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REVIEW OF THE ARTICLE CLAUDIA CAPOZZA & MARIALUISA DIVELLA (2019) "HUMAN CAPITAL AND FIRMS" INNOVATION: EVIDENCE FROM EMERGING ECONOMIES, ECONOMICS OF INNOVATION AND NEW TECHNOLOGY

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Abstract. The article provides an overview of the article Claudia Capozza & Marialuisa Divella (2019) «Human capital and firms' innovation: evidence from emerging economies, Economics of Innovation and New Technology» which explores the relationship between human capital and firm innovation, in emerging economies. The author of the article believes that in order to improve its technological capabilities, the company must invest in various forms of human capital, namely in very high educated staff and experienced managers, but also strategically human resources (HR) aimed at developing human capital by increasing the technical skills and competencies of employees, typical for a particular company. In addition to analyzing the results of innovations, the article focuses on emphasis on strategies for innovative development, as they should signal an improvement in the ability of firms to not only innovate but also own creative efforts in the development of innovations. Research results contrast with the traditional view of firms in emerging economies as relying mainly on external acquisition of innovation, showing their real ability to develop new technologies. In this regard, HR practices aimed at facilitating employee training and independence in work seem to be more important than the educational level of the workers, until the experience of managers seems to be effective.

Keywords: human capital development, innovative companies, enterprise economics, intellectual capital, personnel management

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ОБЗОР СТАТЬИ КЛАУДИА КАПОЦЦА И МАРИАЛУИЗА ДИВЕЛЛА (2019) «ЧЕЛОВЕЧЕСКИЙ КАПИТАЛ И ИННОВАЦИИ ФИРМ: ДАННЫЕ ИЗ СТРАН С РАЗВИВАЮЩЕЙСЯ ЭКОНОМИКОЙ, ЭКОНОМИКИ ИННОВАЦИЙ И НОВЫХ ТЕХНОЛОГИЙ»

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Аннотация. В статье представлен обзор на статью Клаудиа Капоцца и Мариалуиза Дивелла (2019) «Человеческий капитал и фирмы» инновации: данные из стран с развивающейся экономикой, экономики инноваций и новых технологий» где исследуется взаимосвязь между человеческим капиталом и инновациями фирм. в странах с развивающейся экономикой. Автор статьи считает, что для улучшения своих технологических возможностей фирмы должны инвестировать в различные формы человеческого капитала, а именно в очень высокие образованный персонал и опытные менеджеры, но также и в стратегическом кадровые ресурсы (HR), направленные на развитие человеческого капитала путем повышение технических навыков и компетенций сотрудников, характерных для конкретной фирмы. Помимо анализа результатов инноваций, в статье уделяется внимание акценту на стратегии инновационного развития, так как они должны сигнализировать об улучшении способности фирм не только вводить новшества, но и собственные творческие усилия в развитии инноваций. Результаты исследований контрастируют с традиционным взглядом на фирмы в странах с развивающейся экономикой как на в основном полагаясь на внешнее приобретение инноваций, показывая их реальная способность разрабатывать новые технологии. В этом отношении HR практики, направленные на содействие обучению сотрудников и

самостоятельность в работе, кажутся более важными, чем образовательный уровень рабочих, пока опыт менеджеров не кажется эффективным.

Ключевые слова: развитие человеческого капитала, инновационные компании, экономика предприятия, интеллектуальный капитал, управление персоналом

This paper aims at understating whether, and how, different forms of human capital (i.e. education and industry-specific experience) and strategic HR practices aimed at human capital development (i.e. on-job training and participation at work) are related to the innovation performance of firms in emerging economies [1]. Most research consider the formal knowledge developed in R&D laboratories as a major source of innovation, but most of the knowledge required for innovation resides in human resources and is created outside any formalized R&D activity. The article analyzes firms' innovation performance from two perspectives: the type of innovation outcomes and the strategies of innovation development. The authors of the article believe that for the development of innovations within the company it is necessary to invest in various forms of human capital: highly educated workforce and experienced managers, but also in strategic human resource (HR) practices aimed at developing human capital by increasing employees' firm-specific technical skills and competences.Expected results are that HR practices aimed at fostering employees' learning and autonomy at work appear more important for the development of innovation in firms than the educational attainment of workers. The practical application of the research results by the authors is not indicated in the article.

Innovation is associated with an important source of firm productivity and competitiveness and speaks of the country's economic growth. In the literature on innovation at the firm level, there is a tendency to consider innovation as a linear process, largely associated with scientific and technical knowledge developed in research laboratories. Scholars have less attention to the direct contribution of individual workers, which can be pivotal both for the

absorption of new knowledge from the external environment and the internal generation of new knowledge and technologies.The authors contribute to the understanding of "innovation" by expanding this concept. They examine the "human side" of firms, exploring the relationship between human capital and innovation from a broad perspective. Besides, the authors pay great attention to innovation in emerging economies, and most importantly, much attention is paid to innovative development strategies [2]. The authors of the article examine the "human side" of firms, because they believe that in order to improve their technological capabilities, firms should invest in various forms of human capital. When considering countries with developing economies, the authors rely on the results of previous studies and believe that more attention should be paid to the factors of human capital, which, contributing to the accumulation of knowledge, can to innovation. And the authors pay attention to innovative development, because the internal generation of innovation, requiring the exploration, absorption, integration, creation and application of new knowledge and ideas, should be more demanding and high-skill intensive than the acquisition of innovations from external sources, mostly relying on the exploitation, modification and adaptation of existing knowledge and technologies.

From a review of the literature, it was found that the strategies of internal generation of innovation, by requiring the exploration, absorption, creation and application of new knowledge and ideas, should be more demanding and high-skill intensive than strategies based on the acquisition of innovation from external sources and, thus, on exploitation, modification and adaptation of existing knowledge and technologies [3]. Based on this thought, the authors conclude that firms undertaking strategies of internal generation should be with greater technological capabilities and, therefore, closer to the world technology frontier compared to firms relying on strategies of external sourcing. Also, firms in emerging economies do not invest heavily in research and development, their ability to innovate should be more based on specific firms and

people with built-in procedures, skills, capabilities and experience.The process of innovation generation should thus rely on continuous practice and internal and external interactions, namely on learning. This puts the role of knowledge at the centre for firms in emerging economies to be more innovative [4].

The article also reviews literature on the role of human capital. The research investigates the model of intellectual capital which includes three components: human capital (the focus of this study), structural capital and relational capital. A greater emphasis is placed on human capital, which should be developed by firms as a precondition for the development of structural and social capital and serves to produce new knowledge and technologies. The novelty of the consideration of human capital lies in this work in consideration the adoption of strategic HR practices aimed at human capital development by increasing employees' firm-specific technical skills and competences. The forms of human capital are considered in the article through education and previous work experience. The authors of the article agree that higher education can influence the development of innovations, but higher education institutions are not sufficiently developed in comparison with developed countries and therefore are not able to provide people with adequate knowledge and skills corresponding to the level of human capital necessary for firms. Moreover, the previous work experience and its impact on innovation in firms is not well understood. It also requires additional research (which is discussed further in the article).

Based on the reviewed literature on XP practices, the researchers concluded that firm-level HR practices to develop human capital could play a large part in fostering innovation. Thus, it is considered two strategic HR practices aiming at developing human capital by enhancing employees' firm-specific technical skills and competences: the on-job training and the involvement and participation at work.

In addition, the article focuses on the involvement and participation at work of employees, consisting in granting opportunities to employees for using their own ideas and for

exercising discretion over work methods and tasks. In emerging economies, the empowerment of employees through initiatives that give them some freedom and discretion over work pace and tasks positively affects firms' innovation outcomes.

Based on the analyzed literature and studies that have been conducted previously, the following 6 hypotheses are put forward:

Hypothesis1a: Firms in emerging economies with a greater endowment of highly-educated workers are more likely to introduce product and process innovation.

Hypothesis1b: Firms in emerging economies with a greater endowment of highly-educated workers are more likely to internally generate new products and processes instead of relying on external sourcing.

Hypothesis 2a: Firms in emerging economies whose managers have a greater industry-specific experience are more likely to introduce product and process innovation.

Hypothesis 2b: Firms in emerging economies whose manager have a greater industry-specific experience are more likely to internally generate new products and processes instead of relying on external sourcing.

Hypothesis 3a: Firms in emerging economies adopting on-job training are more likely to introduce product and process innovation.

Hypothesis 3b: Firms in emerging economies adopting on-job training are more likely to internally generate new products and processes instead of relying on external sourcing.

Hypothesis 4a: Firms in emerging economies adopting involvement and participation at work are more likely to introduce product and process innovation.

Hypothesis 4b: Firms in emerging economies adopting involvement and participation at work are more likely to internally generate new products and processes instead of relying on external sourcing [5]

For research data are used from the fifth round of the Business Environment and Enterprise Performance Survey (BEEPS V), a firm-level survey based on face-to-face interviews with

managers, conducted in 2012–2014 by the European Bank for Reconstruction and Development (EBRD) and the World Bank. BEEPS V provides detailed information on innovative activities, organization practices, management and employees, besides other general information on firms. Based on this survey, the authors identify types of innovation: innovations aimed at reducing costs (innovation process) and innovations aimed at increasing the range of goods and services and entering new markets (product innovations, especially if they are new in the market). Based on the survey, the authors construct significant variables for the type of innovative result and degree of novelty in innovative products, as well as for innovative development strategies. New product innovation for the company - the variable is 1, if the company has introduced new or significantly improved products or services over the past three years.If this has not happened, the variable is 0. Also, the innovation of a new product on the market is equal to 1 if the company within the last three years has introduced new or significantly improved products or services that are new to the market of the company, 0 otherwise. And, if process innovation gains value 1, if the company has introduced new or significantly improved methods of production or delivery of goods or services over the past three years, 0 otherwise.

Turning to the strategies of innovative development, the following dependent variables are built: The binary variable is equal to 1 if the company introduced product and / or technological innovation by developing or adapting it from its own ideas, 0 otherwise, binary variable equal to 1 if the company introduced product and / or process innovation, developing it in collaboration with other companies, 0 otherwise. As the authors note, these two variables determine the generation of innovations within the company or partially together with other firms. If the company uses an external source to form innovations, then the binary variable is 1, if the company: introduced the innovation of a product and / or process by acquiring a license from another company; implemented its own version of a product or service already supplied by another

company; or bought a new machine or equipment to adopt new technology, 0 otherwise.

To test hypotheses 1a and 1b, such indicators are used as education, the percentage of permanent staff working full time (employees and managers) with higher education, the amount of knowledge embodied in the human resources of firms is measured. In order to test hypothesis 2a and 2b, a variable industry experience is used, namely, the number of years of senior manager experience in the industry of the same company. To test hypotheses 3a and 3b, the indicator on-the-job training is introduced, a binary variable equal to 1 if the company has official training programs for its permanent full-time employees, 0 if it does not. Finally, in order to test hypotheses 4a and 4b, the indicator "participation in labor" turns on, a binary variable equal to 1 if the company has given employees time over the past three years to develop or test a new approach or new idea about products or services, business process, company management or marketing, 0 otherwise.

In addition to these indicators, the authors will also include additional ones that may affect the innovativeness of firms. Indicator q is introduced, if the company spent money over the past 3 years on research and development, then value1 and value 0 are given if this was not done. The binary variable fixed capital is also included, taking the value 1 if the company acquired any fixed assets, such as cars, vehicles, equipment, land or buildings, 0 otherwise. The indicator turns on the credit line and takes the value 1, if the company has a credit line or a loan from a financial institution, 0 otherwise. The authors include the Exporter binary variable, which takes the value 1 if the company is engaged in export activity, 0 otherwise. It also takes into account the size of the enterprise, its location and industry models.

In order to analyze various forms of human capital and a strategic approach to company innovation, this article uses multidimensional probity model. The multidimensional modeling approach allows predicting several correlated binary outcomes and monitoring for potential correlation of error terms. This is important

for this study, since its purpose is to identify the factors of the "human side" associated with innovation, and whether these factors differ in the type of results of innovation and innovation development strategies.

To ascertain the appropriateness of the multivariate approach, we perform the likelihood ratio test on the null hypothesis that the correlation coefficients ρ of the error terms are jointly equal to zero. The rejection of the null indicates that the multivariate probit model is preferred to the univariate probit model.

The authors define the following equation linking key explanatory factors and controls with the likelihood that a firm is involved in three types of innovation outcomes: yih = x′ih bh + 1ih (1) yih is a binary variable that gives one of three kinds of innovation outcome, where h indicates the type: innovation of a novelty for a product; innovation process of an innovative product [5].

And the authors define the following equation for the study, linking key explanatory factors and controls with the likelihood that the firm is participating in three innovative development strategies: yis = x ′ is bs + 1is (1) y is is a binary indicator of whether the firm has is developed innovations in products and / or processes according to one of three strategies, where s denotes a strategy: generation within the company, generation in cooperation and an external source [5].

In this study, the following data were obtained:

hypothesis 1a is partially confirmed, since the "education" variable is positively associated with two types of innovation, namely innovation in new products and innovation in new products. However, education does not affect the process of innovation in general, but is associated with product innovation.

Hypothesis 2a is not confirmed, because industry experience is in no way associated with any type of innovation

Hypothesis 3a is confirmed, since variable training at the workplace is positively and significantly associated with all three types of innovative outcomes. And hypothesis 4a is strictly supported, since the incentive for employees to effectively use their

knowledge and express “creative efforts” in doing work helps firms introduce all kinds of innovations. Thus, the ability of firms to innovate is more closely linked to employment and the development of human potential created by a participatory work environment.

The above hypotheses 1b and 2b are not confirmed, since education and industry experience are not associated with any of the three innovative development strategies

Hypothesis 3b is partially supported because The Variable On-job training is positively and significantly associated with two of three strategies of innovation development, the Generation in cooperation and the External sourcing, but it is not associated with the Generation in-house.

Finally, 4b is strictly supported, since the variable “Participation in work” is positively and significantly associated with all three innovative development strategies. The variable Fixed assets is positively and significantly associated with all the three strategies of innovation development, especially with External sourcing, showing the greatest coefficient’s size. This supports the trade of new technologies embodied in physical capital constituting the most important channel for innovation diffusion. The variable Age is positively and significantly associated with one of the three strategies of innovation development, the Generation in cooperation. Hence, the capacity of firms to develop innovations cooperating with other firms or institutions seems to increase with the years of business operation. It is likely becausefirms can establish stronger partnerships, and workers can expand their established technological competences (accumulated knowledge and expertise) to exploit and build upon.

The limitations of our empirical analysis are given by the cross-sectional nature of the data and by the simultaneity of innovative output and input variables.

To conclude, results related to the impact of education on innovation in firms are not well-reasoned.

Here, what seems to be taken into consideration is the level of a higher educational institution, as well as the profile of the company and the correlation of the acquired specialty and position.

Concerning the doubtful results, they could be summed up as the lack of the influence of the previous work experience on innovation, .and as an opinion, there is a need to explore this issue in more detail, since this study focuses only on the managerial work experience, without affecting other areas of the market.

This study turned out to be an interesting one and it should be carried out among the Russian market. For example, you can compare the factors that influence innovation in state and commercial firms. You can study the case of the middle and senior managers, perhaps their career path and the factors that influenced their career progress and what contribution was made to the work of the company.

In addition to using the results of this study, you can conduct another study in a specific area, for example, in the field of education and studying the factors that influence the emergence of new teaching methods that can be called innovative. Among the limitations of the study, it was not mentioned that a short period of time was selected from the BEEPS V survey, but it worth's keeping an eye on the areas of the firms in which the study was conducted were not differentiated.in other words different factors will influence innovation development in different market sectors. It was not indicated with what level of staff the interview was conducted.

Actually it would be worthwhile to pay great attention to the topic of training in the organization, as the development of time and training technologies, new methods of personnel training appear, which can also serve as a tool of development for human capital and thus helping firms to reach a new level of innovation.

References

1. *Weterings, A., and S. Koster*. 2007. "Inheriting Knowledge and Sustaining Relationships: What Stimulates the Innovative

Performance of Small Software Firms in the Netherlands?" Research Policy 36 (3): 320–335.

2. *Becker, G.S.* 1994. Human Capital. A Theoretical and Empirical Analysis, with Special Reference to Education. 3rd ed. Chicago, IL: The University of Chicago Press.

3. *March, J.G.* 1991. "Exploration and Exploitation in Organizational Learning." Organization Science 2 (1): 71–87.

4. *Parrilli, M.D., and H. Alcalde Heras*. 2016. "STI and DUI Innovation Modes: Scientific-technological and Context-specific Nuances." Research Policy 45 (4): 747–756.

5. *Claudia Capozza & Marialuisa Divella* (2019) Human capital and firms' innovation: evidence from emerging economies, Economics of Innovation and New Technology, 28:7, 741-757

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