

Geographic Information Systems and a Breath of Opportunities for Supply Chain Management: Results from a Systematic Literature Review

Authors : Anastasia Tsakiridi

Abstract : Geographic information systems (GIS) have been utilized in numerous spatial problems, such as site research, land suitability, and demographic analysis. Besides, GIS has been applied in scientific fields like geography, health, and economics. In business studies, GIS has been used to provide insights and spatial perspectives in demographic trends, spending indicators, and network analysis. To date, the information regarding the available usages of GIS in supply chain management (SCM) and how these analyses can benefit businesses is limited. A systematic literature review (SLR) of the last 5-year peer-reviewed academic literature was conducted, aiming to explore the existing usages of GIS in SCM. The searches were performed in 3 databases (Web of Science, ProQuest, and Business Source Premier) and reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) methodology. The analysis resulted in 79 papers. The results indicate that the existing GIS applications used in SCM were in the following domains: a) network/ transportation analysis (in 53 of the papers), b) location - allocation site search/ selection (multiple-criteria decision analysis) (in 45 papers), c) spatial analysis (demographic or physical) (in 34 papers), d) combination of GIS and supply chain/network optimization tools (in 32 papers), and e) visualization/ monitoring or building information modeling applications (in 8 papers). An additional categorization of the literature was conducted by examining the usage of GIS in the supply chain (SC) by the business sectors, as indicated by the volume of the papers. The results showed that GIS is mainly being applied in the SC of the biomass biofuel/wood industry (33 papers). Other industries that are currently utilizing GIS in their SC were the logistics industry (22 papers), the humanitarian/emergency/health care sector (10 papers), the food/agro-industry sector (5 papers), the petroleum/ coal/ shale gas sector (3 papers), the faecal sludge sector (2 papers), the recycle and product footprint industry (2 papers), and the construction sector (2 papers). The results were also presented by the geography of the included studies and the GIS software used to provide critical business insights and suggestions for future research. The results showed that research case studies of GIS in SCM were conducted in 26 countries (mainly in the USA) and that the most prominent GIS software provider was the Environmental Systems Research Institute's ArcGIS (in 51 of the papers). This study is a systematic literature review of the usage of GIS in SCM. The results showed that the GIS capabilities could offer substantial benefits in SCM decision-making by providing key insights to cost minimization, supplier selection, facility location, SC network configuration, and asset management. However, as presented in the results, only eight industries/sectors are currently using GIS in their SCM activities. These findings may offer essential tools to SC managers who seek to optimize the SC activities and/or minimize logistic costs and to consultants and business owners that want to make strategic SC decisions. Furthermore, the findings may be of interest to researchers aiming to investigate unexplored research areas where GIS may improve SCM.

Keywords : supply chain management, logistics, systematic literature review, GIS

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