermore, entrepreneurship is taken as a multifaceted phenomenon which is being considered a process, a resource or symbol of growth. However, researchers have varying points of views in literature while describing the relationship between entrepreneurship and human development. The importance of entrepreneurship and its association with human development is gaining more importance because of turbulence environment and abrupt changes in technology and communication. Entrepreneurial innovations can be considered to revolutionize from this turbulent environment. So, the role of entrepreneurship is gaining more importance for the present era. According to Tidd and Bessant (2018), entrepreneurship matters a lot because from above all the contributions in the growth implies a human activity which is a direct contribution of human activity to the development process (Benhabib & Spiegel, 1994; Davidsson & Honig, 2003; Haber & Reichel, 2007; Hessels & Naude, 2019; Unger, Rauch, Frese, & Rosenbusch, 2011).

After the thorough review of empirically-based literature, it can be concluded that most of the previous studies did not correctly address the explanatory variables of human development. Very few have

determined the association between entrepreneurship and human development. Because of this slackness in literature, the stratums of human development are yet to be explored and empirically tested subsequently. As per suggested in the literature, further investigation may be carried out to analyze the relationship mentioned above. So, to fill this imparity and to analyze the relationship between entrepreneurship and human development, the study assumed that entrepreneurship positively affects human development worldwide. Description of Study Model through Equation:

$$HDI_{it} = \beta_0 + \beta_1 GEI_{it} + \varepsilon \quad (1)$$

where HDI = Human Development Indicators; β_0 = intercept of the equation; β_1 = coefficient of variable (independent variable); GEDI = Global Entrepreneurship Innovation; It = time of 1, 2 and 3 years (2016 to 2018); ε = the error term.

From the above equation, it can be hypothesized.

Hypothesis: Global entrepreneurship innovation positively affects human development worldwide.

Methodology and research methods. The data set of 129 countries were included in this study to measure the association between global entrepreneurship and human development. For panel analysis, data were used for the period of three years, starting from 2016 to 2018 for both GEI and HDI. Selection of data only for three years is because of the non-availability of data for previous years of GEDI. Data set for GEI has been accessed from «The global entrepreneurship and development institute (GEDI)» while the data set for HDI has been obtained from «United Nations Development Program (UNDP)». GEI data was developed by (Acs, Szerb, & Autio, 2016), initially developed in 2009 and then updated till 2018. GEI is the composite index with three sub-indices and 14 pillars. The three sub-indices are attitudes, abilities and aspiration. Out of 14 pillars opportunity perception, startup skills, risk acceptance, networking and cultural support are associated with attitudes. Opportunity startup, technology absorption, human capital and competition are associated with abilities while production innovation, process innovation, high growth, internationalization and risk capital are associated with aspiration. HDI is also a composite index developed by (Jahan, 2017). The data was accessed from 2016 to 2018. Although the data of the HDI index was initially developed since 1990 due to non-availability of GEI data, only three years of panel data were included in the study. HDI comprises of three basic dimensions which include the knowledge, standard of living and healthy life. Further, the knowledge is measured through education index or mean years of schooling; the standard of living is measured through GINI index or income or consumption index; long and healthy life is measured through life expectancy index.

Results. Equation 1 was empirically estimated and tested via Eviews software. For estimation of the model, dynamic panel analysis was adopted. That is based on "Generalized Panel method of moments" (GMM) as suggested by (Hansen, 1982). Before applying the GMM, data were tested for normality and to identify the outliers. For this purpose, scatter diagram and standardized values were plotted as shown below subsequently as figure 1 and 2.

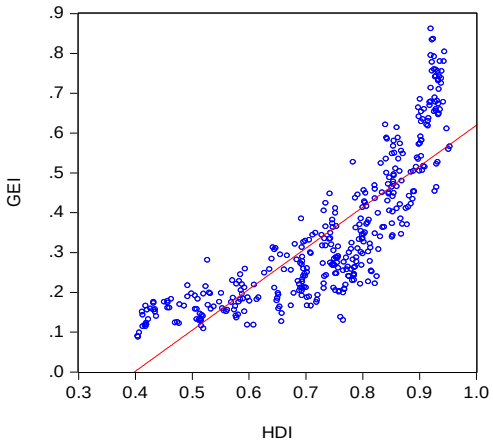

Figure1. Scatter Diagram of HDI and GEI

Source: developed by the authors

Figure 1 above shows the scatter diagram along x and y-axis, where HDI is taken on the x-axis while GEI on the y-axis. Scatter diagram is a line graph used to plot a continuous function to see the relationship of observed variables. The diagram used dots of individual values of HDI and GEI and shows that there is a linear relationship between HDI and GEI. The analysis is supported with the work of (Sammon, 1969) who used the algorithm for the analysis of multidimensional data mapped through scatter diagrams.

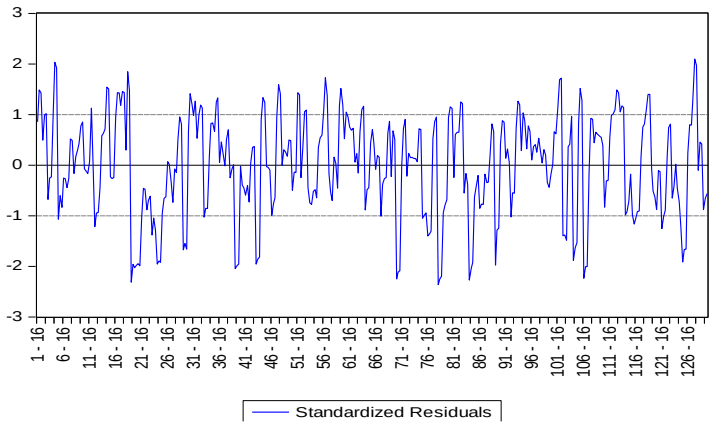

Figure 2. Standardized Residuals

Source: developed by the authors

Standardized residual values are plotted for two purposes. Firstly, to see the dispersion among the observed variables and secondly, to determine the statistical-based on the relationship, either it is linear or nonlinear. The above figure 2 shows that the line of the standardized residual has an excellent fit to the data, which shows the randomness of the residual plot. The plot also shows the linear relationship between HDI and GEI, so panel GMM method is adopted to measure the association between HDI and GEI. The advantage of standardized values is their dependence not only on the common values, but they also take

into consideration the mean square error. In this way, the standardized values can easily determine the extreme values in standard deviations and point out the outliers (Haberman, 1973). From figure 1 and 2, it is clear that the data has no normality issues and has no outliers. So, further sophisticated statistical tests were applied for the description of data and to measure the association between entrepreneurship and human development.

Table 1. Descriptive Statistics

Indicators	HDI	GEI
Mean	0.737633	0.349620
Median	0.761000	0.298000
Maximum	0.953000	0.862000
Minimum	0.404000	0.088000
Std. Dev.	0.149066	0.185033
Skewness	-0.593772	0.802691
Kurtosis	2.376193	2.666602
Jarque-Bera	29.01528	43.35054
Probability	0.000001	0.000000
Sum	285.4640	135.3030
Sum Sq. Dev.	8.577180	13.21552
Observations	387	387

Source: developed by the authors

Table 1 describes the data for all 387 observations in a general way. It explains the average values of HDI and GEI through mean and median. As there is a slighter difference between the values of mean and median, it can be stated that there are no normality issues in the data. For HDI, the data is slightly negatively skewed with less value of mean than the median. On the other hand, GEI is slightly positively skewed with less value of median than mean. Lower values of standard deviation for both HDI and GEI shows there is no much deviation in the data and most of the values are scattered around the origin. The values of Jarque-Bera also support the normality of data as suggested by (Thadewald & Buning, 2007) for both HDI and GEI, which are 29.01528 and 43.35054 subsequently. From all above discussion based on the obtained values, it can be said that the data has no high variations nor normality issues. So, further sophisticated statistical analysis can be applied to measure the association, strength and type of relationship. Hence, the linear correlation and panel generalized method of moments has been applied to measure the relationships mentioned above.

Table 2. Correlation Matrix

Indicators	HDI	GEI
HDI	1.000000	
GEI	0.829095	1.000000
	29.09634	-----
	0.0000	-----

Source: developed by the authors

Table 2 above shows the correlation between global entrepreneurship and human development. Correlation is a bivariate variable which shows the association between two variables. Usually, these variables are in the form of pair, and one variable contains information about another variable (Cohen,

West, & Aiken, 2014). Its values have a range between -1 to +1. Zero means there is no correlation. Negative sign shows negative association while positive sign shows the positive association among the observed variables. The association is weak if the value of R, which is also known as the coefficient of correlation having a value less than 0.5 while the association is strong if the value of R is more significant than 0.5. From table 2, it is clear that the value of R is 0.8, which shows that there is a very strong and positive correlation between global entrepreneurship and human development.

Table 3. Findings of GMM Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.504110	0.014770	34.12975	0.0000
GEI	0.667935	0.022369	29.85994	0.0000
R-squared	0.687398	Mean dependent var		0.737633
Adjusted R-squared	0.686586	S.D. dependent var		0.149066
S.E. of regression	0.083452	Sum squared resid		2.681246
Durbin-Watson stat	0.143883	J-statistic		1.23E-24
Instrument rank	2			

Source: developed by the authors

Table 3 presents the results of the generalized method of moments (GMM). GMM is recommended by (Arellano & Bover, 1995) and (Blundell & Bond, 1998) as it can tackle the issues of endogeneity. This method is widely used in developmental models as it yields reliable results. GMM method was also applied by (Bond, Hoeffler, & Temple, 2001) and is considered to be the most appropriate method for measuring the relationship of observed variables. From table 3, it is evident that the explanatory variable entrepreneurship successfully explained the 68 per cent variation in the dependent variable of human development. This association is also found to be very strong and positive. From the coefficient of GEI, it can be said that one-unit change in GEI may cause the 66 per cent change in human development. The relationship is also found to be positive and significant. From results, it is evident that GEI can be associated with human development which supports the hypothesis of the study that global entrepreneurship positively affects human development worldwide. The overall results were in the favour that the estimated model successfully explained the variation in human development.

Conclusions. The prime focus of this study was to measure the association between global entrepreneurship and human development. It was also to be measured to what extent the entrepreneurship can unfold the stratums of human development. For this very purpose, data from 129 countries were assessed for 3 years. Out of 387 observations, it was found that there is a strong and positive relationship between entrepreneurship and human development. By applying the GMM test, it was observed that Global entrepreneurship had successfully explained the 68 per cent variation in human development. The relationship is also found to be statistically significant with the p-value of 0.00 at 95 per cent confidence interval with t-value greater than 3. Following the above mentioned, the study hypothesis is accepted, and it can be safely said that global entrepreneurship has a strong and positive association with human development. These results are consistent with previous studies Tidd and Bessant (2018) that entrepreneurship and development are strongly interconnected. For improvement in human development index, the nations should focus on enhancing the activities of entrepreneurial undertakings. Unfortunately, this entrepreneurial venture is missing while calculating the human development index by (Ghislandi, Sanderson, & Scherbov, 2019); Jahan, 2015). So, based on the empirical evidence in this study, it is strongly urged by the authors that entrepreneurial innovations should be an integral part of human development index in future. The study empirically contributed to the body of knowledge and emphasized

that the world human development index should be enhanced with the inclusion of entrepreneurial innovation.

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Вплив бізнес-інновацій на розвиток людського потенціалу: емпіричний аналіз міжнародного досвіду

У статті узагальнено аргументи та контраргументи у рамках наукової дискусії щодо впливу бізнес-інновацій на розвиток людського потенціалу. Головною метою дослідження є оцінювання впливу ефективності бізнес-інновацій на розвиток людського потенціалу в країні. Емпіричний аналіз засновано на панельних даних, сформованих для вибірки зі 129 країн за 2016-2018 роки. Для визначення показників розвитку людського потенціалу використано індекс людського розвитку (ІЛР), що розраховується екпсертами Програми розвитку Організації Об'єднаних Націй (ПРООН). Аналіз рівня ефективності бізнес-інновацій здійснено з використанням глобального індексу підприємництва та розвитку. Авторами зазначено, що застосування даних індексів дозволило здійснити інтегральне оцінювання людського потенціалу. До складу зведеного глобального індексу підприємництва та розвитку включено три субіндекси: поведінковий (свідомість, навички запуску стартапів, рівень ризикованості, нетворкінг, культурна підтримка), здібностний (умови для запуску стартапу, наявні технології виробництва, людські ресурси та рівень конкуренції) та рівень прагнення (наявні промислові інновації, інноваційні методи виробництва, рівень інтернаціоналізації, обсяги ризикованого капіталу). До зведеного індексу людського розвитку включено показники: рівень освіти, рівень добробуту населення та доступ до здорового способу життя. У статті на основі аналізу та узагальнення наукових робіт із досліджуваної тематики сформовано гіпотезу щодо позитивного впливу бізнес-інновацій на розвиток людського потенціалу. Практична реалізація перевірки сформованої гіпотези здійснено з використанням програмного забезпечення EViews. Визначення динаміки даних, а також перевірку на нормальний розподіл здійснено за допомогою діаграми розсіювання. Дисперсію та лінійне відхилення даних перевірено з використанням стандартизованих залишків. Емпіричні результати дослідження підтверджують наявність статистично значущої позитивної кореляції між ефективністю впровадження бізнес-інновацій та розвитком людського потенціалу. Авторами доведено, що зростання активності підприємницької діяльності та поширення бізнес-інновацій призводить до підвищення рівня індексу людського розвитку. У статті розроблено стратегію просування бізнес-інновацій з метою формування сучасних навичок, підвищення професійної кваліфікації та якості життя населення.

Ключові слова: підприємництво, підприємницька діяльність, показники розвитку людського потенціалу, індекс глобального розвитку підприємництва, індекс людського розвитку, людський потенціал, професійні навички, людські ресурси.

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