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Interactions between flows of human resources in functional regions and flows of inventories in dynamic processes of global supply chains

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Abstract: According to the Ageing Report 2015 (EC, 2015), the number of workers in Europe will decline for 20 million by 2060. The question thus arises how this shrinking pool of workers unequally dispersed in the European regions will influence the competitiveness and profitability of global supply chains and location of the production and distribution nodes. Within the human resource market, commuting costs are compensated, thus influencing wage rates and/or land rent, capitalised in the value of residential properties. These aspects influence the total costs of human resources in the activity cells of supply chains and the stream of profit achieved in a chain. The corporation, whose activity cells are located in the local area which is a net importer of human resources, has to pay higher average wages than the corporation, whose facilities are located in the district from which the labour is exported. If higher wages do not cover these differences, they create incentives to commute into other functional regions. The edges of the functional regions are the lines from which human resources are indifferent regarding commuting to a given central place where the activity cell is located or in the competing central place. These indifference curves move as relative wages change. Therefore, those planning the location and intensity of activities in the nodes of a supply chain should consider the influence of the required level of wages, which depends on the spatial dispersion of dwellings of workers. So, the intensity of the flow of items (inventories in the process) and intensity of the inflow of human resources interact in the area in which the activity cell is located and influence the profit of corporations. Therefore, our aim is to present an innovative approach to the integration of the gravity model of spatially dispersed human resources with the supply systems described by extended MRP Theory. Here the dynamics of delineation of functional regions is assumed to respond immediately to the changes in the differences between wages and commuting costs, which is also a novelty of this compound model. In our study, these two analytical models interact and merge in the compact form for studying the profitability of activities under the volatile intensity of the production flows; this represents a new approach to the evaluation of the present value of chain. Our method enables us to evaluate an expected long-term stream of profit. This is an important tool for managers and owners, who might have different options regarding where to place and invest in an activity cell. They can forecast the influences of the localities and wages on the profit stream before deciding to open or to close and to intensify or not their activities in the particular central place of a functional region.

Keywords: Human resources, Functional region, MRP theory, Supply chain, Location, Central places.

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